FUEL TECH, INC.
Form 10-K
March 14, 2019
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SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form 10-K
(Mark One)
ý ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended: December 31, 2018
OR

¨ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to
Commission File Number 001-33059

Fuel Tech, Inc.
(Exact name of registrant as specified in its charter)

Delaware	20-5657551
(State of Incorporation)	(I.R.S. ID)

Fuel Tech, Inc.
27601 Bella Vista Parkway
Warrenville, IL 60555-1617
(630) 845-4500
www.ftek.com
Securities registered pursuant to Section 12(b) of the Act:

COMMON STOCK, $0.01 par value per share	NASDAQ

Securities registered pursuant to 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 ý
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Exchange Act. Yes ¨ No ý
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 ý 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 (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ý No ¨
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) 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, smaller reporting company, or an emerging growth company. See definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company,” and “emerging growth company” in Rule 12b-2 of the Exchange Act. (Check one):

Large Accelerated Filer	¨	Accelerated Filer	¨
Non-accelerated Filer	ý	Smaller reporting company	ý
Emerging growth company	¨		

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. Yes ¨ No ¨

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

As of June 30, 2018, the aggregate market value of the registrant's common stock held by non-affiliates of the registrant was approximately $23,336,583 based on the closing sale price as reported on the NASDAQ National Market System.

As of February 28, 2019, there were 24,186,824 shares of common stock outstanding.

Documents incorporated by reference:

Portions of the definitive Proxy Statement to be delivered to shareholders in connection with the Annual Meeting of Shareholders to be held on May 16, 2019 are incorporated by reference into Part III.

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TABLE OF DEFINED TERMS

Term	Definition
ACE	
AIG	Ammonia Injection Grid
ASCR™	A trademark used to describe our Advanced Selective Catalytic Reduction process
CAIR	Clean Air Interstate Rule
CSAPR	Cross-State Air Pollution Rule
CFD	Computational Fluid Dynamics
EPA	The U.S. Environmental Protection Agency
ESP	Electrostatic Precipitator
FGC	Flue Gas Conditioning
FUEL CHEM®	A trademark used to describe our fuel and flue gas treatment processes, including its TIFI® Targeted In-Furnace Injection™ technology to control slagging, fouling, corrosion and a variety of sulfur trioxide-related issues
GSG™	Graduated Straightening Grid
HERT™ High Energy Reagent Technology™	A trademark used to describe one of our SNCR processes for the reduction of NOx
I-NOx®	Systems can include LNB, OFA, and SNCR components, along with SCR technology, Ammonia Injection Grid (AIG), and Graduated Straightening Grid (GSG™) system
NO_x	Oxides of nitrogen
NO_xOUT®	A trademark used to describe one of our SNCR processes for the reduction of NOx
NO_xOUT-SCR®	A trademark used to describe our direct injection of urea as a catalyst reagent
NO_xOUT-CASCADE®	A trademark used to describe our process for the combination of SNCR and SCR technologies
SCR	Selective Catalytic Reduction
SNCR	Selective Non-Catalytic Reduction
TIFI® Targeted In-Furnace Injection™	A trademark used to describe our proprietary technology that enables the precise injection of a chemical reagent into a boiler or furnace as part of a FUEL CHEM program
UDI™	Urea Direct Injection as the process to provide urea reagent directly into a duct for SCR applications
ULTRA®	A trademark used to describe our process for generating ammonia for use as a Selective Catalytic Reduction reagent
BREF	Best Available Reference Technology. European emission requirements.
ACE	Affordable Clean Energy. EPA rule to address greenhouse gas emissions.
DGI™	Dissolved Gas Infusion
BACT	Best Available Control Technology

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PART I

Forward-Looking Statements

This Annual Report on Form 10-K contains "forward-looking statements," as defined in Section 21E of the Securities Exchange Act of 1934, as amended, that are made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 and reflect our current expectations regarding our future growth, results of operations, cash flows, performance and business prospects, and opportunities, as well as assumptions made by, and information currently available to, our management. We have tried to identify forward-looking statements by using words such as "anticipate," "believe," "plan," "expect," "intend," "will," and similar expressions, but these words are not the exclusive means identifying forward-looking statements. These statements are based on information currently available to us and are subject to various risks, uncertainties, and other factors, including, but not limited to, those discussed herein under the caption "Risk Factors" that could cause our actual growth, results of operations, financial condition, cash flows, performance and business prospects and opportunities to differ materially from those expressed in, or implied by, these statements. Except as expressly required by the federal securities laws, we undertake no obligation to update such factors or to publicly announce the results of any of the forward-looking statements contained herein to reflect future events, developments, or changed circumstances or for any other reason. Investors are cautioned that all forward-looking statements involve risks and uncertainties, including those detailed in our filings with the Securities and Exchange Commission. See "Risk Factors" in Item 1A.

ITEM 1 - BUSINESS

As used in this Annual Report on Form 10-K, the terms "we," "us," or "our," refer to Fuel Tech, Inc. and our wholly-owned subsidiaries.

GENERAL

We are a leading technology company engaged in the worldwide development, commercialization and application of state-of-the-art proprietary technologies for air pollution control, process optimization, water treatment and advanced engineering services. These technologies enable our customers to operate efficiently in a cost-effective and environmentally sustainable manner.

- The Company's nitrogen oxide (NO_x) reduction technologies include advanced combustion modification techniques and post-combustion NO_x control approaches, including NO_xOUT®, HERT™, and Advanced SNCR systems, ASCR™ Advanced Selective Catalytic Reduction systems, and I-NO_x® Integrated NO_x Reduction Systems, which utilize various combinations of these systems, along UDI™ Urea Direct Injection system for SCR reagent supply, and the ULTRA® process for safe ammonia generation. These technologies have established Fuel Tech as a leader in NO_x reduction, with installations on over 900 units worldwide.

- Fuel Tech's APC technologies include particulate control with Electrostatic Precipitator (ESP) products and services including complete turnkey capability for ESP retrofits, with experience on units up to 700 MW. Flue gas conditioning (FGC) systems include treatment using sulfur trioxide (SO_3) and ammonia (NH_3) based conditioning to improve the performance of ESPs by modifying the properties of fly ash particles. Fuel Tech's particulate control technologies have been installed on more than 125 units worldwide.

- Our FUEL CHEM technologies revolve around the unique application of chemical injection programs which improve the efficiency, reliability, fuel flexibility, boiler heat rate and environmental status of combustion units by controlling slagging, fouling, corrosion, opacity and acid plume, as well as the formation of sulfur trioxide, ammonium bisulfate, particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), and carbon dioxide (CO_2). We use our patented TIFI® Targeted In-Furnace Injection™ processes to apply specialty chemical programs to units burning a wide variety of fuels including coal, heavy oil, biomass, and municipal waste. These TIFI programs incorporate design, modeling, equipment, reagent, and service to provide complete customized on-site programs designed to improve plant operations and provide a return on investment in addition to helping meet emission regulatory requirements.

- Water treatment technologies include DGI™ Dissolved Gas Infusion Systems which utilize a patented nozzle to provide a competitive advantage over conventional utility and industrial aeration. An innovative alternative to current aeration technology among other applications, DGI systems can deliver supersaturated oxygen solutions and other gas-water combinations to target process applications or environmental issues. This infusion process has a variety of applications in the water and wastewater industries, including remediation, treatment, biological activity and wastewater odor management. DGI technology benefits include reduced energy consumption, installation costs, and operating costs, while improving treatment performance.

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Many of our products and services rely heavily on our computational fluid dynamics and chemical kinetics modeling capabilities, which are enhanced by internally developed, high-end visualization software. These capabilities, coupled with our innovative technologies and multi-disciplined team approach, enable us to provide practical solutions to some of our customers' most challenging issues.

AIR POLLUTION CONTROL

Regulations and Markets: Domestic

The continued growth of our APC technology segment is dependent upon the adoption and enforcement of environmental regulations in the U.S. and globally. In the U.S., federal and state laws regulating the emission of NO_x are the primary driver in our APC technology segment. The principal regulatory drivers currently in effect are as follows:

Clean Air Act: The Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to establish national ambient air quality standards (NAAQS) at levels that are protective of public health with an adequate margin of safety. The six pollutants specified include: Ozone (O_3), Particulate Matter (PM), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), Lead, and Carbon Monoxide (CO). The NAAQS provisions require that states comply with ozone and particulate emissions standards. NO_x emissions are a precursor to ozone formation and also contribute to fine particulate emissions ($PM_{2.5}$), which has been the recent regulatory driver through the Cross-State Air Pollution Rule (CSAPR). NO_x emissions were targeted as contributors to fine particulate emissions and ozone emissions. Since 1990, programs have been established by the EPA at the regional and federal level to help states in their mission to define and meet their State Implementation Plans (SIPs) for attainment. NAAQS PM standards were issued in 1997, with more stringent standards issued in 2006 and 2012. The NAAQS ozone standards issued in 1997 were made more stringent in 2008. On October 1, 2015, the EPA strengthened the NAAQS for ground-level ozone by reducing the minimum acceptable level from 75 to 70 parts per billion (ppb). Implementation of the 2015 NAAQS standards started in 2018 with finalization of the area designations. A number of Eastern States are considering NOx reduction system upgrades for existing sources to meet the 70 ppb requirement.

Cross-State Air Pollution Rule (CSAPR): In 2011, the Environmental Protection Agency passed the Cross-State Air Pollution Rule (CSAPR) under the “good neighbor” provision of the Clean Air Act to reduce emissions of SO_2 and NO_x from power plants in the eastern half of the United States. Under CSAPR, state emission caps were designated to mitigate the emission impact on downwind states by controlling emissions from upwind states. If sources within a state caused the state to exceed its assurance limit, severe penalties including a two-for-one reduction based on each source’s contribution percentage of the state overage would be applied. The timing of CSAPR's implementation has been affected by a number of court actions. In December 2011, CSAPR was stayed prior to implementation due to lawsuits filed by various states and combustion sources, and in August 2012 the U.S. Circuit Court of Appeals, D.C. Circuit, vacated CSAPR and remanded it to the EPA. The U.S. Supreme Court reversed that decision in April 2014. Following the remand of the case to the D.C. Circuit, the EPA requested that the court lift the CSAPR stay and toll the CSAPR compliance deadlines by three years. In October 2014, the D.C. Circuit granted the EPA's request and, accordingly, CSAPR Phase 1 implementation commenced in 2015, with Phase 2 implementation starting in 2018 for the May to September ozone season, one year later than originally planned.

Clean Air Visibility Rule (CAVR): The Clean Air Visibility Rule (CAVR), also known as the Regional Haze rule, is part of the Clean Air Act and was finalized in 2005. Under CAVR, certain States are required to submit implementation plans to the EPA to comply with the Regional Haze requirements, and updates are required every five years. A new CAVR was issued in January 2017 which requires states to implement new air pollution controls by 2021. The overall obligation of CAVR is to return the US scenic areas to “active” visibility by 2064.

New Unit Permits: New gas fired units for both electricity generation and industrial use will require BACT technology as a permit requirement. SCR technology is very often BACT for NOx, and these permit requirements generate new market opportunities.

Consent Decrees: Consent decree activity through the US Department of Justice or EPA may require emission sources to meet individual requirements. Sources may also agree to specific air pollution requirements with states or environmental groups.

Regulations and Markets: International

We also sell NO_x control systems outside the United States, specifically in Europe, Latin America, India (under a license agreement) and in the Pacific Rim, including the People's Republic of China (China). The demand for our technologies comes from specific governmental regulations in NOx and PM emission limits which vary by country. We expect that there will be further opportunities to implement our technologies globally in established as well as new geographies in 2019.

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In China, the implementation of the ultra-low emission rules first announced in 2015, is close to completion on large utility boilers and the focus has now shifted to the industrial sector where low-cost local suppliers are well established and preferred. We anticipate that Fuel Tech's technologies will encounter significant price competition in this sector, and will only be sought after occasionally by clients in critical process industries such as petro-chemical and LCD manufacturing, who value high performance over low cost.

The European Union published the BREF (Best Available Reference Technology) emission guidelines in mid 2017 that further lowered emission targets over a span of the next four years. These measures are expected to lower the environment impact of more than 3,000 large combustion plants throughout the European Union. Moreover, European countries that are not current EU members are expected to adopt these new standards as part of their approach to gain EU membership. Despite the significant expansion of renewable energy throughout Europe, the EU and neighboring states still rely heavily on coal generation to provide a stable base load to their power and heating demands. The BREF guidelines reduce NOx limit values by up to 25% which will require an upgrade of first generation NOx abatement systems, and that is expected to present new opportunities for Fuel Tech. However, the place of implementation will still be dependent on each country's internal processes.

The Indian government's initial compliance deadline of December 2017 has been delayed, but adoption of emission control technologies has started and it is expected to progress at a faster pace in 2019. After a wave of FGD implementation to address SOx, the focus is now shifting to NOx and PM control. This shift is expected to result in a higher demand for Fuel Tech's SNCR and flue gas conditioning technologies, which will be implemented through a collaboration with our local partner ISGEC.

Elsewhere in Southeast Asia, particulate emissions due to poor performing ESPs have been gaining attention by local authorities. Power generators in several countries like Vietnam, Malaysia and the Philippines are actively looking for corrective options and this presents Fuel Tech with opportunities to bring our DFGC technology to these markets.

Products

Our NO_x reduction and particulate control technologies are installed worldwide on over 1,000 combustion units, including utility, industrial and municipal solid waste applications. Our products include customized NO_x control systems and our patented ULTRA®technology, which converts urea-to-ammonia on site and provides safe reagent for use in Selective Catalytic Reduction (SCR) systems.

- SNCR Systems: Our NO_xOUT® and HERT™ SNCR processes use non-hazardous urea as the reagent rather than ammonia. Both the NO_xOUT® and HERT™ processes on their own are capable of reducing NO_x by up to 25% - 50% for utilities and by potentially significantly greater amounts for industrial units in many types of plants with capital costs ranging from $5 - $20/kW for utility boilers and with total annualized operating costs ranging from $1,000 - $2,000/ton of NO_x removed. Advanced SNCR systems are also available to improve performance and minimize reagent costs through in-furnace monitoring and an advanced control system.

- I-NOx® Systems: Our I-NOx® systems can include LNB, OFA, and SNCR components, along with SCR technology, Ammonia Injection Grid (AIG), and Graduated Straightening Grid (GSG™) system. Together, these systems provide up to 90% NO_x reduction at significantly lower capital and operating costs than conventional SCR systems while providing greater operational flexibility to plant operators. The capital costs for I-NOx® systems can range from $30 - $150/kW depending on boiler size and configuration, which is significantly less than that of conventional SCRs, which can cost $300/kW or more, while operating costs are competitive with those experienced by SCR systems. Our SCR systems utilize urea or ammonia as the SCR catalyst reagent to achieve NO_x reductions of up to 85% from industrial combustion sources.

- ULTRA Technology: Our ULTRA® process is designed to convert urea to ammonia safely and economically for use as a reagent in the SCR process for NO_x reduction. Recent local objections in the ammonia permitting process have raised concerns regarding the safety of ammonia shipment and storage in quantities sufficient to supply SCR. In

addition, the Department of Homeland Security has characterized anhydrous ammonia as a Toxic Inhalation Hazard commodity. Our ULTRA® process is believed to be a market leader for the safe conversion of urea to ammonia just prior to injection into the flue gas duct, which is particularly important near densely populated cities, major waterways, harbors or islands, or where the transport of anhydrous or aqueous ammonia is a safety concern. Ammonia feed systems provide reagent flexibility for SCR reagent feed system, while our UDI™ Urea Direct Injection systems utilize direct injection of reagent without the need for an ammonia injection grid.

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SCR Processes and Services: Our SCR group provides process design optimization, performance testing and improvement, and catalyst selection services for SCR systems on coal-fired boilers. In addition, other related services, including start-ups, maintenance support and general consulting services for SCR systems, Ammonia Injection Grid design and tuning to help optimize catalyst performance, and catalyst management services to help optimize catalyst life, are now offered to customers around the world. We also specialize in computational fluid dynamics models, which simulate fluid flow by generating a virtual replication of real-world geometry and operating inputs. We design flow corrective devices, such as turning vanes, ash screens, static mixers and our patented GSG® Graduated Straightening Grid. Our models help clients optimize performance in flow critical equipment, such as selective catalytic reactors in SCR systems, where the effectiveness and longevity of catalysts are of utmost concern. The Company's modeling capabilities are also applied to other power plant systems where proper flow distribution and mixing are important for performance, such as flue gas desulfurization- scrubbers, electrostatic precipitators, air heaters, exhaust stacks and carbon injection systems for mercury removal.

ESP Processes and Services: ESP technologies for particulate control include Electrostatic Precipitator (ESP) products and services including ESP Inspection Services, Performance Modeling, and Performance and Efficiency Upgrades, along with complete turnkey capability for ESP retrofits. Flue gas conditioning (FGC) systems include treatment using sulfur trioxide (SO_3) and ammonia (NH_3) based systems to improve the performance of ESPs by modifying the properties of the fly ash particle. Our ULTRA technology can provide the ammonia system feed requirements for FGC applications as a safe alternative to ammonia reagent based systems. FGC systems offer a lower capital cost approach to improving ash particulate capture versus the alternative of installing larger ESPs or utilizing fabric filter technology to meet targeted emissions and opacity limits. Fuel Tech's particulate control technologies have been installed on more than 125 units worldwide.

Burner Systems: Low NO_x Burners and Ultra Low NO_x Burners (LNB and ULNB) are available for coal-, oil-, and gas-fired industrial and utility units. Each system application is specifically designed to maximize NO_x reduction. Computational fluid dynamics combustion modeling is used to validate the design prior to fabrication of equipment. NO_x reductions can range from 40%-60% depending on the fuel type. Over-Fire Air (OFA) systems stage combustion for enhanced NO_x reduction. Additional NO_x reductions, beyond Low NO_x Burners, of 35% - 50% are possible on different boiler configurations on a range of fuel types. Combined overall reductions range from 50% - 70%, with overall capital costs ranging from $10 - $20/kW and total costs ranging from $300 - $1,500/ton of NO_x removed, depending on the scope.

A key market dynamic for the APC product line is the continued use of coal for global electricity production. Coal currently accounts for approximately 30% of all U.S. electricity generation and roughly 69% of Chinese electricity generation. Major coal consumers include China, the United States and India. The growth of natural gas in the U.S. for industrial applications has increased the need for SCR technology since it often meets the definition of Best Available Control Technology and is required on new industrial units.

Sales of APC products were $38.4 million, $27.8 million, and $34.1 million for the years ended December 31, 2018, 2017 and 2016, respectively.

APC Competition

Competition with our NO_x reduction suite of products may be expected from companies supplying SCR Systems and ammonia SNCR Systems, urea SNCR systems, ESP retrofits and FGC technologies. In addition, we experience competition in the urea-to-ammonia conversion market.

The SCR process is an effective and proven method of control for removal of NO_x up to 90%. SCR systems have a high capital cost of $300+/kW on retrofit coal applications. Such companies as GE, Babcock Power, Babcock & Wilcox (B&W) Company, CECO Environmental and Mitsubishi Hitachi, are active SCR system and reagent feed system providers.

The use of both urea and ammonia as the reagent for the SNCR process can reduce NO_x by 30% - 70%, depending on a number of factors. Ammonia can be effective on incinerators and on Circulating Fluidized Bed combustion units, but has limited applicability for most utility boilers, where urea is dominant. Both urea and ammonia SNCR system capital costs range from $5 - $20/kW, with annualized operating costs ranging from $1,000 - $3,000/ton of NO_x removed. The ammonia-based systems utilize either anhydrous or aqueous ammonia, both of which are hazardous substances. Competitors for ammonia based SNCR include CECO Environmental, B&W, and Wahlco, with Hamon and B&W for urea based SNCR systems.

ESP retrofit competitors include B&W, Southern Environmental and Hamon. Flue Gas Conditioning competition includes Wahlco, Inc. and Chemithon, Inc.

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Lastly, with respect to urea-to-ammonia conversion technologies, a competitive approach to our controlled urea decomposition system competes with Wahlco, Inc., which manufactures a system that hydrolyzes urea under high temperature and pressure.

APC Backlog

Consolidated APC segment backlog at December 31, 2018 was $12.4 million versus backlog at December 31, 2017 of $22.1 million. A substantial portion of the backlog as of December 31, 2018 should be recognized as revenue in fiscal 2019, although the timing of such revenue recognition in 2019 is subject to the timing of the expenses incurred on existing projects.

FUEL CHEM

Product and Markets

The FUEL CHEM® technology segment revolves around the unique application of specialty chemicals to improve the efficiency, reliability and environmental status of plants operating in the electric utility, industrial, pulp and paper, waste-to-energy, and university and district heating markets. FUEL CHEM programs are currently in place on combustion units in North America, Mexico and Europe, treating a wide variety of solid and liquid fuels, including coal, heavy oil, black liquor, biomass and municipal waste.

Central to the FUEL CHEM approach is the introduction of chemical reagents, such as magnesium hydroxide, to combustion units via in-body fuel application (pre-combustion) or via direct injection (post-combustion) utilizing our proprietary TIFI® technology. By attacking performance-hindering problems, such as slagging, fouling and corrosion, as well as the formation of sulfur trioxide (SO_3), and ammonium bisulfate (ABS), our programs offer numerous operational, financial and environmental benefits to owners of boilers, furnaces and other combustion units.

A key market dynamic for this product line is the continued use of coal for global electricity production. Coal currently accounts for approximately 30% of all U.S. electricity generation and roughly 69% of Chinese electricity generation. Major coal consumers include the United States, China and India. Additional market dynamics include a growing, worldwide utilization of biomass for both steam and electrical production, as well as the strengthening of the pulp and paper industry worldwide, resulting in black liquor recovery boilers needing to maximize throughput. A new potential driver in the US is the Affordable Clean Energy (ACE) Rule issued by EPA in 2018 as a replacement for the Clean Power Plan which EPA has repealed. This Rule calls for the use of a wide range of available boiler heat rate improvement technologies to improve efficiency to reduce greenhouse gas emissions.

The principal markets for this product line are electric power plants burning coals with slag-forming constituents such as sodium, iron and high levels of sulfur. Sodium is typically found in the Powder River Basin coals of Wyoming and Montana. Iron is typically found in coals produced in the Illinois Basin region. High sulfur content is typical of Illinois Basin coals and certain Appalachian coals. High sulfur content can give rise to unacceptable levels of SO_3 formation especially in plants with SCR systems and flue gas desulphurization units (scrubbers). As coal units strive to compete in electricity supply markets, lower cost, higher slagging fuels can create more operational challenges which TIFI Programs can help mitigate.

The combination of slagging coals and SO_3-related issues, such as “blue plume” formation, air pre-heater fouling and corrosion, SCR fouling and the proclivity to suppress certain mercury removal processes, represents an attractive market potential for Fuel Tech.

Sales of the FUEL CHEM products were $18.1 million, $17.4 million, and $21.1 million for the years ended December 31, 2018, 2017 and 2016, respectively.

Competition

Competition for our FUEL CHEM product line includes chemicals sold by specialty chemical companies, such as Imerys, Environmental Energy Services, Inc., and SUEZ Water Technologies. No technologically comparable substantive competition currently exists for our TIFI technology, which is designed primarily for slag control and SO_3

abatement, but there can be no assurance that such lack of substantive competition will continue.

INTELLECTUAL PROPERTY

The majority of our products are protected by U.S. and non-U.S. patents. We own 53 granted patents worldwide and 15 allowed utility model patents in China. We have 15 patent applications pending; including 4 in the United States and 11 in non-U.S. Jurisdictions. These patents and applications cover some 29 inventions, 16 associated with our NO_x reduction business, 12 associated with the FUEL CHEM business, and one associated with water treatment. Our granted patents have expiration dates ranging from October of 2019 to October of 2035.

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Management believes that the protection provided by the numerous claims in the above referenced patents or patent applications is substantial, and afford us a significant competitive advantage in our business. Accordingly, any significant reduction in the protection afforded by these patents or any significant development in competing technologies could have a material adverse effect on our business.

EMPLOYEES

At December 31, 2018, we had 113 employees, 82 in North America, 23 in China and eight in Europe. We enjoy good relations with our employees and are not a party to any labor management agreement.

RELATED PARTIES

Douglas G. Bailey, a member of our Board, is a stockholder of American Bailey Corporation (ABC), which is a related party. Please refer to Note 11 to the consolidated financial statements in this Form 10-K for information about our transactions with ABC. Additionally, see the more detailed information relating to this subject under the caption "Certain Relationships and Related Transactions" in our definitive Proxy Statement to be distributed in connection with our 2019 Annual Meeting of Stockholders, which information is incorporated by reference.

AVAILABLE INFORMATION

We are a fully integrated company using a suite of advanced technologies to provide boiler optimization, efficiency improvement and air pollution reduction and control solutions to utility and industrial customers worldwide. Originally incorporated in 1987 under the laws of the Netherlands Antilles as Fuel-Tech N.V., we were domesticated in the United States on September 30, 2006, and continue as a Delaware corporation with our corporate headquarters at 27601 Bella Vista Parkway, Warrenville, Illinois, 60555-1617. Fuel Tech maintains an Internet website at www.ftek.com. Our Annual Report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and any amendments to those reports filed or furnished pursuant to Section 13(a) of the Exchange Act are made available through our website as soon as reasonably practical after we electronically file or furnish the reports to the Securities and Exchange Commission. Our website also contains our Corporate Governance Guidelines and Code of Ethics and Business Conduct, as well as the charters of the Audit, Compensation, and Nominating and Corporate Governance committees of the Board of Directors. All of these documents are available in print without charge to stockholders who request them. Information on our website is not incorporated into this report.

ITEM 1A - RISK FACTORS

Investors in our Common Shares should be mindful of the following risk factors relative to our business.

Our Product Portfolio Lacks Diversification

We have two broad technology segments that provide advanced engineering solutions to meet the pollution control, efficiency improvement, and operational optimization needs of coal-fired energy-related facilities worldwide. They are as follows:

- The Air Pollution Control technology segment includes technologies to reduce NO_x emissions in flue gas from boilers, incinerators, furnaces and other stationary combustion sources. These include Low and Ultra Low NO_x Burners (LNB and ULNB), Over-Fire Air (OFA) systems, NO_xOUT® and HERT™ Selective Non-Catalytic Reduction (SNCR) systems, and Advanced Selective Catalytic Reduction (ASCR™) systems. The ASCR system includes ULNB, OFA, and SNCR components, along with a downsized SCR catalyst, Ammonia Injection Grid (AIG), and Graduated Straightening Grid (GSG™) systems to provide high NO_x reductions at significantly lower capital and operating costs than conventional SCR systems. The NO_xOUT CASCADE® and NO_xOUT-SCR® processes are basic types of ASCR systems, using just SNCR and SCR catalyst components. ULTRA® technology creates ammonia at a plant site using safe urea for use with any SCR application. ESP technologies make use of electrostatic precipitator products and services to reduce particulate matter. Flue Gas Conditioning systems are chemical injection systems offered in

markets outside the U.S. and Canada to enhance electrostatic precipitator and fabric filter performance in controlling particulate emissions.

The FUEL CHEM® technology segment which uses chemical processes in combination with advanced Computational Fluid Dynamics (CFD) and Chemical Kinetics Modeling (CKM) boiler modeling for the control of slagging, fouling, corrosion, opacity and other sulfur trioxide-related issues in furnaces and boilers through the addition of chemicals into the furnace using TIFI® Targeted In-Furnace Injection™ technology.

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An adverse development in our advanced engineering solution business as a result of competition, technological change, government regulation, customers converting to use natural gas or other fuels, or any other factor could have a significantly greater impact than if we maintained more diverse operations.

We Face Substantial Competition

Competition in the Air Pollution Control market comes from competitors utilizing their own NO_x reduction processes, including SNCR systems, Low NO_x Burners, Over-Fire Air systems, flue gas recirculation, ammonia SNCR and SCR, which do not infringe our patented technologies. Indirect competition will also arise from business practices such as the purchase rather than the generation of electricity, fuel switching, closure or de-rating of units, and sale or trade of pollution credits and emission allowances. Utilization by customers of such processes or business practices or combinations thereof may adversely affect our pricing and participation in the NO_x control market if customers elect to comply with regulations by methods other than the purchase of our Air Pollution Control products. See Item 1 “Products” and “APC Competition” in the Air Pollution Control segment overview.

Competition for our FUEL CHEM markets include chemicals sold by specialty chemical companies, such as Imerys, Environmental Energy Services, Inc., and SUEZ Water Technologies.

Demand for Our APC and FUEL CHEM Products is Affected by External Market Factors

Reduced coal-fired electricity demand across the United States has led to coal-fired electricity production declines. Contributing to this decline in coal-fired generations were 1) lower natural gas prices which allowed utility operators to increase the amount of power generated from natural gas plants, 2) increased cost of environmental compliance with current environmental regulations, 3) constrained funding for capital projects, and 4) the uncertainty of regulation resulted in electricity generating unit operators delaying investment in NO_x emission remediation plans until such time as the United States Environmental Protection Agency further clarifies the regulations.

Our Business Is Dependent on Continuing Air Pollution Control Regulations and Enforcement

Our business is significantly impacted by and dependent upon the regulatory environment surrounding the electricity generation market. Our business will be adversely impacted to the extent that regulations are repealed or amended to significantly reduce the level of required NO_x reduction, or to the extent that regulatory authorities delay or otherwise minimize enforcement of existing laws. 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 which result in the reduction or closure of a significant number of fossil fuel-fired power plants may adversely affect our business, financial condition and results of operations. See Item 1 above under the caption “Regulations and Markets” in the Air Pollution Control segment overview.

We May Not Be Able to Successfully Protect our Patents and Proprietary Rights

We hold licenses to or own a number of patents for our products and processes. In addition, we also have numerous patent applications pending both in the U.S. and abroad. There can be no assurance that any of our pending patent applications will be granted or that our outstanding patents will not be challenged, overturned or otherwise circumvented by competitors. In foreign markets, the absence of harmonized patent laws makes it more difficult to ensure consistent respect for our patent rights in emerging markets. In addition, certain critical technical information relating to our products which is not patented is held as trade secret, and protected by trade secret laws and restrictions on disclosure contained in our confidentiality and licensing agreements. There can be no assurance that such protections will prove adequate or that we will have adequate remedies against contractual counterparties for disclosure of our trade secrets or other violations of our intellectual property rights. See Item 1 above under the caption “Intellectual Property.”

Our Results May Be Affected By Foreign Operations

In 2007, we expanded our operations in China by establishing a wholly-owned subsidiary in Beijing. On January 17, 2019, we announced the suspension of further business development activity for its Air Pollution Control operation in Beijing. Our future financial results will be impacted by our ability to successfully complete the wind-down activities in Beijing during 2019.

In 2012, we expanded our operations in Latin and South America by establishing a wholly-owned subsidiary in Chile. The future business opportunities in these markets are dependent on the continued implementation and enforcement of regulatory policies that will benefit our technologies, the acceptance of our engineering solutions in such markets, the ability of potential customers to utilize our technologies on a competitive, cost-effective basis, and our ability to protect and enforce our intellectual property rights.

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Our Operating Results May Be Adversely Affected by Product Pricing

The onset of significant competition for either of the technology segments might require us to lower our product prices in order to remain competitive and have a corresponding adverse impact on our realized gross margins and operating profitability. See the risk factor entitled “We Face Substantial Competition” above.

We May Not Be Able to Purchase Raw Materials on Commercially Advantageous Terms

Our FUEL CHEM technology segment is dependent, in part, upon a supply of magnesium hydroxide. Any adverse changes in the availability of this chemical will likely have an adverse impact on ongoing operation of our FUEL CHEM programs. On March 4, 2009, we entered into a Restated Product Supply Agreement (“PSA”) with Martin Marietta Magnesia Specialties, LLC (MMMS) in order to assure the continuance of a stable supply from MMMS of magnesium hydroxide products for our requirements in the United States and Canada. The term of the PSA expires on December 31, 2019. Pursuant to the PSA, MMMS supplies us with magnesium hydroxide products manufactured pursuant to our specifications and we have agreed to purchase from MMMS, and MMMS has agreed to supply, 100% of our requirements for such magnesium hydroxide products for our customers who purchase such products for delivery in the United States and Canada. There can be no assurance that we will be able to obtain a stable source of magnesium hydroxide in markets outside the United States.

Our Customer Base Is Highly Concentrated

A small number of customers have historically accounted for a significant portion of our revenues. There can be no assurance that our current customers will continue to place orders, that orders by existing customers will continue at the levels of previous periods, or that we will be able to obtain orders from new customers. The loss of one or more of our customers could have a material adverse effect on our sales and operating results.

We May Not Be Able to Borrow Funds Pursuant to our Credit Facilities

We are party to a $5.5 million domestic revolving credit agreement with JPMorgan Chase Bank, N.A. As of December 31, 2018, there were no outstanding borrowings on this facility, and we had advanced $5.0 million of Letters of Credit. The Facility is secured by cash held by the Company in a separate restricted use designated JPM Chase deposit account, which is not readily available for our operating needs. The balance in this restricted cash account is $6,020 as of December 31, 2018. In addition, our Chinese subsidiary, Beijing Fuel Tech Environmental Technologies Company, Ltd., has a RMB 2.625 million (approximately $382) revolving credit facility with JPMorgan Chase Bank (China) Company Limited. As of December 31, 2018, there were no outstanding borrowings under this facility, and we had outstanding bank guarantees of approximately $0. In the event of any default on our part under either of these agreements, the lender is entitled to accelerate payment of any amounts outstanding and may, under certain circumstances, cancel the facilities. If we were unable to obtain a waiver for a breach of covenant and the lender accelerated the payment of any outstanding amounts, such acceleration may cause our cash position to significantly deteriorate or, if cash on hand were insufficient to satisfy the payment due, may require us to obtain alternate financing.

The domestic revolving credit facility will expire in June 2019. While the Company is actively pursuing the renewal of its credit agreement, there is no assurance that the Company will be successful in the renewal of its credit agreement, or if obtained, that such financing will be in a similar amount or be on similar terms and conditions as the Company's current credit agreement.

We may not be able to recover a significant portion of our carrying value of our assets held for sale associated with our Fuel Conversion business segment

Effective June 28, 2017, the Company has suspended all operations associated with the Fuel Conversion business segment. We may not be able to realize as much value from the sale of the assets as we expect and we may incur higher than expected, or unforeseen, costs associated with the disposal related activities. Any of the foregoing could have a material adverse effect on our business, financial position and results of operations.

ITEM 1B - UNRESOLVED STAFF COMMENTS

None

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ITEM 2 - PROPERTIES

We own an office building in Warrenville, Illinois, which has served as our corporate headquarters since June 23, 2008. This facility, with approximately 40,000 square feet of office space, is sufficient to meet our requirements for the foreseeable future.

We also operate from leased office facilities and we do not segregate any of these leased facilities by operating business segment. The terms of the Company's eight primary lease arrangements are as follows:

- The Stamford, Connecticut building lease, for approximately 6,440 square feet, runs from February 1, 2010 to December 31, 2019. The facility houses certain administrative functions.
- The Beijing, China building lease, for approximately 9,000 square feet, runs from June 1, 2017 to May 31, 2020. This facility serves as the operating headquarters for our Beijing Fuel Tech operation. As a result of our announcement on January 17, 2019 related to the suspension of our APC business in Beijing, we notified the landlord of our intention to early terminate the lease on July 22, 2019.
- The Durham, North Carolina building lease, for approximately 2,590 square feet, runs from July 1, 2016 to July 31, 2019. This facility houses engineering operations.
- The Gallarate, Italy building lease, for approximately 1,636 square feet, runs from May 1, 2013 to April 30, 2019. This facility serves as the operating headquarters for our European operations.
- The Westlake, Ohio building lease, for approximately 3,000 square feet, runs from May 1, 2017 to April 30, 2020. This facility houses engineering operations.
- The Aurora, IL warehouse lease, for approximately 11,000 square feet, runs from September 1, 2013 to December 31, 2020. This facility serves as an outside warehouse facility.
- The Overland Park, KS lease, for approximately 600 square feet, runs from October 16, 2018 to October 15, 2021. This facility serves primarily as a sales office.

ITEM 3 - LEGAL PROCEEDINGS

From time to time we are involved in litigation with respect to matters arising from the ordinary conduct of our business. In the opinion of management, based upon presently available information, either adequate provision for anticipated costs have been accrued or the ultimate anticipated costs will not materially affect our consolidated financial position, results of operations, or cash flows.

See Note 9 "Commitments and Contingencies" in the Notes to the Consolidated Financial Statements in this Annual Report on Form 10-K.

ITEM 4 – MINE SAFETY DISCLOSURES

Not Applicable

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PART II

ITEM 5 - MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASE OF EQUITY SECURITIES

Market

Our Common Shares have been traded since September 1993 on The NASDAQ Stock Market, Inc, where it trades under the symbol FTEK.

Prices

The table below sets forth the high and low sales prices during each calendar quarter since January 2017.

2018	High	Low
Fourth Quarter	$1.49	$1.15
Third Quarter	1.42	0.97
Second Quarter	1.42	1.00
First Quarter	1.57	1.00

2017	High	Low
Fourth Quarter	$1.17	$0.91
Third Quarter	1.14	0.79
Second Quarter	0.99	0.76
First Quarter	1.28	1.02

Dividends

We have never paid cash dividends on the Common Shares and have no current plan to do so in the foreseeable future. The declaration and payment of dividends on the Common Shares are subject to the discretion of our Board of Directors. The decision of the Board of Directors to pay future dividends will depend on general business conditions, the effect of a dividend payment on our financial condition, and other factors the Board of Directors may consider relevant. The current policy of the Board of Directors is to reinvest earnings in operations to promote future growth.

Holders

As of February 28, 2019, there were 98 holders of record of our common stock, which does not include the number of beneficial owners whose common stock was held in street name or through fiduciaries.

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Performance Graph

The following line graph compares our total return to stockholders per common share for the five years ended December 31, 2018 to that of the NASDAQ Composite Index and the WilderHill Progressive Energy Index for the period December 31, 2013 through December 31, 2018. The graph tracks the performance of a $100 investment in the Company's common stock and in each of the indexes (with the reinvestment of all dividends) on December 31, 2013.

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ITEM 6 - SELECTED FINANCIAL DATA

Selected financial data are presented below as of the end of and for each of the fiscal years in the five-year period ended December 31, 2018. The selected financial data should be read in conjunction with the audited consolidated financial statements as of and for the year ended December 31, 2018, and "Management's Discussion and Analysis of Financial Condition and Results of Operations" included elsewhere in this report and the schedules thereto.

	For the years ended December 31				
CONSOLIDATED STATEMENT OF OPERATIONS DATA (in thousands of dollars, except for share and per-share data)	2018	2017	2016	2015	2014
Revenues	$56,535	$45,166	$55,161	$73,664	$79,017
Cost of sales	36,471	27,144	36,367	45,107	43,889
Selling, general and administrative	18,564	20,933	25,564	30,897	35,432
Restructuring charge	—	119	1,428	219	—
Research and development	1,073	1,070	1,752	1,447	1,459
Impairment and abandonment charges	317	2,965	2,074	1,425	23,400
Operating (loss) income from continuing operations	110	(7,065)	(12,024)	(5,431)	(25,163)
Net loss from continuing operations	85	(6,535)	(14,588)	(9,554)	(17,448)
Loss from discontinued operations	(113)	(3,914)	(2,800)	(2,826)	(277)
Net loss	$(28)	$(10,449)	$(17,388)	$(12,380)	$(17,725)
Net loss per common share:					
Basic					
Continuing operations	$—	$(0.28)	$(0.62)	$(0.41)	$(0.77)
Discontinued operations	—	(0.16)	(0.12)	(0.13)	(0.01)
Basic net loss per common share	$—	$(0.44)	$(0.74)	$(0.54)	$(0.78)
Diluted					
Continuing operations	$—	$(0.28)	$(0.62)	$(0.41)	$(0.77)
Discontinued operations	—	(0.16)	(0.12)	(0.13)	(0.01)
Diluted net loss per common share	$—	$(0.44)	$(0.74)	$(0.54)	$(0.78)
Weighted-average basic shares outstanding	24,164,000	23,872,000	23,365,000	23,101,000	22,782,000
Weighted-average diluted shares outstanding	24,164,000	23,872,000	23,365,000	23,101,000	22,782,000

	December 31				
CONSOLIDATED BALANCE SHEET DATA (in thousands of dollars)	2018	2017	2016	2015	2014
Working capital	$23,556	$18,025	$26,585	$35,865	$39,688
Total assets	51,719	50,484	57,788	76,011	91,471
Long-term obligations	335	420	346	501	520
Total liabilities	17,667	16,312	15,099	17,740	19,170
Stockholders' equity (1)	34,052	34,172	42,689	58,271	72,301

Notes:

(1) Stockholders' equity includes the principal amount of nil coupon non-redeemable perpetual loan notes. See Note 7 to the consolidated financial statements; Refer to Note 1 of the Notes to the Consolidated Financial Statements for further detail related to a revision made in the previously issued financial statements as a result of an error discovered in the preparation of the current year income tax provision.

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ITEM 7 - MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS (amounts in thousands of dollars)

Background

We have two broad technology segments that provide advanced engineered solutions to meet the pollution control, efficiency improvement and operational optimization needs of energy-related facilities worldwide. They are as follows:

Air Pollution Control Technologies

The Air Pollution Control technology segment includes technologies to reduce NO_x emissions in flue gas from boilers, incinerators, furnaces and other stationary combustion sources. These include Low and Ultra Low NO_x Burners (LNB and ULNB), OFA systems, NO_xOUT and HERT SNCR systems, and ASCR systems. The ASCR system includes ULNB, OFA, and SNCR components, along with a downsized SCR catalyst, AIG, and GSG systems to provide high NO_x reductions at significantly lower capital and operating costs than conventional SCR systems. The NO_xOUT CASCADE and NO_xOUT-SCR processes are basic types of ASCR systems, using just SNCR and SCR catalyst components. ULTRA technology creates ammonia at a plant site using safe urea for use with any SCR application. Our ESP products and services include complete turnkey ESP retrofits and related services. Flue Gas Conditioning systems are chemical injection systems offered in markets outside the U.S. and Canada to enhance electrostatic precipitator and fabric filter performance in controlling particulate emissions. We distribute our products through our direct sales force and third-party sales agents.

FUEL CHEM Technologies

The FUEL CHEM technology segment, which uses chemical processes in combination with advanced CFD and CKM boiler modeling, for the control of slagging, fouling, corrosion, opacity and other sulfur trioxide-related issues in furnaces and boilers through the addition of chemicals into the furnace using TIFI Targeted In-Furnace Injection technology. Fuel Tech sells its FUEL CHEM program through its direct sales force and agents to industrial and utility power-generation facilities. FUEL CHEM programs have been installed on combustion units in North America, Europe, China, and India, treating a wide variety of solid and liquid fuels, including coal, heavy oil, biomass and municipal waste. The FUEL CHEM program improves the efficiency, reliability and environmental status of plants operating in the electric utility, industrial, pulp and paper, waste-to-energy, university and district heating markets and offers numerous operational, financial and environmental benefits to owners of boilers, furnaces and other combustion units.

The key market dynamic for both technology segments is the continued use of fossil fuels, especially coal, as the principal fuel source for global electricity production. Coal currently accounts for approximately 30% of all U.S. electricity generation and roughly 69% of Chinese electricity generation. Major coal consumers include China, the United States and India.

Critical Accounting Policies and Estimates

The consolidated financial statements are prepared in accordance with accounting principles generally accepted in the United States of America, which require us to make estimates and assumptions. We believe that of our accounting policies (see Note 1 to the consolidated financial statements), the following involve a higher degree of judgment and complexity and are deemed critical. We routinely discuss our critical accounting policies with the Audit Committee of the Board of Directors.

Revenue Recognition

Change in Accounting Policy

On January 1, 2018, we adopted ASC 606 "Revenue from Contracts with Customers" ("ASC 606") using the modified retrospective method applied to those contracts which were not completed as of January 1, 2018. Results for reporting periods beginning after January 1, 2018 are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported in accordance with our legacy accounting under Accounting Standards Codification Topic 605: Revenue Recognition (ASC 605).

For the years ended prior to January 1, 2018

Revenues from the sales of chemical products are recorded when title transfered, either at the point of shipment or at the point of destination, depending on the contract with the customer in accordance with ASC 605. We used the percentage of completion method of accounting for equipment construction, equipment supply and license contracts that are sold within the Air Pollution Control technology segment. Under the percentage of completion method, revenues are recognized as work is performed based

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on the relationship between actual construction costs incurred and total estimated costs at completion. Construction costs include all direct costs such as materials, labor, and subcontracting costs, and indirect costs allocable to the particular contract such as indirect labor, tools and equipment, and supplies. Revisions in completion estimates and contract values are made in the period in which the facts giving rise to the revisions become known and can influence the timing of when revenues are recognized under the percentage of completion method of accounting. Such revisions have historically not had a material effect on the amount of revenue recognized. Provisions are made for estimated losses on uncompleted contracts in the period in which such losses are determined.

Years beginning after January 1, 2018

The Company recognizes revenue when control of the promised goods or services is transferred to our customers, in amount that reflects the consideration we expect to be entitled to in exchange for those goods or services. Fuel Tech's sales of products to customers represent single performance obligations, which are not impacted upon the adoption of ASC 606. The majority of our contracts have a single performance obligation as the promise to transfer the individual goods or services is not separately identifiable from other promises in the contracts and, therefore, not distinct. Revenue is measured as the amount of consideration we expect to receive in exchange for transferring goods or providing services. Sales, value add, and other taxes we collect concurrent with revenue-producing activities are excluded from revenue.

FUEL CHEM

Revenues from the sale of chemical products are recognized when control transfers to customer upon shipment or delivery of the product based on the applicable shipping terms. We generally recognize revenue for these arrangements at a point in time based on our evaluation of when the customer obtains control of the promised goods or services.

Air Pollution Control Technology

Fuel Tech's APC contracts are typically six to eighteen months in length. A typical contract will have three or four critical operational measurements that, when achieved, serve as the basis for us to invoice the customer via progress billings. At a minimum, these measurements will include the generation of engineering drawings, the shipment of equipment and the completion of a system performance test.

As part of most of its contractual APC project agreements, Fuel Tech will agree to customer-specific acceptance criteria that relate to the operational performance of the system that is being sold. These criteria are determined based on modeling that is performed by Fuel Tech personnel, which is based on operational inputs that are provided by the customer. The customer will warrant that these operational inputs are accurate as they are specified in the binding contractual agreement. Further, the customer is solely responsible for the accuracy of the operating condition information; typically all performance guarantees and equipment warranties granted by us are voidable if the operating condition information is inaccurate or is not met.

Since control transfers over time, revenue is recognized based on the extent of progress towards completion of the single performance obligation. Fuel Tech uses the cost-to-cost input measure of progress for our contracts since it best depicts the transfer of assets to the customer which occurs as we incur costs on our contracts. Under the cost-to-cost input measure of progress, the extent of progress towards completion is measured based on the ratio of costs incurred to date to the total estimated costs at completion of the performance obligation. Revenues are recorded proportionally as costs are incurred. Costs to fulfill include all internal and external engineering costs, equipment charges, inbound and outbound freight expenses, internal and site transfer costs, installation charges, purchasing and receiving costs, inspection costs, warehousing costs, project personnel travel expenses and other direct and indirect expenses specifically identified as project- or product-line related, as appropriate (e.g. test equipment depreciation and certain insurance expenses).

Fuel Tech has installed over 1,000 units with APC technology and normally provides performance guarantees to our customers based on the operating conditions for the project. As part of the project implementation process, we perform system start-up and optimization services that effectively serve as a test of actual project performance. We believe that this test, combined with the accuracy of the modeling that is performed, enables revenue to be recognized prior to the receipt of formal customer acceptance.

As of December 31, 2018, we had five construction contracts in progress that were identified as loss contracts and a provision for losses in the amount of $123 was recorded in other accrued liabilities on the consolidated balance sheet. As of December 31, 2017, we had four construction contract in progress that were identified as a loss contract and a provision for losses in the amount of $117 was recorded in other accrued liabilities on the consolidated balance sheet.

In our Air Pollution Control Technology segment, amounts are billed as work progresses in accordance with agreed-upon contractual terms. Generally, billing occurs subsequent to revenue recognition, resulting in contract assets. These assets are reported on the

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consolidated balance sheet on a contract-by-contract basis at the end of each reporting period. At December 31, 2018, 2017 and 2016, contract assets were approximately $5,540, $7,894 and $6,755 respectively, and are included in accounts receivable on the consolidated balance sheets.

However, the Company will periodically bill in advance of costs incurred before revenue is recognized, resulting in contract liabilities. These liabilities are reported on the consolidated balance sheet on a contract-by-contract basis at the end of each reporting period. Contract liabilities were $1,234, $2,403 and $1,730 at December 31, 2018, 2017 and 2016 respectively, and are included in other accrued liabilities on the consolidated balance sheets.

Allowance for Doubtful Accounts

The allowance for doubtful accounts is management's best estimate of the amount of credit losses in accounts receivable. In order to control and monitor the credit risk associated with our customer base, we review the credit worthiness of customers on a recurring basis. Factors influencing the level of scrutiny include the level of business the customer has with us, the customer's payment history and the customer's financial stability. Receivables are considered past due if payment is not received by the date agreed upon with the customer, which is normally 30 days. Representatives of our management team review all past due accounts on a weekly basis to assess collectability. At the end of each reporting period, the allowance for doubtful accounts balance is reviewed relative to management's collectability assessment and is adjusted if deemed necessary through a corresponding charge or credit to bad debts expense, which is included in selling, general, and administrative expenses in the consolidated statements of operations. Bad debt write-offs are made when management believes it is probable a receivable will not be recovered.

Inventories

Inventories consist primarily of spare parts and are stated at the lower of cost or net realizable value, using the weighted-average cost method. Usage is recorded in cost of sales in the period that parts were issued to a project or used to service equipment. Inventories are periodically evaluated to identify obsolete or otherwise impaired parts and are written off when management determines usage is not probable. The Company estimates the balance of excess and obsolete inventory by analyzing inventory by age using last used and original purchase date and existing sales pipeline for which the inventory could be used.

Assessment of Potential Impairments of Goodwill and Intangible Assets

Goodwill is not amortized, but rather is reviewed annually (in the fourth quarter) or more frequently if indicators arise, for impairment. We do not have any indefinite-lived intangible assets other than goodwill. Such indicators include a decline in expected cash flows, a significant adverse change in legal factors or in the business climate, unanticipated competition, a decrease in our market capitalization to an amount less than the carrying value of our assets, or slower growth rates, among others.

Goodwill is allocated among and evaluated for impairment at the reporting unit level, which is defined as an operating segment or one level below an operating segment. We have two reporting units: the FUEL CHEM segment and the APC technology segment.

Our evaluation of goodwill impairment involves first assessing qualitative factors to determine whether it is more likely than not that the fair value of a reporting unit is less than its carrying amount. We may bypass this qualitative assessment, or determine that based on our qualitative assessment considering the totality of events and circumstances including macroeconomic factors, industry and market considerations, current and projected financial performance, a sustained decrease in our share price, or other factors, that additional impairment analysis is necessary. This additional analysis involves comparing the current fair value of a reporting unit to its carrying value. Fuel Tech uses a discounted

cash flow (DCF) model to determine the current fair value of its two reporting units as this methodology was deemed to best quantify the present values of our expected future cash flows and yield a fair value that should be in line with the aggregate market value placed on the outstanding number of Common Shares as reflected by the current stock price multiplied by the outstanding common shares. A number of significant assumptions and estimates are involved in the application of the DCF model to forecast operating cash flows, including markets and market share, sales volumes and prices, costs to produce and working capital changes. Events outside our control, specifically market conditions that impact revenue growth assumptions, could significantly impact the fair value calculated. Management considers historical experience and all available information at the time the fair values of its reporting units are estimated. However, actual fair values that could be realized in an actual transaction may differ from those used to evaluate the impairment of goodwill.

The application of our DCF model in estimating the fair value of each reporting segment is based on the ‘net asset’ approach to business valuation. In using this approach for each reportable segment, we forecast segment revenues and expenses out to perpetuity and then discount the resulting cash flows to their present value using an appropriate discount rate. The forecast considers, among other items, the current and expected business environment, expected changes in the fixed and variable cost structure as the business

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grows, and a revenue growth rate that we feel is both achievable and sustainable. The discount rate used is composed of a number of identifiable risk factors, including equity risk, company size, and certain company specific risk factors such as our debt-to-equity ratio, among other factors, that when added together, results in a total return that a prudent investor would demand for an investment in our company.

In the event the estimated fair value of a reporting unit per the DCF model is less than the carrying value, additional analysis would be required. The additional analysis would compare the carrying amount of the reporting unit's goodwill with the implied fair value of that goodwill. The implied fair value of goodwill is the excess of the fair value of the reporting unit over the fair values assigned to all of the assets and liabilities of that unit as if the reporting unit was acquired in a business combination and the fair value of the reporting unit represented the purchase price.

In January 2017, the FASB issued ASU 2017-04, Intangibles-Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. This ASU is meant to simplify how an entity is required to test goodwill for impairment by eliminating Step 2 from the goodwill impairment test. Step 2 measures a goodwill impairment loss by comparing the implied fair value of a reporting unit's goodwill with the carrying amount of that goodwill. The Company early adopted ASU 2017-04 on October 1, 2018 for the annual goodwill impairment test completed during the fourth quarter which simplified the test by comparing the implied fair value of the reporting unit's goodwill with the carrying amount of goodwill and eliminating Step 2.
Fuel Tech performed its annual goodwill impairment analysis for each of its reporting units as of October 1, 2018 and determined that no impairment of goodwill existed within the FUEL CHEM technology segment.

Building Impairment

During the second quarter of 2017, we experienced a decrease in our stock price that caused our market capitalization to fall below the equity value on our consolidated balance sheet, which resulted in an indicator of impairment. This, along with an overall slowdown in APC technology and corresponding downward adjustments to our financial forecasts, was considered during a detailed evaluation of the fair value of our reporting units. As a result of these triggering events, Fuel Tech performed a long-lived asset impairment analysis for each of the reporting units as of April 1, 2017. Based on this evaluation, we determined that our APC segment failed the first step of our impairment analysis because the estimated gross cash flows and fair value of the reporting unit was less than its carrying value, thus requiring additional analysis of the segment. However, no impairment resulted as the fair values of the underlying patents and equipment equaled or exceeded their carrying values. We evaluated the corporate asset group, which contains our corporate headquarters office building and land in Warrenville, Illinois, using the residual method and management determined that there was not adequate gross cash flows to support the carrying value. After obtaining an appraisal from a third-party appraiser, management determined that the carrying value of the office building and land exceeded the fair value and recorded an impairment charge of $2,965 for the year ended December 31, 2017.

Impairment of Long-Lived Assets and Amortizable Intangible Assets

Long-lived assets, including property, plant and equipment (PP&E) and intangible assets, are reviewed for impairment when events and circumstances indicate that the carrying amount of the assets (or asset group) may not be recoverable. If impairment indicators exist, we perform a more detailed analysis and an impairment loss is recognized when estimated future undiscounted cash flows expected to result from the use of the asset (or asset group) and its eventual disposition are less than the carrying amount. This process of analyzing impairment involves examining the operating condition of individual assets (or asset group) and estimating a fair value based upon current condition, relevant market factors and remaining estimated operational life compared to the asset's remaining depreciable life. Quoted market prices and other valuation techniques are used to determine expected cash flows. Due to the existence of impairment indicators as more fully described in Note 1 to our consolidated financial statements, we performed a more detailed analysis of potential long-lived and intangible asset impairment in the APC technology asset group

during the fourth quarter of 2018 using the aforementioned undiscounted cash flows analysis.

In the second quarter of 2018, the Company recorded an abandonment charge of $317 associated with certain international patent assets which the Company elected to not maintain and abandon in certain international locations due to limited business opportunities in those regions. The abandonment charge was calculated by determining the net book values of the abandoned patent assets by deducting the accumulated amortization from the acquisition cost. The abandonment charge of $317 is included in “Intangible assets abandonment and building impairment” line in the accompanying Consolidated Statements of Operations for the year ended December 31, 2018.

In the fourth quarter of 2016, the Company performed an impairment test of the carrying value of our intangible assets to determine whether any impairment existed. The Company determined that the sum of the expected undiscounted cash flows attributable to certain intangible assets was less than its carrying value and that an impairment write-down was required. The impairment loss

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primarily related to the developed technology, customer relationships and trademarks acquired in the 2014 acquisition of PECO and FGC. The Company calculated the estimated fair value of the intangible asset by summing the present value of the expected cash flows over its life. The impairment was calculated by deducting the present value of the expected cash flows from the carrying value. This assessment resulted in an impairment charge of $2,074, which was included in “Goodwill and intangible assets impairment” line in the accompanying Consolidated Statements of Operations for the year ended December 31, 2016.

A significant portion of our property and equipment is comprised of assets deployed at customer locations relating to our FUEL CHEM technology asset group, and due to the shorter-term duration over which this equipment is depreciated, the likelihood of impairment is mitigated. The discontinuation of a FUEL CHEM program at a customer site would most likely result in the re-deployment of all or most of the affected assets to another customer location rather than an impairment.

Valuation Allowance for Deferred Income Taxes

Deferred tax assets represent deductible temporary differences and net operating loss and tax credit carryforwards. A valuation allowance is recognized if it is more likely than not that some portion of the deferred tax asset will not be realized. At the end of each reporting period, management reviews the realizability of the deferred tax assets. As part of this review, we consider if there are taxable temporary differences that could generate taxable income in the future, if there is the ability to carry back the net operating losses or credits, if there is a projection of future taxable income, and if there are any tax planning strategies that can be readily implemented. As required by ASC 740 "Income Taxes", a valuation allowance must be established when it is more likely than not that all or a portion of a deferred tax asset will not be realized. This assessment resulted in a valuation allowance on our deferred tax assets of $13,044, $12,234 and $13,179 for the years ended December 31, 2018, 2017 and 2016 respectively.

Stock-Based Compensation

We recognize compensation expense for employee equity awards ratably over the requisite service period of the award, adjusted for estimated forfeitures.

We utilize the Black-Scholes option-pricing model to estimate the fair value of stock option awards. Determining the fair value of stock options using the Black-Scholes model requires judgment, including estimates for (1) risk-free interest rate - an estimate based on the yield of zero-coupon treasury securities with a maturity equal to the expected life of the option; (2) expected volatility - an estimate based on the historical volatility of our Common Shares for a period equal to the expected life of the option; and (3) expected life of the option - an estimate based on historical experience including the effect of employee terminations.

In addition, we utilize a Monte Carlo valuation pricing model to determine the fair value of certain restricted stock units (RSUs) that contain market conditions. Determining the fair value of these RSUs requires judgment and involves simulating potential future stock prices based on estimates for the risk-free interest rate, stock volatility, and correlations between our stock price and the stock prices of a peer group of companies. If any of these assumptions differ significantly from actual results, stock-based compensation expense could be impacted. There were no stock options or RSUs granted during the year ended December 31, 2018.

Recently Adopted Accounting Standards

In May 2014, the Financial Accounting Standards Board (FASB) issued ASU 2014-09 "Revenue from Contracts with Customers" (ASC 606). These changes created a comprehensive framework for all entities in all industries to apply in the determination of when to recognize revenue, and, therefore, supersede virtually all existing revenue recognition requirements and guidance. This framework is expected to result in less complex guidance in application while providing a consistent and comparable methodology for revenue recognition. The core principle of the guidance is that

an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. To achieve this principle, an entity should apply the following steps: (i) identify the contract(s) with a customer, (ii) identify the performance obligations in the contract(s), (iii) determine the transaction price, (iv) allocate the transaction price to the performance obligations in the contract(s), and (v) recognize revenue when, or as, the entity satisfies a performance obligation. The new standard also requires additional financial statement disclosures that will enable users to understand the nature, amount, timing and uncertainty of revenue and cash flows relating to customer contracts. In August 2015, the FASB approved a one-year deferral to January 1, 2018. The Company adopted the standard on January 1, 2018 using the modified retrospective transition method. See Note 3, Revenue Recognition, for further discussion.

In November 2016, the FASB issued ASU 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash (a consensus of the FASB Emerging Issues Task Force). The amendments in this Update require that a statement of cash flows explain the change during the period in the total of cash, cash equivalents, and amounts generally described as restricted cash or restricted cash

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equivalents. Accordingly, restricted cash will be included with cash and cash equivalents when reconciling the beginning-of period and end-of-period total amounts shown on the Consolidated Statement of Cash Flows. The Company adopted ASU 2016-18 beginning on January 1, 2018 and adopted the standard using a retrospective approach.

In January 2017, the FASB issued ASU 2017-04, Intangibles-Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. This ASU is meant to simplify how an entity is required to test goodwill for impairment by eliminating Step 2 from the goodwill impairment test. Step 2 measures a goodwill impairment loss by comparing the implied fair value of a reporting unit’s goodwill with the carrying amount of that goodwill. ASU 2017-04 is effective for fiscal years beginning after December 15, 2019, with early adoption permitted for interim or annual goodwill impairment tests performed on testing dates after January 1, 2017. The Company early adopted ASU 2017-04 on October 1, 2018 for the annual goodwill impairment test completed during the fourth quarter which simplified the test by comparing the implied fair value of the reporting unit's goodwill with the carrying amount of goodwill and eliminating Step 2. The adoption did not have a material impact on the Company’s consolidated financial statements.
Recently Issued Accounting Pronouncements

In February 2016, the FASB issued ASU 2016-02, Leases (Topic 842). The amendments in this Update increase transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheet and disclosing key information about leasing arrangements. The liability recorded for a lease is meant to recognize the lease payments and the asset as a right to use the underlying asset for the lease, including optional periods if it reasonably certain the option will be exercised. Recording of the liability should be based on the present value of the lease payments. If a lease term is less than twelve months, a company is allowed to elect not to record the asset and liability. Expense related to these leases are to be amortized on a straightline basis over the expected term of the lease. Additionally, the provisions of Topic 842 provide additional guidance on separating lease terms from maintenance and other type of provisions that provide a good or service, accounting for sale-leaseback provisions, and leveraged leases. Reporting in the cash flow statement remains virtually unchanged. Additional qualitative and quantitative disclosures are required.
ASU 2016-02 will be effective for the Company beginning on January 1, 2019. We expect that this standard will have a material effect on our financial statements. While we continue to assess all of the effects of adoption, we currently believe the most significant effects relate to the recognition of new right-of-use assets and lease liabilities on our balance sheet for our office and equipment operating leases and providing significant new disclosures about our leasing activities. We do not expect a significant change in our leasing activities between now and adoption. On adoption, we currently expect to recognize additional operating liabilities of approximately $756, with corresponding right-of-use assets of the same amount based on the present value of the remaining minimum rental payments under current leasing standards for existing operating leases. The new standard also provides practical expedients for an entity's ongoing accounting. We currently expect to elect the short-term lease recognition exemption for all leases that qualify. This means, for those leases that qualify, we will not recognize right-of-use assets or lease liabilities, and this includes not recognizing right-of-use assets or lease liabilities for existing short-term leases of those assets in transitions. We also currently expect to elect the practical expedient to not separate lease and non-lease components for all of our leases.
In July 2018, the FASB issued ASU 2018-11 "Leases (Topic 842) Targeted Improvements." This amendment allows companies to elect to record a cumulative effect adjustment to beginning retained earnings on the date of adoption. We expect to elect the provisions of ASU 2018-11 as of the date of adoption on January 1, 2019.

2018 versus 2017

Revenues for the years ended December 31, 2018 and 2017 were $56,535 and $45,166, respectively. The year-over-year increase of $11,369 or 25%, was driven by increased revenue in both APC and FUEL CHEM technology segments in our United States (U.S.) operations. Our U.S. revenues increased by $14,377 or 49% from $29,510 to $43,887, and our international revenues decreased by $3,008 or 19% from $15,656 to $12,648.

Revenues for the APC technology segment were $38,417 for the year ended December 31, 2018, an increase of $10,609, or 38%, versus fiscal 2017. The increase in APC revenue for the twelve month period ending December 31, 2018 in comparison to prior year amount is related to the timing of project execution as a result of conversion of new orders announced during 2017 and 2018. Backlog for the years ended December 31, 2018 and 2017 was $12.4 million and $22.1 million, respectively.

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Revenues for the FUEL CHEM technology segment for the year ended December 31, 2018 were $18,118, an increase of $760, or 4% versus fiscal 2017. We remain focused on attracting new customers in our FUEL CHEM business, for both coal and non-coal applications, but our ability to attract new coal customers continues to be affected by the soft electric demand market and fuel switching as a result of low natural gas prices.

Consolidated cost of sales for the years ended December 31, 2018 and 2017 were $36,471 and $27,144, respectively. Consolidated gross margin percentages for the years ended December 31, 2018 and 2017 were 35% and 40%, respectively. The gross margins for the APC technology segment decreased to 29% in 2018 from 34% in 2017. The overall decrease in gross margin in the APC technology segment from 2017 to 2018 is primarily due to project mix, timing of project execution and margin erosion on lower-margin projects being executed in foreign geographies, which will not recur. Gross margin percentage for the FUEL CHEM technology segment remained consistent at 50% for the years ended December 31, 2018 and 2017.

Selling, general and administrative (SG&A) expenses for the years ended December 31, 2018 and 2017 were $18,564 and $20,933, respectively. The decrease of $2,369 or 11%, is primarily attributed to the following:

- A decrease in employee related costs of $1,004
- A decrease in professional fees and consulting services of $438
- A decrease in office and administrative costs relating to our foreign subsidiaries of $809
- A decrease in other administrative costs, including depreciation and amortization of $118

Restructuring costs were $0 and $119 in connection with the workforce reduction for the years ended December 31, 2018 and 2017. See Note 15, Restructuring Activities, for further discussion.

Research and development (“R&D”) expenses were $1,073 and $1,070 for the years ended December 31, 2018 and 2017, respectively.

In the second quarter of 2018, Fuel Tech recorded an abandonment charge of $317 associated with certain international patent assets which the Company elected to not maintain and abandon in certain international locations due to limited business opportunities in those regions. The abandonment charge was calculated by determining the net book values of the abandoned patent assets by deducting the accumulated amortization from the acquisition cost. The abandonment charge of $317 is included in “Intangible assets abandonment and building impairment” line in the accompanying Consolidated Statements of Operations for the twelve months ended December 31, 2018.

During the second quarter of 2017, the Company suspended all operations associated with the Fuel Conversion business segment. The activity of the Fuel Conversion discontinued operations consisted of Research and Development, severance and other costs for the for the year ended December 31, 2018 and 2017 of $113 and $3,914, respectively. The loss from discontinued operations in the Consolidated Statement of Operations for the year ended December 31, 2018 includes an impairment charge related to the Carbonite patent assets of $56 as a result of not being able to reach an agreement with a third-party to acquire or license the Carbonite technology in combination with the sale of certain equipment included in Assets held for sale. The Fuel Conversion business segment had no revenues associated with it. The overall decline in the discontinued operations for the year ended December 31, 2018 in comparison to the same periods in 2017 is due to the overall wind-down of operations for the Fuel Conversion discontinued operations.

Interest income for the year ended December 31, 2018 decreased by $4 to $6 versus $10 in 2017. Interest expense was $0 in both 2018 and 2017. Finally, the decrease in net other expenses to $2 from $60 in the prior year is due primarily to the impact of foreign exchange rates as it relates to settlement of balances denominated in foreign currencies, and

certain other bank fees related to Letter of Credits.

For the year ended December 31, 2018, we recorded an income tax expense of $33 on pre-tax income of $118. Our effective tax rates were 676.3% and 4.5% for the years ended December 31, 2018 and 2017, respectively. The effective tax rate for the year-ended December 31, 2018, differed from the federal statutory rate of 21% as a result of establishing a deferred tax liability associated with a certain book-to-tax timing difference. For the year ended December 31, 2017, we recorded an income tax benefit of $580 on pre-tax loss of $7,115. The effective tax rate for the year-ended December 31, 2017 differed from the federal statutory rate of 34% as a result of net operating losses generated in the United States, China, and Italy, which were offset by establishment of full valuation allowances.

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2017 versus 2016

Revenues for the years ended December 31, 2017 and 2016 were $45,166 and $55,161, respectively. The year-over-year decrease of $9,995, or 18%, was driven by decreased revenue in both APC and FUEL CHEM technology segments in both our United States (U.S.) and foreign operations. Our U.S. revenues decreased by $13,035 or 31%from $42,545 to $29,510, and our international revenues increased by $3,040 or 24% from $12,616 to $15,656.

Revenues for the APC technology segment were $27,808 for the year ended December 31, 2017, a decrease of $6,244, or 18%, versus fiscal 2016. First, the U.S. regulatory environment, while remaining favorable for our prospects, has not spurred capital investment in our products by electric power producers. Second, while general economic conditions in the U.S. have improved, energy demand for coal fired power plants has declined as utilities have switched to lower cost natural gas sources. At the same time, these sources have generally allowed utilities to meet their regulatory objectives with existing emissions investments. Sales in foreign locations have not been robust enough to offset reduced demand in the U.S. While we expect to see improved order flow in our U.S. APC segment in 2018, any future orders will be dependent on our customers' capital investment decisions to install emissions control technologies in order to meet state or federal regulations. We continue to actively bid projects in our foreign markets during 2018 and will continue to look for growth opportunities within our chosen markets. Backlog for the years ended December 31, 2017 and 2016 was $22.1 million and $8.0 million, respectively.

Revenues for the FUEL CHEM technology segment for the year ended December 31, 2017 were $17,358, a decrease of $3,751, or 18% versus fiscal 2016. This decrease is principally associated with reduced product demand from some of our largest Fuel Chem customers. These customers' decision to reduce spending was based on a number of factors including cost of coal fire powered generation, energy demand and overall economic conditions affecting the plant. We remain focused on attracting new customers in our FUEL CHEM business, for both coal and non-coal applications, but our ability to attract new coal customers continues to be affected by the soft electric demand market and fuel switching as a result of low natural gas prices.

Consolidated cost of sales for the years ended December 31, 2017 and 2016 were $27,144 and $36,367, respectively. Consolidated gross margin percentages for the years ended December 31, 2017 and 2016 were 40% and 34%, respectively. The gross margins for the APC technology segment increased to 34% in 2017 from 25% in 2016. Gross margin for the APC technology segment in 2016 included charges totaling $0.8 million consisting of a subcontractor dispute of $0.6 million and a non-cash excess and obsolete inventory reserve of $0.2 million; exclusive of these charges, gross margin would have been $9.5 million, or 28%. The overall increase in gross margin in the APC technology segment from 2016 to 2017 is due to product and technology mix. Gross margin percentage for the FUEL CHEM technology segment increased slightly in 2017 to 50% from 48% in 2016. Gross margin for the FUEL CHEM technology segment in 2016 included the impact of the above-referenced non-cash excess and obsolete inventory reserve of $0.6 million; excluding this impact, gross margin would have been $10.7 million or 51%.

During the second quarter of 2017, we experienced a decrease in our stock price that caused our market capitalization to fall below the equity value on our consolidated balance sheet, which resulted in an indicator of impairment. This, along with an overall slowdown in APC technology and corresponding downward adjustments to our financial forecasts, was considered during a detailed evaluation of the fair value of our reporting units. As a result of these triggering events, Fuel Tech performed a long-lived asset impairment analysis for each of the reporting units as of April 1, 2017. We evaluated the corporate asset group, which contains our corporate headquarters office building and land in Warrenville, Illinois, using the residual method and management determined that there was not adequate gross cash flows to support the carrying value. After obtaining an appraisal from a third-party appraiser, management determined that the carrying value of the office building and land exceeded the fair value and recorded an impairment charge of $2,965 for the year ended December 31, 2017.

Selling, general and administrative (SG&A) expenses for the years ended December 31, 2017 and 2016 were $20,933 and $25,564, respectively. The decrease of $4,631 or 18%, is primarily attributed to the following:

- A decrease in employee related costs, totaling $2,060, including an overall reduction in travel and entertainment costs of $437
- A decrease in stock compensation expense of $602
- A decrease in depreciation and amortization of $436
- A decrease in professional fees and consulting services of $452
- A decrease in office and administrative costs relating to our foreign subsidiaries of $377
- A decrease in other administrative costs of $730

Restructuring costs were $119 and $1,428 in connection with the workforce reduction for the years ended December 31, 2017 and 2016. See Note 15, Restructuring Activities, for further discussion.

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Research and development ("R&D") expenses were $1,070 and $1,752 for the years ended December 31, 2017 and 2016, respectively. The decrease in research and development expenses for the year ended December 31, 2017 in comparison to the same period prior year amounts was related to organizational workforce actions taken in both 2017 and 2016. The remaining expenditures in our research and development expenses were focused on new product development for our APC and Fuel Chem businesses. We plan to continue focusing on increased research and development efforts in the pursuit of commercial applications for technologies outside of our traditional markets, and in the development and analysis of new technologies that could represent incremental market opportunities.

Interest income for the year ended December 31, 2017 decreased by $15 to $10 versus $25 in 2016. Interest expense was $0 in both 2017 and 2016. Finally, the decrease in net other expenses to $60 from $925 in the prior year is due primarily to the impact of foreign exchange rates as it relates to settlement of balances denominated in foreign currencies, and certain other bank fees related to Letter of Credits.

For the year ended December 31, 2017, we recorded an income tax benefit of $580 on pre-tax loss of $7,115. Our effective tax rates were 4.5% and 11% for the years ended December 31, 2017 and 2016, respectively. The effective tax rate for the year-ended December 31, 2017 differed from the federal statutory rate of 34% as a result of net operating losses generated in the United States, China, and Italy, which were offset by establishment of full valuation allowances. For the year ended December 31, 2016, we recorded an income tax expense of $1,664 on pre-tax loss of $12,924. Our income tax expense of 1,664 in 2016 resulted from the establishment of a full valuation allowance for the China deferred tax assets.

On December 22, 2017, the United States ("U.S.") enacted significant changes to the U.S. tax law following the passage and signing of H.R.1, "An Act to Provide for Reconciliation Pursuant to Titles II and V of the Concurrent Resolution on the Budget for Fiscal Year 2018" (the "Tax Act") (previously known as "The Tax Cuts and Jobs Act"). Information regarding the impact on the Company is included in Note 4. Income Taxes to the consolidated financial statements included herein.

Liquidity and Sources of Capital

At December 31, 2018, we had cash and cash equivalents of $12,039 (excluding restricted cash of $6,020) and working capital of $23,556 versus cash and cash equivalents of $8,366 (excluding restricted cash of $6,020) and working capital of $18,025 at December 31, 2017.

Operating activities provided $4,927 of cash for the year ended December 31, 2018, primarily due to the add back of non-cash items from our net income from continuing operations of $85 including stock compensation expense of $233, depreciation and amortization of $847, intangible assets abandonment charge of $317, excess and obsolete inventory reserve of $78, a loss on sale of equipment of $142, a decrease in our accounts receivable balance of $848, an increase in our inventory balance of $108, a decrease in prepaid expenses and other current and non-current assets of $251, an increase in our accrued liabilities and other non-current liabilities of $1,897, and an increase in our accounts payable balance of $521. Cash provided by operating activities also included cash used of $122 associated with the activity of the Fuel Conversion discontinued operations.

Operating activities used $3,568 of cash for the year ended December 31, 2017, primarily due to the add back of non-cash items from our net loss from continuing operations of $6,535 including stock compensation expense of $1,389, depreciation and amortization of $1,527, building impairment charge of $2,965, excess and obsolete inventory reserve of $228, and a loss on sale of equipment of $304, as well as a decrease in our accounts receivable balance of $113, an increase in our inventory balance of $134, and an increase in prepaid expenses and other current and non-current assets of $1,084, and an decrease in our accrued liabilities and other non-current liabilities of $2,439.

Partially offsetting these items was subtraction from our net loss related to an increase in our accounts payable balance of $2,500. Cash used by operating activities also included cash used of $1,868 associated with the activity of the Fuel Conversion discontinued operations.

Investing activities used cash of $569 and $490 for the years ended December 31, 2018 and 2017, respectively. Investment activities for the year ended December 31, 2018 consisted of purchases of equipment, patents, and other intangibles of $570 and proceeds from sale of equipment of $1. Investment activities for the year ended December 31, 2017 consisted of purchases of equipment, patents, and other intangibles of $492 and proceeds from sale of equipment of $2.

Financing activities used $12 and $258 of cash for the years ended December 31, 2018 and 2017 as a result of $12 and $258 in cash used for the acquisition of common shares held in treasury that were withheld for taxes due by employees upon lapsing of restricted stock units.

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The Company is obligated under a U.S. Domestic credit facility with (the Facility) with JPMorgan Chase Bank, N.A. (JPM Chase) which provides for maximum revolving credit borrowings of $5,500 and matures on June 28, 2019. Fuel Tech can use this Facility for cash advances and standby letters of credit. The Facility is secured by $5,500 in cash held by the Company in a separate restricted use designated JPM Chase deposit account and has the Company's Italian subsidiary, Fuel Tech S.r.l., as a guarantor. Outstanding borrowings under the Facility bear interest at a rate of LIBOR plus 300 basis points. There are no financial covenants set forth in this amendment to the Facility. The Facility was amended on three occasions during 2018, most recently October 19, 2018, in order to amend the maximum availability under the Facility. The Company is actively pursuing the renewal of its U.S. Domestic credit facility and intends to renew the U.S. Domestic credit facility at its maturity. As of December 31, 2018 and 2017, there were no outstanding borrowings under the Facility.

The existing U.S. Domestic credit Agreement will expire on June 28, 2019. The Company is actively pursuing the renewal of its U.S. Domestic credit facility and intends to renew the U.S. Domestic credit facility at its maturity.

At December 31, 2018 and 2017, we had outstanding standby letters of credit and bank guarantees totaling approximately $5,028 and $3,004, respectively, on our domestic credit facility in connection with contracts in process. We are committed to reimbursing the issuing bank for any payments made by the bank under these instruments. At December 31, 2018 and 2017, there were no cash borrowings under the domestic revolving credit facility and approximately $443 and $1,996, was available for future borrowings under the Facility. We pay a commitment fee of 0.25% per year on the unused portion of the revolving credit facility.

Beijing Fuel Tech Environmental Technologies Company, Ltd. (Beijing Fuel Tech), is obligated under a revolving credit facility (the China Facility) agreement, as most recently amended on October 19, 2018, with JPM Chase which provides which provides for maximum revolving credit borrowings of RMB 2.625 million (approximately $382) and matures on June 30, 2019. The Facility is secured by $520 in cash held by the Company in a separate restricted use designated JPM Chase deposit account. The China Facility bears interest at a rate of 140% of the People's Bank of China (PBOC) Base Rate, and is guaranteed by the Company. Beijing Fuel Tech can use this facility for cash advances and bank guarantees. As of December 31, 2018 and 2017, Beijing Fuel Tech had no cash borrowings under the China Facility. At December 31, 2018 and 2017, we had outstanding standby letters of credit and bank guarantees totaling approximately $0 and $246, respectively, on its Beijing Fuel Tech revolving credit facility in connection with contracts in process. At December 31, 2018 and 2017, approximately $382 and $753 was available for future borrowings. As a result of the announcement of the suspension of the Air Pollution Control business in Beijing, the Company intends to not renew the China Facility upon its expiration on June 30, 2019.

In the event of default on either the domestic facility or the China facility, the cross default feature in each allows the lending bank to accelerate the payments of any amounts outstanding and may, under certain circumstances, allow the bank to cancel the facility. If we were unable to obtain a waiver for a breach of covenant and the bank accelerated the payment of any outstanding amounts, such acceleration may cause our cash position to deteriorate or, if cash on hand were insufficient to satisfy the payment due, may require us to obtain alternate financing to satisfy the accelerated payment.

We continue to monitor our liquidity needs and in response to our continued losses have taken measures to reduce expenses and restructure operations which we feel are necessary to ensure we maintain sufficient working capital and liquidity to operate the business and invest in our future.

For the year ended December 31, 2018, we have sustained income before discontinued operations totaling $85. Our cash provided by continuing operations for this same period totaled $5,049. We have taken measures to reduce our expense infrastructure, and over the past three years have eliminated approximately $7.0 million in aggregate selling, general and administrative expenses primarily through headcount and other operating expense cutbacks.

Our cash balance as of December 31, 2018 totaled $18.1 million (inclusive of our restricted cash balance), and our working capital totaled $24.0 million. We do not have any outstanding debt obligations other than our letters of credit, and our current credit agreement does not have any financial covenants as we have moved to a cash collateralized line of credit with our lender.

We have evaluated our ongoing business needs, and considered the cash requirements of our base business of Air Pollution Control and Fuel Chem businesses. This evaluation included consideration of the following: a) customer and revenue trends in our APC and Fuel Chem business segments, b) current operating structure and expenditure levels, c) contingent payouts as described in the notes to our financial statements, and d) support for our research and development initiatives.

We currently have a $5.5 million domestic U.S. credit facility which we use to issue letters of credit to our customers, which is a fully cash collateralized line of credit requiring us to deposit funds in a restricted cash account to support that credit line. We expect to continue operating under this arrangement for the foreseeable future. Our liquidity may be adversely affected to the extent we are required to collateralize further letters of credit by additional cash deposits.

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Based on this analysis, management believes that currently we have sufficient cash and working capital to operate our base APC and Fuel Chem businesses.

Contractual Obligations and Commitments

In our normal course of business, we enter into agreements obligating us to make future payments. The contractual cash obligations noted below are primarily related to supporting the ongoing operations of the business.

Payments due by period in thousands of dollars

Contractual Cash Obligations	Total	2019	2020	2021	Thereafter
Operating lease obligations	$726	$613	$102	$ 11	$ —
Total	$726	$613	$102	$ 11	$ —

In the normal course of our business, we use bank performance guarantees and letters of credit in support of construction contracts with customers as follows:

- in support of the warranty period defined in the contract; or
- in support of the system performance criteria that are defined in the contract.

In addition, we use bank performance guarantees with standby letters of credit and performance surety bonds as security for contract performance and other obligations as needed in the normal course of business. As of December 31, 2018, we had outstanding bank performance obligations that may or may not result in cash obligations as follows:

Commitment expiration by period in thousands of dollars

Commercial Commitments	Total	2019	2020	2021	Thereafter
Standby letters of credit and bank guarantees	$5,028	$4,402	$277	$ 71	$ 278
Total	$5,028	$4,402	$277	$ 71	$ 278

Off-Balance-Sheet Transactions

There were no other off-balance-sheet transactions other than the obligations and commitments listed above during the three-year period ended December 31, 2018.

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ITEM 7A - QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Our earnings and cash flow are subject to fluctuations due to changes in foreign currency exchange rates. We do not enter into foreign currency forward contracts or into foreign currency option contracts to manage this risk due to the nature of the transactions involved.

We are also exposed to changes in interest rates primarily due to our debt arrangement (refer to Note 10 to the consolidated financial statements). A hypothetical 100 basis point adverse move in interest rates along the entire interest rate yield curve would not have a materially adverse effect on interest expense during the upcoming year ended December 31, 2018.

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ITEM 8 - FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Fuel Tech, Inc.

Opinion on the Financial Statements
We have audited the accompanying consolidated balance sheets of Fuel Tech, Inc. (the Company) as of December 31, 2018 and 2017, the related consolidated statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2018, and the related notes to the consolidated financial statements (collectively, the financial statements). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion
These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's 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 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 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 financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the 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 financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ RSM US LLP

We have served as the Company's auditor since 2010.

Chicago, Illinois
March 14, 2019

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Fuel Tech, Inc.
Consolidated Balance Sheets
(in thousands of dollars, except share and per-share data)

	December 31,	
	2018	2017
ASSETS		
Current assets:		
Cash and cash equivalents	$12,039	$8,366
Restricted cash	6,020	1,020
Marketable securities	—	6
Accounts receivable, net	18,399	19,690
Inventories, net	957	945
Prepaid expenses and other current assets	3,184	3,592
Income taxes receivable	118	129
Total current assets	40,717	33,748
Property and equipment, net	5,976	6,272
Goodwill	2,116	2,116
Other intangible assets, net	1,164	1,671
Restricted cash	—	5,000
Assets held for sale	485	485
Other assets	1,261	1,192
Total assets	$51,719	$50,484
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$9,499	$9,065
Accrued liabilities:		
Employee compensation	1,563	1,487
Income taxes payable	—	73
Other accrued liabilities	6,099	5,098
Total current liabilities	17,161	15,723
Deferred income taxes	171	169
Other liabilities	335	420
Total liabilities	17,667	16,312
COMMITMENTS AND CONTINGENCIES (Note 9)		
Stockholders' equity:		
Common stock, $.01 par value, 40,000,000 shares authorized, 24,825,891 and 24,777,001 shares issued, and 24,170,585 and 24,132,910 outstanding in 2018 and 2017, respectively	248	248
Additional paid-in capital	138,992	138,760
Accumulated deficit	(102,495)	(102,672)
Accumulated other comprehensive loss	(1,285)	(768)
Nil coupon perpetual loan notes	76	76
Treasury stock, 655,306 and 644,091 shares in 2018 and 2017, respectively, at cost	(1,484)	(1,472)
Total shareholders' equity	34,052	34,172
Total liabilities and shareholders' equity	$51,719	$50,484

See notes to consolidated financial statements.

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Fuel Tech, Inc.
Consolidated Statements of Operations
(in thousands of dollars, except share and per-share data)

	For the years ended December 31,		
	2018	2017	2016
Revenues	$56,535	$45,166	$55,161
Costs and expenses:			
Cost of sales	36,471	27,144	36,367
Selling, general and administrative	18,564	20,933	25,564
Restructuring charge	—	119	1,428
Research and development	1,073	1,070	1,752
Intangible assets abandonment and building impairment	317	2,965	2,074
Total Costs and Expenses	56,425	52,231	67,185
Operating income (loss) from continuing operations	110	(7,065)	(12,024)
Interest income	6	10	25
Other expense	2	(60)	(925)
Income (loss) from continuing operations before income taxes	118	(7,115)	(12,924)
Income tax benefit (expense)	(33)	580	(1,664)
Net income (loss) from continuing operations	85	(6,535)	(14,588)
Loss from discontinued operations (net of income tax benefit of $0 in 2018, 2017 and 2016)	(113)	(3,914)	(2,800)
Net loss	$(28)	$(10,449)	$(17,388)
Net loss per common share:			
Basic			
Continuing operations	$—	$(0.28)	$(0.62)
Discontinued operations	$—	$(0.16)	$(0.12)
Basic net loss per common share	$—	$(0.44)	$(0.74)
Diluted			
Continuing operations	$—	$(0.28)	$(0.62)
Discontinued operations	$—	$(0.16)	$(0.12)
Diluted net loss per common share	$—	$(0.44)	$(0.74)
Weighted-average number of common shares outstanding:			
Basic	24,164,000	23,872,000	23,365,000
Diluted	24,164,000	23,872,000	23,365,000

See notes to consolidated financial statements.

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Fuel Tech, Inc.
Consolidated Statements of Comprehensive (Loss) Income
(in thousands of dollars)

	For the years ended December 31,		
	2018	2017	2016
Net loss	$ (28)	$ (10,449)	$ (17,388)
Other comprehensive income (loss):			
Foreign currency translation adjustments	(513)	802	(6)
Unrealized losses from marketable securities, net of tax	(4)	(2)	(6)
Total other comprehensive income (loss)	(517)	800	(12)
Comprehensive loss	$ (545)	$ (9,649)	$ (17,400)

See notes to consolidated financial statements.

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Fuel Tech, Inc.
Consolidated Statements of Stockholders' Equity
(in thousands of dollars or shares, as appropriate)

	Common Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income (Loss)	Nil Coupon Perpetual Loan Notes	Treasury Stock	Total
	Shares	Amount						
Balance at December 31, 2015	23,167	$ 234	$135,394	$(74,835)	$ (1,556)	$ 76	$(1,042)	$58,271
Net loss				(17,388)				(17,388)
Foreign currency translation adjustments					(6)			(6)
Unrealized loss on marketable securities, net of tax					(6)			(6)
Stock compensation expense			1,991					1,991
Common shares issued upon vesting of restricted stock units	382	4	(5)					(1)
Treasury shares withheld	(103)						(172)	(172)
Balance at December 31, 2016	23,446	$ 238	$137,380	$(92,223)	$ (1,568)	$ 76	$(1,214)	$42,689
Net loss				(10,449)				(10,449)
Foreign currency translation adjustments					802			802
Unrealized loss on marketable securities, net of tax					(2)			(2)
Stock compensation expense			1,389					1,389
Common shares issued upon vesting of restricted stock units	976	10	(9)					1
Treasury shares withheld	(289)						(258)	(258)
Balance at December 31, 2017	24,133	$ 248	$138,760	$(102,672)	$ (768)	$ 76	$(1,472)	$34,172
Net loss				(28)				(28)
Foreign currency translation adjustments					(513)			(513)
Unrealized loss on marketable securities, net of tax					(4)			(4)
Stock compensation expense			233					233
Common shares issued upon vesting of restricted stock units	49	—	(1)					(1)
Treasury shares withheld	(12)						(12)	(12)
Adoption of ASC 606				205				205
Balance at December 31, 2018	24,170	$ 248	$138,992	$(102,495)	$ (1,285)	$ 76	$(1,484)	$34,052

See notes to consolidated financial statements.

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Fuel Tech, Inc.
Consolidated Statements of Cash Flows
(in thousands of dollars)

	For the years ended December 31,		
	2018	2017	2016
OPERATING ACTIVITIES			
Net loss	$(28)	$(10,449)	$(17,388)
Loss from discontinued operations	113	3,914	2,800
Net income (loss) from continuing operations	85	(6,535)	(14,588)
Adjustments to reconcile net income (loss) to net cash used in operating activities:			
Depreciation	654	1,312	1,780
Amortization	193	215	1,118
Loss on disposal of equipment	142	304	60
Provision for doubtful accounts, net of recoveries	(64)	—	(111)
Deferred income taxes	2	(534)	1,196
Stock-based compensation, net of forfeitures	233	1,389	1,991
Intangible assets abandonment and building impairment	317	2,965	2,074
Excess and obsolete inventory provision	78	228	825
Changes in operating assets and liabilities:			
Accounts receivable	848	113	3,522
Inventories	(108)	(134)	446
Prepaid expenses, other current assets and other non-current assets	251	(1,084)	2,893
Accounts payable	521	2,500	(2,445)
Accrued liabilities and other non-current liabilities	1,897	(2,439)	699
Net cash provided by (used in) operating activities - continuing operations	5,049	(1,700)	(540)
Net cash used in operating activities - discontinued operations	(122)	(1,868)	(2,198)
Net cash provided by (used in) operating activities	4,927	(3,568)	(2,738)
INVESTING ACTIVITIES			
Purchases of equipment and patents	(570)	(492)	(940)
Proceeds from the sale of equipment	1	2	2
Net cash used in investing activities	(569)	(490)	(938)
FINANCING ACTIVITIES			
Taxes paid on behalf of equity award participants	(12)	(258)	(172)
Net cash used in financing activities	(12)	(258)	(172)
Effect of exchange rate fluctuations on cash	(673)	856	10
Net increase (decrease) in cash, cash equivalents and restricted cash	3,673	(3,460)	(3,838)
Cash, cash equivalents and restricted cash at beginning of period	14,386	17,846	21,684
Cash, cash equivalents and restricted cash at end of period	$18,059	$14,386	$17,846
Supplemental Cash Flow Information:			
Cash paid for:			
Interest	$—	$—	$—
Income taxes paid	$27	$31	$368

See notes to consolidated financial statements.

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Notes to Consolidated Financial Statements
(in thousands of dollars, except share and per-share data)

1. ORGANIZATION AND SIGNIFICANT ACCOUNTING POLICIES

Organization

Fuel Tech, Inc. and subsidiaries ("Fuel Tech", the "Company", "we", "us" or "our") provides advanced engineered solutions for the optimization of combustion systems in utility and industrial applications. Our primary focus is on the worldwide marketing and sale of NOx reduction technologies as well as our FUEL CHEM program. The Company's NOx reduction technologies reduce nitrogen oxide emissions from boilers, furnaces and other stationary combustion sources.

Our FUEL CHEM program is based on proprietary TIFI® Targeted In-Furnace™ Injection technology, in combination with advanced Computational Fluid Dynamics (CFD) and Chemical Kinetics Modeling (CKM) boiler modeling, in the unique application of specialty chemicals to improve the efficiency, reliability and environmental status of combustion units by controlling slagging, fouling, corrosion, opacity and other sulfur trioxide-related issues in the boiler.

Our business is materially dependent on the continued existence and enforcement of air quality regulations, particularly in the United States. We have expended significant resources in the research and development of new technologies in building our proprietary portfolio of air pollution control, fuel and boiler treatment chemicals, computer modeling and advanced visualization technologies.

International revenues were $12,648, $15,656, and $12,616 for the years ended December 31, 2018, 2017 and 2016, respectively. These amounts represented 22%, 35%, and 23% of Fuel Tech's total revenues for the respective periods of time. Foreign currency changes did not have a material impact on the calculation of these percentages. We have foreign offices in Beijing, China and Gallarate, Italy.

Basis of Presentation

The consolidated financial statements include the accounts of Fuel Tech and its wholly-owned subsidiaries. All intercompany transactions have been eliminated.

The consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America (GAAP). The books and records of subsidiaries located in foreign countries are maintained according to generally accepted accounting principles in those countries. Upon consolidation, the Company evaluates the differences in accounting principles and determines whether adjustments are necessary to convert the foreign financial statements to the accounting principles upon which the consolidated financial statements are based. As a result of this evaluation no material adjustments were identified. All intercompany transactions have been eliminated.

During the year ended December 31, 2018, we discovered an error in the previously issued financial statements as a result of the preparation of the current year income tax provision. The income tax error discovered did not correctly include a deferred tax liability associated with historical goodwill from our Fuel Chem business segment for the year ended December 31, 2015.

We evaluated the revision in accordance with Accounting Standards Codification (ASC) 250, Accounting Changes and Error Corrections and evaluated the materiality of the revision on prior periods' financial statements in accordance with the Securities and Exchange Commission Staff Accounting Bulletin No. 99, Materiality. We concluded that the revision was not material to any prior annual or interim period and therefore, amendments of previously filed reports are not required. In accordance with ASC 250, we have corrected the error in all prior periods presented by revising the consolidated financial statements appearing herein. Periods not presented herein will be revised, as applicable, in future filings. The revision did have an impact on net income (loss) or earnings per share data for the year ended December 31, 2017. The revision did not have an impact on net income (loss) or earnings per share data for the year ended December 31, 2016.

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The following table presents the impact of this revision on our consolidated statements of operations as follows:

Year Ended December 31, 2017	As Previously Reported	Revision	As Revised
Income tax benefit	46	534	580
Net loss from continuing operations	(7,069)	534	(6,535)
Net loss	(10,983)	534	(10,449)
Comprehensive loss	(10,183)	534	(9,649)
Basic			
Continuing operations	(0.30)	0.02	(0.28)
Discontinued operations	(0.16)	—	(0.16)
Basic loss per common share	(0.46)	0.02	(0.44)
Diluted			
Continuing operations	(0.30)	0.02	(0.28)
Discontinued operations	(0.16)	—	(0.16)
Basic loss per common share	(0.46)	0.02	(0.44)

The following table presents the impact of the revision on the December 31, 2017 and 2016 consolidated balance sheet:

Year Ended December 31, 2017	As Previously Reported	Revision	As Revised
Deferred income taxes (long-term)	—	(169)	(169)
Accumulated deficit	(102,503)	(169)	(102,672)
Total shareholders' equity	34,341	(169)	34,172
Year Ended December 31, 2016	As Previously Reported	Revision	As Revised
Deferred income taxes (long-term)	—	(703)	(703)
Accumulated deficit	(91,520)	(703)	(92,223)
Total shareholders' equity	43,392	(703)	42,689

The error originated for the year ended December 31, 2015 and the accumulated deficit was revised in the Statement of Stockholder's Equity to reflect the correction of the deferred tax liability:

Year Ended December 31, 2015	As Previously Reported	Revision	As Revised
Accumulated deficit	(74,132)	(703)	(74,835)
Total shareholders' equity	58,974	(703)	58,271

Use of Estimates

The preparation of the financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. The Company uses estimates in accounting for, among other items, revenue recognition, allowance for doubtful accounts, income tax provisions, excess and obsolete inventory reserve, impairment of long-lived assets, and warranty expenses. Actual results could differ from those estimates.

Fair Value of Financial Instruments

The carrying values of cash and cash equivalents, accounts receivable, and accounts payable are reasonable estimates of their fair value due to their short-term nature. Our marketable securities are carried at fair value based on quoted market prices in an active market.

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Cash, cash equivalents and restricted cash

We include cash and investments having an original maturity of three months or less at the time of acquisition in cash and cash equivalents. We have never incurred realized or unrealized holdings gains or losses on securities classified as cash equivalents. Income resulting from short-term investments is recorded as interest income. At December 31, 2018, we had cash on hand of approximately $855 at our Beijing, China subsidiary that is subject to certain local regulations that may limit the immediate availability of these funds outside of China. Cash on hand at our Italy subsidiary totaled approximately 2,008 at December 31, 2018.

Restricted cash represents funds that are restricted to satisfy any amount borrowed against the Company's existing revolving credit facility (the Facility) with JPMorgan Chase Bank, N.A. The remaining balance of restricted cash totaling $6,020 will remain through the Maturity Date of the Facility. Refer to Note 10 Debt Financing for further information on the Facility.

The following table provides a reconciliation of cash, cash equivalents, and restricted cash reported within the Consolidated Balance Sheet that sum to the total of the same such amounts shown in the Consolidated Statements of Cash Flows:

	December 31, 2018	December 31, 2017
Cash and cash equivalents	$ 12,039	$ 8,366
Restricted cash included in current assets	6,020	1,020
Restricted cash included in long-term assets	—	5,000
Total cash, cash equivalents, and restricted cash shown in the Consolidated Statements of Cash Flows	$ 18,059	$ 14,386

Foreign Currency Risk Management

Our earnings and cash flows are subject to fluctuations due to changes in foreign currency exchange rates. We do not enter into foreign currency forward contracts or into foreign currency option contracts to manage this risk due to the nature of the transactions involved.

Accounts Receivable

Accounts receivable consist of amounts due to us in the normal course of our business, are not collateralized, and normally do not bear interest. Accounts receivable includes contract assets, billings occurring subsequent to revenue recognition under ASC 606 Revenue from Contracts with Customers. At December 31, 2018 and 2017, unbilled receivables were approximately $5,540 and $7,894, respectively. Refer to Note 3 for further detail.

Allowance for Doubtful Accounts

The allowance for doubtful accounts is our management's best estimate of the amount of credit losses in accounts receivable. In order to control and monitor the credit risk associated with our customer base, we review the credit worthiness of customers on a recurring basis. Factors influencing the level of scrutiny include the level of business the customer has with Fuel Tech, the customer’s payment history, and the customer’s financial stability. Receivables are considered past due if payment is not received by the date agreed upon with the customer, which is normally 30 days. Representatives of our management team review all past due accounts on a weekly basis to assess collectability. At the end of each reporting period, the allowance for doubtful accounts balance is reviewed relative to management’s collectability assessment and is adjusted if deemed necessary through a corresponding charge or credit to bad debts expense, which is included in selling, general, and administrative expenses in the consolidated statements of operations. Bad debt write-offs are made when management believes it is probable a receivable will not be recovered. The table below sets forth the components of the Allowance for Doubtful Accounts for the years ended December 31.

Year	Balance at January 1	Provision charged to expense	Write-offs / Recoveries	Balance at December 31
2016	$ 1,772	$ 172	$ (375)	$ 1,569
2017	$ 1,569	$ —	$ (24)	$ 1,545
2018	$ 1,545	$ —	$ (134)	$ 1,411

Prepaid expenses and other current assets

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Prepaid expenses and other current assets includes Chinese banker acceptances of $997 and $613 as of December 31, 2018 and 2017. These are short-term commitments of typically 30 to 60 days for future payments and can be redeemed at a discount or applied to future vendor payments.

Inventories

Inventories consist primarily of spare parts and are stated at the lower of cost or net realizable value, using the weighted-average cost method. Usage is recorded in cost of sales in the period that parts were issued to a project or used to service equipment. Inventories are periodically evaluated to identify obsolete or otherwise impaired parts and are written off when management determines usage is not probable. The Company estimates the balance of excess and obsolete inventory by analyzing inventory by age using last used and original purchase date and existing sales pipeline for which the inventory could be used. The table below sets forth the components of the Excess and Obsolete Inventory Reserve for the years ended December 31.

Year	Balance at January 1	Provision charged to expense	Write-offs / Recoveries	Balance at December 31
2016	$—	$ 825	$—	$ 825
2017	825	228	—	1,053
2018	1,053	78	—	1,131

Foreign Currency Translation and Transactions

Assets and liabilities of consolidated foreign subsidiaries are translated into U.S. dollars at exchange rates in effect at year end. Revenues and expenses are translated at average exchange rates prevailing during the year. Gains or losses on foreign currency transactions and the related tax effects are reflected in net income. The resulting translation adjustments are included in stockholders' equity as part of accumulated other comprehensive income.

Accumulated Other Comprehensive (Loss)

The changes in accumulated other comprehensive (loss) by component were as follows:

	December 31, 2018	2017
Foreign currency translation		
Balance at beginning of period	$(772)	$(1,574)
Other comprehensive (loss):		
Foreign currency translation adjustments (1)	(513)	802
Balance at end of period	$(1,285)	$(772)
Available-for-sale marketable securities		
Balance at beginning of period	$4	$6
Other comprehensive (loss):		
Net unrealized holding (loss) (2)	(4)	(2)
Balance at end of period	$—	$4
Total accumulated other comprehensive (loss)	$(1,285)	$(768)

(1) In all periods presented, there were no tax impacts related to rate changes and no amounts were reclassified to earnings.

(2) In all periods presented, there were no realized holding gains or losses and therefore no amounts were reclassified to earnings.

Research and Development

Research and development costs are expensed as incurred. Research and development projects funded by customer contracts are reported as part of cost of goods sold. Internally funded research and development expenses are reported as operating expenses.

Product/System Warranty

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We typically warrant our air pollution control products and systems against defects in design, materials and workmanship for one to two years. A provision for estimated future costs relating to warranty expense is recorded when the products/systems become commercially operational.

Goodwill

Goodwill is tested for impairment at least annually as of the first day of our fourth quarter, or more frequently if events or changes in circumstances indicate that the carrying value may not be recoverable. Our evaluation of goodwill impairment involves first assessing qualitative factors to determine whether it is more likely than not that the fair value of a reporting unit is less than its carrying amount. We may bypass this qualitative assessment, or determine that based on our qualitative assessment considering the totality of events and circumstances including macroeconomic factors, industry and market considerations, current and projected financial performance, a sustained decrease in our share price, or other factors, that additional impairment analysis is necessary. This additional analysis involves comparing the current fair value of our reporting units to their carrying values. We use a discounted cash flow (DCF) model to determine the current fair value of our two reporting units. A number of significant assumptions and estimates are involved in the application of the DCF model to forecast operating cash flows, including markets and market share, sales volumes and prices, costs to produce and working capital changes. Management considers historical experience and all available information at the time the fair values of its reporting units are estimated. However, actual fair values that could be realized in an actual transaction may differ from those used to evaluate the impairment of goodwill. Fuel Tech performed its annual goodwill impairment analysis for each of its reporting units as of October 1, 2018 and determined that no impairment of goodwill existed within the FUEL CHEM technology segment.

Goodwill is allocated to each of our reporting units, which is defined as an operating segment or one level below an operating segment, upon acquisition after considering the nature of the net assets giving rise to the goodwill and how each reporting unit would enjoy the benefits and synergies of the net assets acquired. Goodwill is also evaluated for impairment at the reporting unit level. We have two reporting units for goodwill evaluation purposes: the FUEL CHEM technology segment and the APC technology segment. There is no goodwill associated with our APC business technology segment.

The entire goodwill balance of $2,116 was allocated to the FUEL CHEM technology segment as of December 31, 2018 and 2017. The Company did not recognize a charge for goodwill impairment for the periods ended December 31, 2018, 2017 and 2016.

Other Intangible Assets

Management reviews other finite-lived intangible assets, which include customer lists and relationships, covenants not to compete, patent assets, trade names, and acquired technologies, for impairment when events or changes in circumstances indicate the carrying amount of an asset or asset group may not be recoverable. In the event that impairment indicators exist, a further analysis is performed and if the sum of the expected undiscounted future cash flows resulting from the use of the asset or asset group is less than the carrying amount of the asset or asset group, an impairment loss equal to the excess of the asset or asset group's carrying value over its fair value is recorded. Management considers historical experience and all available information at the time the estimates of future cash flows are made, however, the actual cash values that could be realized may differ from those that are estimated.

In the second quarter of 2018, Fuel Tech recorded an abandonment charge of $317 associated with certain international patent assets which the Company elected to not maintain and abandon due to limited business opportunities in those regions. The abandonment charge was calculated by determining the net book values of the abandoned patent assets by deducting the accumulated amortization from the acquisition cost. The abandonment charge of $317 is included in “Intangible assets abandonment and building impairment” line in the accompanying Consolidated Statements of Operations for the year ended December 31, 2018.

In the fourth quarter of 2016, the Company performed an impairment test of the carrying value of our intangible assets to determine whether any impairment existed given the decline in our stock price and sustained operating losses in our APC segment. The Company determined that the sum of the expected undiscounted cash flows attributable to certain intangible assets was less than its carrying value and that an impairment charge was required. The impairment loss

primarily related to the developed technology, customer relationships and trademarks acquired in the 2014 acquisition of PECO and FGC. The Company calculated the estimated fair value of the intangible asset by summing the present value of the expected cash flows over its life. The impairment was calculated by deducting the present value of the expected cash flows from the carrying value. This assessment resulted in an impairment charge of $2,074, which was included in “Intangible assets impairment” in the accompanying Consolidated Statements of Operations for the year ended December 31, 2016.

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Third-party costs related to the development of patents are included within other intangible assets on the consolidated balance sheets. As of December 31, 2018 and 2017, the net patent asset balance, excluding patents acquired in business acquisitions, was $1,164 and $1,611, respectively. The third-party costs capitalized as patent costs during the years ended December 31, 2018 and 2017 were $59 and $135, respectively. Third-party costs are comprised of legal fees that relate to the review and preparation of patent disclosures and filing fees incurred to present the patents to the required governing body.

Our intellectual property portfolio has been a significant building block for the Air Pollution Control and FUEL CHEM technology segments. The patents are essential to the generation of revenue for our businesses and are essential to protect us from competition in the markets in which we serve. These costs are being amortized on the straight-line method over the period beginning with the patent issuance date and ending on the patent expiration date. Patent maintenance fees are charged to operations as incurred.

Amortization expense from continuing operations for intangible assets was $193, $215 and $1,118 for the years ended December 31, 2018, 2017 and 2016, respectively. The table below shows the amortization period and other intangible asset cost by intangible asset as of December 31, 2018 and 2017, and the accumulated amortization and net intangible asset value in total for all other intangible assets.

		2018			2017		
Description of Other Intangibles	Amortization Period	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Customer relationships	11-15 years	$1,198	$ (1,198)	$ —	$1,198	$ (1,138)	$ 60
Patent assets	1- 20 years	2,092	(928)	1,164	2,412	(801)	1,611
Total		$3,290	$ (2,126)	$ 1,164	$3,610	$ (1,939)	$ 1,671

The table below shows the estimated future amortization expense for intangible assets:

Year	Estimated Amortization Expense
2019	$ 132
2020	132
2021	132
2022	132
2023	132
Thereafter	504
Total	$ 1,164

Property and Equipment

Property and equipment is stated at historical cost. Provisions for depreciation are computed by the straight-line method, using estimated useful lives that range based on the nature of the asset. Leasehold improvements are depreciated over the shorter of the associated lease term or the estimated useful life of the asset. Depreciation expense from continuing operations was $654, $1,312, and $1,780 for the years ended December 31, 2018, 2017 and 2016, respectively. The table below shows the depreciable life and cost by asset class as of December 31, 2018 and 2017, and the accumulated depreciation and net book value in total for all classes of assets.

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Description of Property and Equipment	Depreciable Life	2018	2017
Land		$1,050	$1,050
Building	39 years	3,950	3,950
Building and leasehold improvements	3-39 years	3,242	3,264
Field equipment	3-4 years	19,541	19,251
Computer equipment and software	2-3 years	3,154	3,124
Furniture and fixtures	3-10 years	1,535	1,539
Vehicles	5 years	32	32
Total cost		32,504	32,210
Less accumulated depreciation		(26,528)	(25,938)
Total net book value		$5,976	$6,272

Property and equipment is reviewed for impairment when events and circumstances indicate that the carrying amount of the assets (or asset group) may not be recoverable. If impairment indicators exists, we perform a more detailed analysis and an impairment loss is recognized when estimated future undiscounted cash flows expected to result from the use of the asset (or asset group) and its eventual disposition are less than the carrying amount. This process of analyzing impairment involves examining the operating condition of individual assets (or asset group) and estimating a fair value based upon current condition, relevant market factors and remaining estimated operational life compared to the asset’s remaining depreciable life. Quoted market prices and other valuation techniques are used to determine expected cash flows. A significant portion of our property and equipment is comprised of assets deployed at customer locations relating to our FUEL CHEM technology asset group, and due to the shorter-term duration over which this equipment is depreciated, the likelihood of impairment is mitigated. The discontinuation of a FUEL CHEM program at a customer site would most likely result in the re-deployment of all or most of the affected assets to another customer location rather than an impairment.

During the second quarter of 2017, we experienced a decrease in our stock price that caused our market capitalization to fall below the equity value on our consolidated balance sheet, which resulted in an indicator of impairment. This, along with an overall slowdown in APC technology and corresponding downward adjustments to our financial forecasts, was considered during a detailed evaluation of the fair value of our reporting units. As a result of these triggering events, Fuel Tech performed a long-lived asset impairment analysis for each of the reporting units as of April 1, 2017. Based on this evaluation, we determined that our APC segment failed the first step of our impairment analysis because the estimated gross cash flows and fair value of the reporting unit was less than its carrying value, thus requiring additional analysis of the segment. However, no impairment resulted as the fair values of the underlying patents and equipment equaled or exceeded their carrying values. We evaluated the corporate asset group, which contains our corporate headquarters office building and land in Warrenville, Illinois, using the residual method and management determined that there was not adequate gross cash flows to support the carrying value. After obtaining an appraisal from a third-party appraiser, management determined that the carrying value of the office building and land exceeded the fair value and recorded an impairment charge of $2,965 for the year ended December 31, 2017.
Revenue Recognition

On January 1, 2018, we adopted ASC 606 "Revenue from Contracts with Customers" ("ASC 606") using the modified retrospective method applied to those contracts which were not completed as of January 1, 2018. Results for reporting periods beginning after January 1, 2018 are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported in accordance with our legacy accounting under Accounting Standards Codification Topic 605: Revenue Recognition (ASC 605).

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For the years ended prior to January 1, 2018

Revenues from the sales of chemical products are recorded when title transfered, either at the point of shipment or at the point of destination, depending on the contract with the customer in accordance with ASC 605. We used the percentage of completion method of accounting for equipment construction, equipment supply and license contracts that are sold within the Air Pollution Control technology segment. Under the percentage of completion method, revenues are recognized as work is performed based on the relationship between actual construction costs incurred and total estimated costs at completion. Construction costs include all direct costs such as materials, labor, and subcontracting costs, and indirect costs allocable to the particular contract such as indirect labor, tools and equipment, and supplies. Revisions in completion estimates and contract values are made in the period in which the facts giving rise to the revisions become known and can influence the timing of when revenues are recognized under the percentage of completion method of accounting. Such revisions have historically not had a material effect on the amount of revenue recognized. Provisions are made for estimated losses on uncompleted contracts in the period in which such losses are determined.

Years beginning after January 1, 2018

The Company recognizes revenue when control of the promised goods or services is transferred to our customers, in amount that reflects the consideration we expect to be entitled to in exchange for those goods or services. Fuel Tech's sales of products to customers represent single performance obligations, which are not impacted upon the adoption of ASC 606. The majority of our contracts have a single performance obligation as the promise to transfer the individual goods or services is not separately identifiable from other promises in the contracts and, therefore, not distinct. Revenue is measured as the amount of consideration we expect to receive in exchange for transferring goods or providing services. Sales, value add, and other taxes we collect concurrent with revenue-producing activities are excluded from revenue.

FUEL CHEM

Revenues from the sale of chemical products are recognized when control transfers to customer upon shipment or delivery of the product based on the applicable shipping terms. We generally recognize revenue for these arrangements at a point in time based on our evaluation of when the customer obtains control of the promised goods or services.

Air Pollution Control Technology

Fuel Tech's APC contracts are typically six to eighteen months in length. A typical contract will have three or four critical operational measurements that, when achieved, serve as the basis for us to invoice the customer via progress billings. At a minimum, these measurements will include the generation of engineering drawings, the shipment of equipment and the completion of a system performance test.

As part of most of its contractual APC project agreements, Fuel Tech will agree to customer-specific acceptance criteria that relate to the operational performance of the system that is being sold. These criteria are determined based on modeling that is performed by Fuel Tech personnel, which is based on operational inputs that are provided by the customer. The customer will warrant that these operational inputs are accurate as they are specified in the binding contractual agreement. Further, the customer is solely responsible for the accuracy of the operating condition information; typically all performance guarantees and equipment warranties granted by us are voidable if the operating condition information is inaccurate or is not met.

Since control transfers over time, revenue is recognized based on the extent of progress towards completion of the single performance obligation. Fuel Tech uses the cost-to-cost input measure of progress for our contracts since it best depicts the transfer of assets to the customer which occurs as we incur costs on our contracts. Under the cost-to-cost input measure of progress, the extent of progress towards completion is measured based on the ratio of costs incurred

to date to the total estimated costs at completion of the performance obligation. Revenues are recorded proportionally as costs are incurred. Costs to fulfill include all internal and external engineering costs, equipment charges, inbound and outbound freight expenses, internal and site transfer costs, installation charges, purchasing and receiving costs, inspection costs, warehousing costs, project personnel travel expenses and other direct and indirect expenses specifically identified as project- or product-line related, as appropriate (e.g. test equipment depreciation and certain insurance expenses).

Fuel Tech has installed over 1,000 units with APC technology and normally provides performance guarantees to our customers based on the operating conditions for the project. As part of the project implementation process, we perform system start-up and optimization services that effectively serve as a test of actual project performance. We believe that this test, combined with the accuracy of the modeling that is performed, enables revenue to be recognized prior to the receipt of formal customer acceptance.

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Cost of Sales

Cost of sales includes all internal and external engineering costs, equipment and chemical charges, inbound and outbound freight expenses, internal and site transfer costs, installation charges, purchasing and receiving costs, inspection costs, warehousing costs, project personnel travel expenses and other direct and indirect expenses specifically identified as project- or product line-related, as appropriate (e.g., test equipment depreciation and certain insurance expenses). Certain depreciation and amortization expenses related to tangible and intangible assets, respectively, are allocated to cost of sales. We classify shipping and handling costs in cost of sales in the consolidated statements of operations.

Selling, General and Administrative Expenses

Selling, general and administrative expenses primarily include the following categories except where an allocation to the cost of sales line item is warranted due to the project- or product-line nature of a portion of the expense category: salaries and wages, employee benefits, non-project travel, insurance, legal, rent, accounting and auditing, recruiting, telephony, employee training, Board of Directors' fees, auto rental, office supplies, dues and subscriptions, utilities, real estate taxes, commissions and bonuses, marketing materials, postage and business taxes. Departments comprising the selling, general and administrative line item primarily include the functions of executive management, finance and accounting, investor relations, regulatory affairs, marketing, business development, information technology, human resources, sales, legal and general administration.

Income Taxes

The provision for income taxes is determined using the asset and liability approach of accounting for income taxes. Under this approach, the provision for income taxes represents income taxes paid or payable (or received or receivable) for the current year plus the change in deferred taxes during the year. Deferred taxes represent the future tax consequences expected to occur when the reported amounts of assets and liabilities are recovered or paid, and result from differences between the financial and tax bases of our assets and liabilities and are adjusted for changes in tax rates and tax laws when enacted. Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not that a tax benefit will not be realized. In evaluating the need for a valuation allowance, management considers all potential sources of taxable income, including income available in carryback periods, future reversals of taxable temporary differences, projections of taxable income, and income from tax planning strategies, as well as all available positive and negative evidence. Positive evidence includes factors such as a history of profitable operations, projections of future profitability within the carryforward period, including from tax planning strategies, and our experience with similar operations. Negative evidence includes items such as cumulative losses, projections of future losses, or carryforward periods that are not long enough to allow for the utilization of a deferred tax asset based on existing projections of income. Deferred tax assets for which no valuation allowance is recorded may not be realized upon changes in facts and circumstances.

Tax benefits related to uncertain tax positions taken or expected to be taken on a tax return are recorded when such benefits meet a more likely than not threshold. Otherwise, these tax benefits are recorded when a tax position has been effectively settled, which means that the statute of limitation has expired or the appropriate taxing authority has completed their examination even though the statute of limitations remains open. Interest and penalties related to uncertain tax positions are recognized as part of the provision for income taxes and are accrued beginning in the period that such interest and penalties would be applicable under relevant tax law until such time that the related tax benefits are recognized.

Stock-Based Compensation

Our stock-based employee compensation plan, referred to as the Fuel Tech, Inc. 2014 Long-Term Incentive Plan (Incentive Plan), was adopted in May 2014 and allows for awards to be granted to participants in the form of non-qualified stock options, incentive stock options, stock appreciation rights, restricted stock, restricted stock units, performance awards, and bonuses or other forms of share-based or non-share-based awards or combinations thereof. Participants in the Incentive Plan may be our directors, officers, employees, consultants or advisors (except consultants or advisors in capital-raising transactions) as the directors determine are key to the success of our

business. There are a maximum of 5,600,676 shares that may be issued or reserved for awards to participants under the Incentive Plan as of December 31, 2018. Based on the existing issued or reserved awards in Incentive Plan, there are 2,133,733 shares available to be used for future awards to participants in the Incentive Plan as of December 31, 2018.

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We adopted the provisions of ASU 2016-09 "Compensation - Stock Compensation (Topic 718): Improvement to Employee Share based Payment Accounting" as of January 1, 2017. Pursuant to this adoption, we recorded any excess tax benefits within income tax expense for the year ended December 31, 2017, where previously these were recorded as increases or decreases to additional paid-in capital. In addition, we have continued to account for forfeitures of awards based on an estimate of the number of awards expected to be forfeited and adjusting the estimate when it is no longer probable that the employee will fulfill the service condition. These changes have been applied prospectively effective January 1, 2017, and therefore no adjustments were made to prior periods. Given the Company has a full valuation allowance on its deferred tax assets, there were no excess tax benefits to record for the years ended December 31, 2018 and 2017. In accordance with the guidance, we retrospectively reported cash paid on behalf of employees for withholding shares for tax-withholding purposes as a financing activity in the Consolidated Statement of Cash Flows. Any future excess tax benefits will be classified as an operating activity, applied prospectively. The adoption of this ASU did not result in a material change in our earnings, cash flows, or financial position.

Basic and Diluted Earnings per Common Share

Basic earnings per share excludes the antidilutive effects of stock options, restricted stock units (RSUs) and the nil coupon non-redeemable convertible unsecured loan notes (see Note 7). Diluted earnings per share includes the dilutive effect of the nil coupon non-redeemable convertible unsecured loan notes, RSUs, and unexercised in-the-money stock options, except in periods of net loss where the effect of these instruments is antidilutive. Out-of-the-money stock options are excluded from diluted earnings per share because they are anti-dilutive. At December 31, 2018, 2017 and 2016, we had outstanding equity awards of 757,000, 2,210,000 and 1,800,000, respectively, which were antidilutive for the purpose of inclusion in the diluted earnings per share calculation because the exercise prices of the options were greater than the average market price of our common stock. As of December 31, 2018, 2017 and 2016 respectively, we had an additional 620,000, 168,000 and 184,000 equity awards that were antidilutive because of the net loss in the year then ended. These equity awards could potentially dilute basic EPS in future years.

The table below sets forth the weighted-average shares used at December 31 in calculating earnings (loss) per share:

	2018	2017	2016
Basic weighted-average shares	24,164,000	23,872,000	23,365,000
Conversion of unsecured loan notes	—	—	—
Unexercised options and unvested restricted stock units	—	—	—
Diluted weighted-average shares	24,164,000	23,872,000	23,365,000

Risk Concentrations

Financial instruments that potentially subject the Company to a significant concentration of credit risk consist primarily of cash and cash equivalents and accounts receivable. The Company maintains deposits in federally insured financial institutions in excess of federally insured limits. However, management believes the Company is not exposed to significant credit risk due to the financial position of its primary depository institution where a significant portion of its deposits are held.

For the year ended December 31, 2018, we had two customers which individually represented greater than 10% of revenues. One customer contributed primarily to our APC technology segment and represented 27% of consolidated revenues. The other customer contributed to our APC technology and FUEL CHEM technology segment and represented 13% of consolidated revenues. We had no customers that accounted for greater than 10% of our current assets as of December 31, 2018.

For the year ended December 31, 2017, we had one customer which individually represented greater than 10% of revenues. This customer contributed primarily to our FUEL CHEM technology segment and represented 10% of consolidated revenues. We had no customers that accounted for greater than 10% of our current assets as of December 31, 2017.

For the year ended December 31, 2016, we had one customer which individually represented greater than 10% of revenues. This customer contributed primarily to our APC technology segment and represented 19% of consolidated

revenues. We had no customers that accounted for greater than 10% of our current assets as of December 31, 2016.

We control credit risk through requiring milestone payments on long-term contracts, performing ongoing credit evaluations of its customers, and in some cases obtaining security for payment through bank guarantees and letters of credit.

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Treasury Stock

We use the cost method to account for its common stock repurchases. During the years ended December 31, 2018 and 2017, we withheld 11,215 and 289,202 shares of our Common Shares, valued at approximately $12 and $258, respectively, to settle personal tax withholding obligations that arose as a result of restricted stock units that vested. Refer to Note 6, “Treasury Stock,” for further discussion.

Recently Adopted Accounting Standards

In May 2014, the Financial Accounting Standards Board (FASB) issued ASU 2014-09 "Revenue from Contracts with Customers" (ASC 606). These changes created a comprehensive framework for all entities in all industries to apply in the determination of when to recognize revenue, and, therefore, supersede virtually all existing revenue recognition requirements and guidance. This framework is expected to result in less complex guidance in application while providing a consistent and comparable methodology for revenue recognition. The core principle of the guidance is that an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. To achieve this principle, an entity should apply the following steps: (i) identify the contract(s) with a customer, (ii) identify the performance obligations in the contract(s), (iii) determine the transaction price, (iv) allocate the transaction price to the performance obligations in the contract(s), and (v) recognize revenue when, or as, the entity satisfies a performance obligation. The new standard also requires additional financial statement disclosures that will enable users to understand the nature, amount, timing and uncertainty of revenue and cash flows relating to customer contracts. In August 2015, the FASB approved a one-year deferral to January 1, 2018. The Company adopted the standard on January 1, 2018 using the modified retrospective transition method. See Note 3, Revenue Recognition, for further discussion.

In November 2016, the FASB issued ASU 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash (a consensus of the FASB Emerging Issues Task Force). The amendments in this Update require that a statement of cash flows explain the change during the period in the total of cash, cash equivalents, and amounts generally described as restricted cash or restricted cash equivalents. Accordingly, restricted cash will be included with cash and cash equivalents when reconciling the beginning-of period and end-of-period total amounts shown on the Consolidated Statement of Cash Flows. The Company adopted ASU 2016-18 beginning on January 1, 2018 and adopted the standard using a retrospective approach.

In January 2017, the FASB issued ASU 2017-04, Intangibles-Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. This ASU is meant to simplify how an entity is required to test goodwill for impairment by eliminating Step 2 from the goodwill impairment test. Step 2 measures a goodwill impairment loss by comparing the implied fair value of a reporting unit’s goodwill with the carrying amount of that goodwill. ASU 2017-04 is effective for fiscal years beginning after December 15, 2019, with early adoption permitted for interim or annual goodwill impairment tests performed on testing dates after January 1, 2017. The Company early adopted ASU 2017-04 on October 1, 2018 for the annual goodwill impairment test completed during the fourth quarter which simplified the test by comparing the implied fair value of the reporting unit's goodwill with the carrying amount of goodwill and eliminating Step 2. The adoption did not have a material impact on the Company’s consolidated financial statements.

Recently Issued Accounting Pronouncements

In February 2016, the FASB issued ASU 2016-02, Leases (Topic 842). The amendments in this Update increase transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheet and disclosing key information about leasing arrangements. The liability recorded for a lease is meant to recognize the lease payments and the asset as a right to use the underlying asset for the lease, including optional periods if it reasonably certain the option will be exercised. Recording of the liability should be based on the present value of the lease payments. If a lease term is less than twelve months, a company is allowed to elect not to record the asset and liability. Expense related to these leases are to be amortized on a straightline basis over the expected term of the lease. Additionally, the provisions of Topic 842 provide additional guidance on separating lease terms from maintenance and other type of provisions that provide a good or service, accounting for sale-leaseback provisions, and

leveraged leases. Reporting in the cash flow statement remains virtually unchanged. Additional qualitative and quantitative disclosures are required.

ASU 2016-02 will be effective for the Company beginning on January 1, 2019. We expect that this standard will have a material effect on our financial statements. While we continue to assess all of the effects of adoption, we currently believe the most significant effects relate to the recognition of new right-of-use assets and lease liabilities on our balance sheet for our office and equipment operating leases and providing significant new disclosures about our leasing activities. We do not expect a significant change in our leasing activities between now and adoption. On adoption, we currently expect to recognize additional operating liabilities of approximately $756, with corresponding right-of-use assets of the same amount based on the present value of the remaining minimum rental payments under current leasing standards for existing operating leases. The new standard also provides

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practical expedients for an entity's ongoing accounting. We currently expect to elect the short-term lease recognition exemption for all leases that qualify. This means, for those leases that qualify, we will not recognize right-of-use assets or lease liabilities, and this includes not recognizing right-of-use assets or lease liabilities for existing short-term leases of those assets in transitions. We also currently expect to elect the practical expedient to not separate lease and non-lease components for all of our leases.

In July 2018, the FASB issued ASU 2018-11 "Leases (Topic 842) Targeted Improvements." This amendment allows companies to elect to record a cumulative effect adjustment to beginning retained earnings on the date of adoption. We expect to elect the provisions of ASU 2018-11 as of the date of adoption on January 1, 2019.

Subsequent Events

On January 18, 2019, the Company announced a planned suspension of its Air Pollution Control (“APC”) business operation in China (“Beijing Fuel Tech”). This action is part of Fuel Tech’s ongoing operational improvement initiatives designed to prioritize resource allocation, reduce costs, and drive profitability for the Company on a global basis. The transition associated with the suspension of the APC business is underway, and includes staff rationalization, supplier and partner engagement, and the monetization of certain assets. The Company expects to complete the process by the end of the second quarter of 2019.

The following table presents our revenues and net loss in China for the years ended December 31, 2018, 2017 and 2016:

	2018	2017	2016
Total revenues	$3,006	$8,034	$5,087
Net loss	(1,868)	(1,343)	(2,300)

The following table presents net assets in China for the years ended December 31, 2018, 2017 and 2016:

	2018	2017	2016
Total assets	$8,546	$13,005	$13,474
Total liabilities	2,953	5,245	5,306
Total net assets	5,593	7,760	8,168

Total assets primarily consist of accounts receivable, contract assets, inventory, prepaid expenses and property, plant and equipment. Total liabilities consist of accounts payable and certain accrued liabilities.

As a result of the announcement, the Company expects to incur approximately $490 of severance costs relating to the suspension of the APC business in China, all of which are expected to be paid in 2019. On January 23, 2019, the Company notified the landlord of our intention to early terminate the lease on July 22, 2019. The Company expects to incur an early termination penalty of $67, which will be recorded in the first quarter of 2019. The Company expects to incur other disposal costs including contractual termination payments or other miscellaneous expenses but an estimated amount or range of amounts has not yet been determined.

2. DISCONTINUED OPERATIONS

During 2017, the Company has suspended all operations associated with the Fuel Conversion business segment. The components of the net assets of the Fuel Conversion discontinued operations in Assets held for sale on the Consolidated Balance Sheets totaling $485 which consisted of certain equipment as of December 31, 2018 and 2017. The resulting amount in assets held for sale was determined using management's assumptions based on a plan of sale and we may not be able to realize as much value from the sale of the assets as we expect. In addition, accrued severance of $65 and $376 is included in the other accrued liabilities line of the Consolidated Balance Sheets as of December 31, 2018 and 2017 respectively. The Fuel Conversion business segment had no other assets or liabilities associated with it.

The activity of the Fuel Conversion discontinued operations consisted of Research and Development, severance, an impairment charge and other costs for the years ended December 31, 2018, 2017, and 2016 of $113, $3,914 and $2,800, respectively. The loss from discontinued operations in the Consolidated Statement of Operations for the year ended December 31, 2018 includes an impairment charge related to the Carbonite patent assets of $56 during the second quarter of 2018 as a result of not being able to reach an agreement with a third-party to acquire or license the Carbonite technology in combination with the sale of certain equipment included in Assets held for sale. The loss from discontinued operations in the Consolidated Statement of Operations for the year ended December 31, 2017 includes the severance charges associated with suspension of the Fuel Conversion business segment of $581. The loss from discontinued operations in the Consolidated Statement of Operations for the year ended

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December 31, 2017 includes an impairment charge related to the Carbonite intangible asset of $1,354 as a result of not being able to reach an agreement with a third-party to acquire or license the Carbonite technology. Absent a third-party agreement, management determined there was not adequate gross cash flows to support the carrying value of the asset and recorded the impairment charge during the fourth quarter of 2017. The Fuel Conversion business segment had no revenues associated with it.

The Company incurred $581 of severance costs relating to the suspension of the Fuel Conversion business segment, of which $205 was paid in 2017, $311 was paid in 2018 and $65 will be paid in 2019. The Company expects to incur additional storage fees and other disposal costs associated with the assets held for sale.

3. REVENUE RECOGNITION

Adoption of ASC 606, "Revenue from Contracts with Customers"

On January 1, 2018, we adopted ASC 606 using the modified retrospective method applied to those contracts which were not completed as of January 1, 2018. Results for reporting periods beginning after January 1, 2018 are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported in accordance with our legacy accounting under Accounting Standards Codification Topic 605: Revenue Recognition (ASC 605).

The cumulative effect of the changes made to our January 1, 2018 consolidated balance sheet for the adoption of ASC 606 were as follows:

	Balance at December 31, 2017	Adjustments Upon Adoption of ASC 606	Balance at January 1, 2018
Liabilities			
Other accrued liabilities	$ 5,098	(205)	$ 4,893
Equity			
Accumulated deficit	(102,672)	205	(102,467)

The adjustment made to the January 1, 2018 consolidated balance sheet related to deferred revenue under ASC 605 for the license of standalone functional intellectual property to a customer in one of our foreign locations which is recognized at a point in time upon adoption of ASC 606.

Practical Expedients and Exemptions

We generally expense sales commissions on a ratable basis when incurred because the amortization period would have been one year or less. These costs are recorded within selling, general and administrative expenses within the Condensed Consolidated Statements of Operations.

Disaggregated Revenue by Product Technology

The following table presents our revenues disaggregated by product technology:

	Twelve Months Ended December 31,		
	2018	2017	2016
Air Pollution Control			
Technology solutions	$35,176	$24,422	$30,082
Spare parts	1,083	1,022	1,328
Ancillary revenue	2,158	2,364	2,642
Total Air Pollution Control Technology	38,417	27,808	34,052

FUEL CHEM			
FUEL CHEM technology solutions	18,118	17,358	21,109
Total Revenues	$56,535	$45,166	$55,161

(1) As noted above, prior period amounts have not been adjusted under the modified retrospective method.

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Disaggregated Revenue by Geography

The following table presents our revenues disaggregated by geography, based on the billing addresses of our customers:

	Twelve Months Ended December 31,		
	2018	2017	2016
United States	$43,887	$29,510	$42,545
Foreign Revenues			
South America	1,290	2,118	2,934
Europe	6,260	6,206	4,460
Asia	5,098	7,332	5,222
Total Foreign Revenues	12,648	15,656	12,616
Total Revenues	$56,535	$45,166	$55,161

(1) As noted above, prior period amounts have not been adjusted under the modified retrospective method.

Timing of Revenue Recognition

The following table presents the timing of our revenue recognition:

	Twelve Months Ended December 31,		
	2018	2017	2016
Products transferred at a point in time	$21,359	$20,744	$25,079
Products and services transferred over time	35,176	24,422	30,082
Total Revenues	$56,535	$45,166	$55,161

(1) As noted above, prior period amounts have not been adjusted under the modified retrospective method.

Contract Balances

The timing of revenue recognition, billings and cash collections results in billed accounts receivable, unbilled receivables (contract assets), and customer advances and deposits (contract liabilities) on the consolidated balance sheets. In our Air Pollution Control Technology segment, amounts are billed as work progresses in accordance with agreed-upon contractual terms. Generally, billing occurs subsequent to revenue recognition, resulting in contract assets. These assets are reported on the consolidated balance sheet on a contract-by-contract basis at the end of each reporting period. At December 31, 2018, 2017 and 2016, contract assets were approximately $5,540, $7,894 and $6,755 respectively, and are included in accounts receivable on the consolidated balance sheets.

However, the Company will periodically bill in advance of costs incurred before revenue is recognized, resulting in contract liabilities. These liabilities are reported on the consolidated balance sheet on a contract-by-contract basis at the end of each reporting period. Contract liabilities were $1,234, $2,403 and $1,730 at December 31, 2018, 2017 and 2016 respectively, and are included in other accrued liabilities on the consolidated balance sheets.

As of December 31, 2018 we had five construction contracts in progress that were identified as loss contracts and a provision for losses of $123 was recorded in other accrued liabilities on the consolidated balance sheet. As of December 31, 2017, we had four construction contracts in progress that were identified as loss contracts and a provision for losses of $117 was recorded in other accrued liabilities on the consolidated balance sheet.

Remaining Performance Obligations

Remaining performance obligations, represents the transaction price of Air Pollution Control technology booked orders for which work has not been performed. As of December 31, 2018, the aggregate amount of the transaction price allocated to remaining performance obligations was $12,384. The Company expects to recognize revenue on approximately $10,622 of the remaining performance obligations over the next 12 months with the remaining recognized thereafter.

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4. INCOME TAXES

On December 22, 2017, the United States ("U.S.") enacted significant changes to the U.S. tax law following the passage and signing of H.R.1, "An Act to Provide for Reconciliation Pursuant to Titles II and V of the Concurrent Resolution on the Budget for Fiscal Year 2018" (the "Tax Act") (previously known as "The Tax Cuts and Jobs Act"). The Tax Act included significant changes to existing tax law, including a permanent reduction to the U.S. federal corporate income tax rate from 35% to 21%, a one-time repatriation tax on deferred foreign income ("Transition Tax"), deductions, credits and business-related exclusions.

On December 22, 2017, the SEC issued guidance under Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cuts and Jobs Act ("SAB 118") directing taxpayers to consider the impact of the U.S. legislation as "provisional" when it does not have the necessary information available, prepared or analyzed (including computations) in reasonable detail to complete its accounting for the change in tax law. The Company did not record additional provisional income tax given the Company has full valuation allowances on its deferred tax assets and liabilities and the net operating loss generated in 2017. This represents our best estimate based on interpretation of the U.S. legislation as we are still accumulating data to finalize the underlying calculations, or in certain cases, the U.S. Treasury is expected to issue further guidance on the application of certain provisions of the U.S. legislation. Future adjustments to the provisional numbers will be recorded as discrete adjustments to income tax expense in the period in which those adjustments become estimable and/or are finalized.

Accordingly, the Company's income tax provision as of December 31, 2018 and 2017 reflects (i) the current year impacts of the U.S. Tax Act on the estimated annual effective tax rate and (ii) the following discrete items resulting directly from the enactment of the Tax Act based on the information available, prepared, or analyzed (including computations) in reasonable detail:

(a) The Tax Act reduced the U.S. federal corporate tax rate from 35% to 21%. The impact from the permanent reduction to the U.S. federal corporate income tax rate from 35% to 21% is effective January 1, 2018. The Company adjusted the deferred tax asset and liabilities and the corresponding valuation reserve as a result of the reduction in the U.S. federal corporate tax rate.

The Tax Act created a new requirement that certain income (commonly referred to as "GILTI") earned by controlled foreign corporations (CFC's) must be included currently in the gross income of the CFC's U.S. shareholder. Under U.S. GAAP, we are allowed to make an accounting policy choice of either (1) treating taxes due on U.S. inclusions in taxable income related to GILTI as a current period expense when incurred (the "period cost method") or (2) factoring such amounts into the Company's measurement of its deferred taxes (the "deferred method"). Our selection of an accounting policy of the new GILTI tax rules will depend on analyzing our global income to determine whether we expect to have future U.S. inclusions in taxable income related to GILTI and, if so, what the impact is expected to be. The Company has included an estimate of the GILTI tax in the Company's annualized effective tax rate used to determine tax expense for the years ended December 31, 2018 and 2017.

Prior to the Tax Act, our practice and intention was to reinvest the earnings in our non-U.S. subsidiaries, and no U.S. deferred income taxes or foreign withholding taxes were recorded. The transition tax noted above resulted in the previously untaxed foreign earnings being included in fiscal 2018 taxable income. We are currently analyzing our global working capital requirements and the potential tax liabilities that would be incurred if the non-U.S. subsidiaries distribute cash to the U.S. parent, which may include withholding taxes, local country taxes and potential U.S. state taxation. For these reasons, we are not yet able to reasonably estimate the effect of this provision of the Tax Act and have not recorded any withholding or state tax liabilities, any deferred taxes attributable to GILTI (as noted above) or any deferred taxes attributable to our investment in our foreign subsidiaries.

Within the calculation of the Company's annual effective tax rate the Company has used assumptions and estimates that may change as a result of future guidance, interpretation, and rule-making from the Internal Revenue Service, the SEC, and the FASB and/or various other taxing jurisdictions. For example, the Company anticipates that the state jurisdictions will continue to determine and announce their conformity to the Tax Act which could have an impact on the annual effective tax rate.

The components of income (loss) before taxes for the years ended December 31 are as follows:

Origin of income before taxes	2018	2017	2016
United States	$3,277	$(9,821)	$(13,016)
Foreign	(3,272)	(1,208)	(2,708)
Income (Loss) before income taxes	$5	$(11,029)	$(15,724)

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Significant components of income tax benefit (expense) for the years ended December 31 are as follows:

	2018	2017	2016
Current:			
Federal	$(18)	$111	$(357)
State	(13)	—	—
Foreign	—	(65)	(105)
Total current	(31)	46	(462)
Deferred:			
Federal	(2)	534	—
Foreign	—	—	(1,202)
Total deferred	(2)	534	(1,202)
Income tax benefit (expense)	$(33)	$580	$(1,664)

A reconciliation between the provision for income taxes calculated at the U.S. federal statutory income tax rate and the consolidated income tax expense in the consolidated statements of operations for the years ended December 31 is as follows:

	2018	2017	2016
Provision at the U.S. federal statutory rate	21.0 %	34.0 %	34.0 %
State taxes, net of federal benefit	(86.5)%	— %	2.4 %
Foreign tax rate differential	(2,210.3)%	(0.9)%	— %
Valuation allowance	(7,152.8)%	15.0 %	(42.7)%
Federal tax rate change	— %	(43.9)%	— %
Other true up	8,904.9 %	— %	(0.6)%
Intangible assets impairment and other non-deductibles	2,194.6 %	(1.8)%	— %
Other	(994.6)%	2.1 %	(4.1)%
Income tax benefit (expense) effective rate	676.3 %	4.5 %	(11.0)%

The deferred tax assets and liabilities at December 31 are as follows:

	2018	2017
Deferred tax assets:		
Stock compensation expense	$1,867	$1,814
Goodwill	1,927	2,366
Royalty accruals	484	443
Bad debt allowance	345	360
Inter-company interest expense accrual	—	496
Net operating loss carryforwards	6,654	5,253
Credit carry-forwards	685	694
Inventory reserve	277	254
Depreciation	515	555
Other	539	362
Total deferred tax assets	13,293	12,597
Deferred tax liabilities:		
Intangible assets	(283)	(386)
Other	(137)	(146)
Total deferred tax liabilities	(420)	(532)
Net deferred tax asset before valuation allowance	12,873	12,065
Valuation allowances for deferred tax assets	(13,044)	(12,234)
Net deferred tax liability	$(171)	$(169)

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The change in the valuation allowance for deferred tax assets for the years ended December 31 is as follows:

Year	Balance at January 1	Charged to costs and expenses	(Deductions)/Other	Balance at December 31
2016	$ 7,832	5,347	—	$ 13,179
2017	$ 13,179	(945)	—	$ 12,234
2018	$ 12,234	810	—	$ 13,044

For the years ended December 31, 2018, 2017 and 2016, there were no exercises of stock options.

As required by ASC 740, we recognize the financial statement benefit of a tax position only after determining that the relevant tax authority would more likely than not sustain the position following an audit. For tax positions meeting the more-likely-than-not threshold, the amount recognized in the financial statements is the largest benefit that has a greater than 50% likelihood of being realized upon ultimate settlement with the relevant tax authority.

We recognize interest and penalties related to unrecognized tax benefits in income tax expense for all periods presented. There were no interest and penalties recognized in income tax expense during the years ended December 31, 2018, 2017 and 2016. There were no unrecognized tax benefits as of December 31, 2018, 2017 and 2016, including interest and penalties $0, $0 $140.

We are subject to taxation in the U.S., various states, and in non-U.S. jurisdictions. Our U.S. income tax returns are primarily subject to examination from 2015 through 2017; however, U.S. tax authorities also have the ability to review prior tax years to the extent loss carryforwards and tax credit carryforwards are utilized. The open years for the non-U.S. tax returns range from 2010 through 2017 based on local statutes.

Management periodically estimates our probable tax obligations using historical experience in tax jurisdictions and informed judgments. There are inherent uncertainties related to the interpretation of tax regulations in the jurisdictions in which we transact business. The judgments and estimates made at a point in time may change based on the outcome of tax audits, as well as changes to or further interpretations of regulations. If such changes take place, there is a risk that the tax rate may increase or decrease in any period. Tax accruals for tax liabilities related to potential changes in judgments and estimates for both federal and state tax issues are included in current liabilities on the consolidated balance sheet.

The investment in our foreign subsidiaries is considered to be indefinite in duration and therefore we have not provided a provision for deferred U.S. income taxes on the unremitted earnings from those subsidiaries. A provision has not been established because it is not practicable to determine the amount of unrecognized deferred tax liability for such unremitted foreign earnings and because it is our present intention to reinvest the undistributed earnings indefinitely. As previously noted, the Tax Act made significant changes to the taxation of undistributed foreign earnings, requiring that all previously untaxed earnings and profits of our controlled foreign corporation be subjected to a one-time mandatory deemed repatriation tax. The transition tax substantially eliminated the basis differences that existed prior to the Tax Act. However, there are limited other taxes that could continue to apply such as foreign withholding and certain state taxes.

As required by ASC 740, a valuation allowance must be established when it is more likely than not that all or a portion of a deferred tax asset will not be realized. We have approximately $10,408 of US net operating loss carryforwards available to offset future US taxable income as of December 31, 2018. The net operating loss carry-forwards related to tax losses generated in prior years in the US begin to expire in 2034. Further, we have tax loss carry-forwards of approximately $5,468 available to offset future foreign income in Italy as of December 31, 2018. We have recorded a full valuation allowance against the resulting $1,312 deferred tax asset because we cannot anticipate when or if this entity will have taxable income sufficient to utilize the net operating losses in the future. There is no expiration of the net operating loss carry-forwards related to tax losses generated in prior years in Italy. Finally, we have tax loss carry-forwards of approximately $10,186 available to offset future foreign income in China as of December 31, 2018. The net operating loss carry-forwards related to tax losses generated in prior years in China expire in 2022.

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5. COMMON SHARES

At December 31, 2018 and 2017, respectively, we had 24,825,891and 24,777,001 Common Shares issued and 24,170,585 and 24,132,910 outstanding, with an additional 6,715 shares reserved for issuance upon conversion of the nil coupon non-redeemable convertible unsecured loan notes (see Note 7). As of December 31, 2018, we had 5,600,676 shares reserved for issuance upon the exercise or vesting of equity awards, of which 932,500 are stock options that are currently exercisable (see Note 8).

6. TREASURY STOCK

Common shares held in treasury totaled 655,306 and 644,091 with a cost of $1,484 and $1,472 at December 31, 2018 and 2017, respectively. These shares were withheld from employees to settle personal tax withholding obligations that arose as a result of restricted stock units that vested during the current and prior years.

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7. NIL COUPON NON-REDEEMABLE CONVERTIBLE UNSECURED LOAN NOTES

At December 31, 2018 and 2017, respectively, we had a principal amount of $76 of nil coupon non-redeemable convertible unsecured perpetual loan notes (the "Loan Notes") outstanding. The Loan Notes are convertible at any time into Common Shares at rates of $6.50 and $11.43 per share, depending on the note. As of December 31, 2018, the nil coupon loan notes were convertible into 6,715 common shares. Based on our closing stock price of $1.19 at December 31, 2018, the aggregate fair value of the common shares that the holders would receive if all the loan notes were converted would be approximately $8, which is less than the principal amount of the loans outstanding as of that date. The Loan Notes bear no interest and have no maturity date. They are repayable in the event of our dissolution and the holders do not have the option to cash-settle the notes. Accordingly, they have been classified within stockholders' equity in the accompanying balance sheet. The notes do not hold distribution or voting rights unless and until converted into common shares.

In 2018, 2017 and 2016, there were no Loan Notes repurchased by the Company.

8. STOCK-BASED COMPENSATION

Under our stock-based employee compensation plan, referred to as the Fuel Tech, Inc. 2014 Long-Term Incentive Plan (Incentive Plan), awards may be granted to participants in the form of Non-Qualified Stock Options, Incentive Stock Options, Stock Appreciation Rights, Restricted Stock, Restricted Stock Units ("RSUs"), Performance Awards, Bonuses or other forms of share-based or non-share-based awards or combinations thereof. Participants in the Incentive Plan may be our directors, officers, employees, consultants or advisors (except consultants or advisors in capital-raising transactions) as the directors determine are key to the success of our business. There are a maximum of 5,600,676 shares that may be issued or reserved for awards to participants under the Incentive Plan which includes 1,200,000 additional shares as a result of an amendment to the Incentive Plan approved by our stockholders in May 2018. At December 31, 2018, we had approximately 2,133,733 equity awards available for issuance under the Incentive Plan.

Stock-based compensation is included in selling, general and administrative costs in our consolidated statements of operations.

The components of stock-based compensation from continuing operations for the years ended December 31, 2018, 2017 and 2016 were as follows:

	For the Year Ended December 31,		
	2018	2017	2016
Stock options	$ —	$ 120	$ 90
Restricted stock units	233	1,269	1,901
Total stock-based compensation expense	233	1,389	1,991
Tax benefit of stock-based compensation expense	—	—	
After-tax effect of stock based compensation	$ 233	$ 1,389	$ 1,991

As of December 31, 2018, there was $509 of total unrecognized compensation cost related to all non-vested share-based compensation arrangements granted under the Incentive Plan. That cost is expected to be recognized over the remaining requisite service period of 1.5 years.

Stock Options

The stock options granted to employees under the Incentive Plan have a 10-year life and they vest as follows: 50% after the second anniversary of the award date, 25% after the third anniversary, and the final 25% after the fourth anniversary of the award date. Fuel Tech calculates stock compensation expense for employee option awards based on the grant date fair value of the award, less expected annual forfeitures, and recognizes expense on a straight-line basis over the four-year service period of the award. Stock options granted to members of our Board of Directors vest immediately. Stock compensation for these awards is based on the grant date fair value of the award and is recognized in expense immediately.

Fuel Tech uses the Black-Scholes option pricing model to estimate the grant date fair value of employee stock options. The principal variable assumptions utilized in valuing options and the methodology for estimating such model inputs include: (1) risk-free interest rate – an estimate based on the yield of zero–coupon treasury securities with a maturity

equal to the expected life of the option; (2) expected volatility – an estimate based on the historical volatility of Fuel Tech's Common Stock for a period equal to the expected life of the option; and (3) expected life of the option – an estimate based on historical experience including the effect of employee terminations.

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Based on the results of the model, the weighted-average fair value of the stock options granted during the 12-month periods ended December 31, 2017 and 2016, respectively, were $0.68 and $1.11 per share using the following weighted average assumptions:

	2017		2016	
Expected dividend yield	—	%	—	%
Risk-free interest rate	2.33	%	1.85	%
Expected volatility	61.2	%	62.3	%
Expected life of option	10 years		8.8 years	

There were no stock options granted during the year ended December 31, 2018.

The following table presents a summary of our stock option activity and related information for the years ended December 31:

	2018		2017		2016	
	Number of Options	Weighted-Average Exercise Price	Number of Options	Weighted-Average Exercise Price	Number of Options	Weighted-Average Exercise Price
Outstanding at beginning of year	1,116,750	$ 6.34	1,039,750	$ 8.39	1,191,125	$ 10.48
Granted	—	—	176,000	0.96	81,000	1.58
Expired or forfeited	(184,250)	14.72	(99,000)	18.32	(232,375)	16.72
Outstanding at end of year	932,500	$ 4.68	1,116,750	$ 6.34	1,039,750	$ 8.39
Exercisable at end of year	932,500	$ 4.68	1,116,750	$ 6.34	1,039,750	$ 8.39
Weighted-average fair value of options granted during the year		$ —		$ 0.68		$ 1.11

The following table provides additional information regarding our stock option activity for the 12 months ended December 31, 2018:

	Number of Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Life	Aggregate Intrinsic Value
Outstanding on January 1, 2018	1,116,750	$ 6.34		
Expired or forfeited	(184,250)	14.72		
Outstanding on December 31, 2018	932,500	$ 4.68	4.67 years	$ 40
Exercisable on December 31, 2018	932,500	$ 4.68	4.67 years	$ 40

The aggregate intrinsic value in the preceding table represents the total pretax intrinsic value, based on our closing stock price of $1.19 as of December 31, 2018, which would have been received by the option holders had those options holders exercised their stock options as of that date.

The following table summarizes information about stock options outstanding at December 31, 2018:

Options Outstanding				Options Exercisable	
Range of Exercise Prices	Number of Options	Weighted-Average Remaining Contractual Life	Weighted-Average Exercise Price	Number of Options	Weighted-Average Exercise Price
$0.96 - $1.27	176,000	8.9 years	$ 0.97	176,000	$ 0.97
$1.28 - $3.00	207,000	6.8 years	2.10	207,000	2.10
$3.01 - $4.54	140,000	4.0 years	3.72	140,000	3.72
$4.55 - $9.06	224,500	3.4 years	6.08	224,500	6.08

$9.07 - $10.20	185,000	0.4 years	10.14	185,000	10.14
$0.96 - $10.20	932,500	4.7 years	$ 4.68	932,500	$ 4.68

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For the 12 months ended December 31, 2018, there was no non-vested stock option activity and as of December 31, 2018, there was $0 of total unrecognized compensation cost related to non-vested stock options granted under the Incentive Plan. Fuel Tech received no proceeds from the exercise of stock options in the years ended December 31, 2018, 2017 and 2016, respectively. It is our policy to issue new shares upon option exercises, loan conversions, and vesting of restricted stock units. We have not used cash and do not anticipate any future use of cash to settle equity instruments granted under share-based payment arrangements.

Restricted Stock Units

Restricted stock units (RSUs) granted to employees vest over time based on continued service (typically vesting over a period between two and four years). Such time-vested RSUs are valued at the date of grant using the intrinsic value method based on the closing price of the Common Shares on the grant date. Compensation cost, adjusted for estimated forfeitures, is amortized on a straight-line basis over the requisite service period.

We recorded expense of approximately $233, $1,269 and $1,901 associated with our restricted stock unit awards in 2018, 2017 and 2016, respectively. During the years ended December 31, 2018 and 2017, there were 48,890 and 981,633 restricted stock units that vested with a grant date fair value of $77 and $2,794, respectively.

A summary of restricted stock unit activity for the years ended December 31, 2018, 2017 and 2016 is as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested restricted units at January 1, 2016	1,204,883	4.21
Granted	845,862	1.88
Forfeited	(205,033)	4.25
Vested	(381,916)	4.36
Unvested restricted stock units at December 31, 2016	1,463,796	2.82
Granted	1,090,000	0.97
Forfeited	(213,001)	2.99
Vested (1)	(981,633)	2.85
Unvested restricted stock units at December 31, 2017	1,359,162	1.28
Forfeited	(199,995)	1.59
Vested	(48,890)	1.59
Unvested restricted stock units at December 31, 2018	1,110,277	1.21

(1) The increase in shares vested in 2017 is due to the accelerated time vesting of outstanding remaining restricted stock units approved by the Company's Board of Directors on June 28, 2017.

Deferred Directors Fees

In addition to the Incentive Plan, Fuel Tech has a Deferred Compensation Plan for Directors (Deferred Plan). Under the terms of the Deferred Plan, Directors can elect to defer Directors' fees for shares of Fuel Tech Common Stock that are issuable at a future date as defined in the agreement. In accordance with ASC 718, Fuel Tech accounts for these awards as equity awards as opposed to liability awards. In 2018, 2017 and 2016, there was no stock-based compensation expense under the Deferred Plan.

9. COMMITMENTS AND CONTINGENCIES

Fuel Tech is subject to various claims and contingencies related to, among other things, workers compensation, general liability (including product liability), and lawsuits. The Company records liabilities where a contingent loss is probable and can be reasonably estimated. If the reasonable estimate of a probable loss is a range, the Company records the most probable estimate of the loss or the minimum amount when no amount within the range is a better estimate than any other amount. The Company discloses a contingent liability even if the liability is not probable or

the amount is not estimable, or both, if there is a reasonable possibility that a material loss may have been incurred.

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From time to time we are involved in litigation with respect to matters arising from the ordinary conduct of our business. In the opinion of management, based upon presently available information, either adequate provision for anticipated costs have been accrued or the ultimate anticipated costs will not materially affect our consolidated financial position, results of operations, or cash flows. We do not believe we have any pending loss contingencies that are probable or reasonably possible of having a material impact on our consolidated financial position, results of operations or cash flows.

Operating Leases

We lease office space, automobiles and certain equipment under agreements expiring on various dates through 2021. Future minimum lease payments under non-cancellable operating leases that have initial or remaining lease terms in excess of one year as of December 31, 2018 are as follows:

Year of Payment	Amount
2019	$ 613
2020	102
2021	10
Total	$ 725

For the years ended December 31, 2018, 2017 and 2016, rent expense, net of related party sub-lease income, approximated $745, $902, and $1,006, respectively.

We are party to a sublease agreement with American Bailey Corporation (ABC) that obligates ABC to reimburse us for its share of lease and lease-related expenses under our February 1, 2010 lease of executive offices in Stamford, Connecticut. Please refer to Note 11 to the consolidated financial statements for a discussion of our relationship with ABC. The future minimum lease income under this non-cancellable sublease as of December 31, 2018 is as follows:

Year of Payment	Amount
2019	$ 164
2020	—
Total	$ 164

The terms of the Company’s seven primary lease arrangements are as follows:

- The Stamford, Connecticut building lease, for approximately 6,440 square feet, runs from February 1, 2010 to December 31, 2019. The facility houses certain administrative functions.
- The Beijing, China building lease, for approximately 9,000 square feet, runs from June 1, 2017 to May 31, 2020. This facility serves as the operating headquarters for our Beijing Fuel Tech operation. As a result of our announcement on January 17, 2019 related to the suspension of our APC business in Beijing, we notified the landlord of our intention to early terminate the lease on July 22, 2019.
- The Durham, North Carolina building lease, for approximately 2,590 square feet, runs from July 1, 2016 to July 31, 2019. This facility houses engineering operations.
- The Gallarate, Italy building lease, for approximately 1,636 square feet, runs from May 1, 2013 to April 30, 2019. This facility serves as the operating headquarters for our European operations.
- The Westlake, Ohio building lease, for approximately 3,000 square feet, runs from May 1, 2017 to April 30, 2020. This facility houses engineering operations.
- The Aurora, IL warehouse lease, for approximately 11,000 square feet, runs from September 1, 2013 to December 31, 2020. This facility serves as an outside warehouse facility.
- The Overland Park, KS lease, for approximately 600 square feet, runs from October 16, 2018 to October 15, 2021. This facility serves primarily as a sales office.

Performance Guarantees

The majority of Fuel Tech’s long-term equipment construction contracts contain language guaranteeing that the performance of the system that is being sold to the customer will meet specific criteria. On occasion, performance surety bonds and bank performance guarantees/letters of credit are issued to the customer in support of the construction contracts as follows:

- in support of the warranty period defined in the contract; or

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in support of the system performance criteria that are defined in the contract.

As of December 31, 2018, we had outstanding bank performance guarantees and letters of credit in the amount of $5,028 in support of equipment construction contracts that have not completed their final acceptance test or that are still operating under a warranty period. The performance guarantees and letters of credit expire in dates ranging from April 2019 through January 2023. The expiration dates may be extended if the project completion dates are extended. Our management believes it is probable that these projects will be successfully completed and that there will not be a material adverse impact on our operations from these bank performance guarantees and letters of credit. As a result, no liability has been recorded for these performance guarantees.

Product Warranties

We issue a standard product warranty with the sale of our products to customers. Our recognition of warranty liability is based primarily on analyses of warranty claims experience in the preceding years as the nature of our historical product sales for which we offer a warranty are substantially unchanged. This approach provides an aggregate warranty accrual that is historically aligned with actual warranty claims experienced. Changes in the warranty liability from continuing operations in 2018, 2017 and 2016 are summarized below:

	2018	2017	2016
Aggregate product warranty liability at beginning of year	$159	$159	$268
Net aggregate expense (income) related to product warranties	—	—	(109)
Aggregate reductions for payments	—	—	—
Aggregate product warranty liability at end of year	$159	$159	$159

10. DEBT FINANCING

The Company is obligated under a U.S. Domestic credit facility with (the Facility) with JPMorgan Chase Bank, N.A. (JPM Chase) which provides for maximum revolving credit borrowings of $5,500 and matures on June 28, 2019. Fuel Tech can use this Facility for cash advances and standby letters of credit. The Facility is secured by $5,500 in cash held by the Company in a separate restricted use designated JPM Chase deposit account and has the Company’s Italian subsidiary, Fuel Tech S.r.l., as a guarantor. Outstanding borrowings under the Facility bear interest at a rate of LIBOR plus 300 basis points. There are no financial covenants set forth in this amendment to the Facility. The Facility was amended on three occasions during 2018, most recently October 19, 2018, in order to amend the maximum availability under the Facility. The Company is actively pursuing the renewal of its U.S. Domestic credit facility and intends to renew the U.S. Domestic credit facility at its maturity. As of December 31, 2018 and 2017, there were no outstanding borrowings under the Facility.

The existing U.S. Domestic credit Agreement will expire on June 28, 2019. The Company is actively pursuing the renewal of its U.S. Domestic credit facility and intends to renew the U.S. Domestic credit facility at its maturity.

At December 31, 2018 and 2017, we had outstanding standby letters of credit and bank guarantees totaling approximately $5,028 and $3,004, respectively, on our domestic credit facility in connection with contracts in process. We are committed to reimbursing the issuing bank for any payments made by the bank under these instruments. At December 31, 2018 and 2017, there were no cash borrowings under the domestic revolving credit facility and approximately $443 and $1,996, was available for future borrowings under the Facility. We pay a commitment fee of 0.25% per year on the unused portion of the revolving credit facility.

Beijing Fuel Tech Environmental Technologies Company, Ltd. (Beijing Fuel Tech), is obligated under a revolving credit facility (the China Facility) agreement, as most recently amended on October 19, 2018, with JPM Chase which provides which provides for maximum revolving credit borrowings of RMB 2.625 million (approximately $382) and matures on June 30, 2019. The Facility is secured by $520 in cash held by the Company in a separate restricted use designated JPM Chase deposit account. The China Facility bears interest at a rate of 140% of the People's Bank of China (PBOC) Base Rate, and is guaranteed by the Company. Beijing Fuel Tech can use this facility for cash advances and bank guarantees. As of December 31, 2018 and 2017, Beijing Fuel Tech had no cash borrowings under the China Facility. At December 31, 2018 and 2017, we had outstanding standby letters of credit and bank guarantees totaling approximately $0 and $246, respectively, on its Beijing Fuel Tech revolving credit facility in connection with contracts in process. At December 31, 2018 and 2017, approximately $382 and $753 was available for future

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borrowings. As a result of the announcement of the suspension of the Air Pollution Control business in Beijing, the Company intends to not renew the China Facility upon its expiration on June 30, 2019.

In the event of default on either the domestic facility or the China facility, the cross default feature in each allows the lending bank to accelerate the payments of any amounts outstanding and may, under certain circumstances, allow the bank to cancel the facility. If we were unable to obtain a waiver for a breach of covenant and the bank accelerated the payment of any outstanding amounts, such acceleration may cause our cash position to deteriorate or, if cash on hand were insufficient to satisfy the payment due, may require us to obtain alternate financing to satisfy the accelerated payment.

11. RELATED PARTY TRANSACTIONS

Persons now or formerly associated with American Bailey Corporation (ABC), currently own approximately 27% of our outstanding Common Shares. ABC is a sub-lessee under our February 1, 2010 lease of its offices in Stamford, Connecticut, which runs through December 31, 2019. ABC reimburses us for its share of lease and lease-related expenses under the sublease agreement. The Stamford facility houses certain administrative functions. The amounts earned from ABC related to the subleases for the years ended December 31, 2018, 2017 and 2016, were $164, $164 and $165, respectively. The amount due from ABC related to the sublease agreement was $40, $13 and $13 at December 31, 2018, 2017 and 2016 respectively.

12. DEFINED CONTRIBUTION PLAN

We have a retirement savings plan available for all our U.S. employees who have met minimum length-of-service requirements. Our contributions are determined based upon amounts contributed by the employees with additional contributions made at the discretion of the Board of Directors. Costs related to this plan were $231, $285 and $376 in 2018, 2017 and 2016, respectively.

13. BUSINESS SEGMENT, GEOGRAPHIC AND QUARTERLY FINANCIAL DATA

Business Segment Financial Data

We segregate our financial results into two reportable segments representing two broad technology segments as follows:

- The Air Pollution Control technology segment includes technologies to reduce NO_x emissions in flue gas from boilers, incinerators, furnaces and other stationary combustion sources. These include Low and Ultra Low NO_x Burners (LNB and ULNB), Over-Fire Air (OFA) systems, NO_xOUT® and HERT™ Selective Non-Catalytic Reduction (SNCR) systems, and Advanced Selective Catalytic Reduction (ASCR)™ systems. Our ASCR systems include ULNB, OFA, and SNCR components, along with a downsized SCR catalyst, Ammonia Injection Grid (AIG), and Graduated Straightening Grid GSG™ systems to provide high NO_x reductions at significantly lower capital and operating costs than conventional SCR systems. The NO_xOUT CASCADE® and NO_xOUT-SCR® processes are more basic, using just SNCR and SCR catalyst components. ULTRA® technology creates ammonia at a plant site using safe urea for use with any SCR application. Flue Gas Conditioning systems are chemical injection systems offered in markets outside the U.S. and Canada to enhance electrostatic precipitator and fabric filter performance in controlling particulate emissions.
- The FUEL CHEM® technology segment, which uses chemical processes in combination with advanced CFD and CKM boiler modeling, for the control of slagging, fouling, corrosion, opacity and other sulfur trioxide-related issues in furnaces and boilers through the addition of chemicals into the furnace using TIFI® Targeted In-Furnace Injection™ technology.

The “Other” classification includes those profit and loss items not allocated to either reportable segment. There are no inter-segment sales that require elimination.

We evaluate performance and allocate resources based on gross margin by reportable segment. The accounting policies of the reportable segments are the same as those described in the summary of significant accounting policies. We do not review assets by reportable segment, but rather, in aggregate for the Company as a whole.
Information about reporting segment net sales and gross margin from continuing operations are provided below:

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For the year ended December 31, 2018	Air Pollution Control Segment	FUEL CHEM Segment	Other	Total
Revenues from external customers	$ 38,417	$ 18,118	$—	$56,535
Cost of sales	(27,382)	(9,089)	—	(36,471)
Gross margin	11,035	9,029	—	20,064
Selling, general and administrative	—	—	(18,564)	(18,564)
Research and development	—	—	(1,073)	(1,073)
Intangible assets impairment	—	—	(317)	(317)
Operating income (loss) from continuing operations	$ 11,035	$ 9,029	$(19,954)	$110

For the year ended December 31, 2017	Air Pollution Control Segment	FUEL CHEM Segment	Other	Total
Revenues from external customers	$ 27,808	$ 17,358	$—	$45,166
Cost of sales	(18,478)	(8,666)	—	(27,144)
Gross margin	9,330	8,692	—	18,022
Selling, general and administrative	—	—	(20,933)	(20,933)
Restructuring charge	(58)	(61)	—	(119)
Research and development	—	—	(1,070)	(1,070)
Building impairment	—	—	(2,965)	(2,965)
Operating income (loss) from continuing operations	$ 9,272	$ 8,631	$(24,968)	$(7,065)

For the year ended December 31, 2016	Air Pollution Control Segment	FUEL CHEM Segment	Other	Total
Revenues from external customers	$ 34,052	$ 21,109	$—	$55,161
Cost of sales	(25,370)	(10,997)	—	(36,367)
Gross margin	8,682	10,112	—	18,794
Selling, general and administrative	—	—	(25,564)	(25,564)
Restructuring charge	(537)	(891)	—	(1,428)
Research and development	—	—	(1,752)	(1,752)
Intangible assets impairment	—	—	(2,074)	(2,074)
Operating income (loss) from continuing operations	$ 8,145	$ 9,221	$(29,390)	$(12,024)

Geographic Segment Financial Data

Information concerning our operations by geographic area is provided below. Revenues are attributed to countries based on the location of the customer. Assets are those directly associated with operations of the geographic area.

For the years ended December 31,	2018	2017	2016
Revenues:			
United States	$43,887	$29,510	$42,545
Foreign	12,648	15,656	12,616
	$56,535	$45,166	$55,161

As of December 31,	2018	2017
Assets:		
United States	$36,784	$29,945
Foreign	14,935	20,539

$51,719	$50,484

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14. FAIR VALUE MEASUREMENTS

We apply authoritative accounting guidance for fair value measurements of financial and nonfinancial assets and liabilities. This guidance defines fair value, establishes a consistent framework for measuring fair value and expands disclosure for each major asset and liability category measured at fair value on either a recurring or nonrecurring basis and clarifies that fair value is an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability. As a basis for considering such assumptions, the standard establishes a three-tier fair value hierarchy, which prioritizes the inputs used in measuring fair value as follows:

- Level 1 – Observable inputs to the valuation methodology such as quoted prices in active markets for identical assets or liabilities
- Level 2 – Inputs to the valuation methodology including quoted prices for similar assets or liabilities in active markets, quoted prices for identical assets or liabilities in inactive markets, inputs other than quoted prices that are observable for the asset or liability, and inputs that are derived principally from or corroborated by observable market data by correlation or other means
- Level 3 – Significant unobservable inputs in which there is little or no market data, which require the reporting entity to develop its own estimates and assumptions or those expected to be used by market participants. Generally, these fair value measures are model-based valuation techniques such as discounted cash flows, option pricing models, and other commonly used valuation techniques

Transfers between levels of the fair value hierarchy are recognized based on the actual date of the event or change in circumstances that caused the transfer. We had no assets or liabilities that were valued using level 2 or level 3 inputs and therefore there were no transfers between levels of the fair value hierarchy during the periods ended December 31, 2018 and 2017.

The carrying amount of our short-term debt and revolving line of credit approximates fair value due to its short-term nature and because the amounts outstanding accrue interest at variable market-based rates.

The following table summarizes the Company's assets measured at fair value on a non-recurring basis relating to the building impairment charge recognized during the second quarter of 2017, as more fully described in Note 1.

	Level 1	Level 2	Level 3	Impairment Losses	Fair Value at December 31, 2017
Building	$ —	$ —	$ 7,965	$ (2,965)	$ 5,000
	$ —	$ —	$ 7,965	$ (2,965)	$ 5,000

The following table summarizes the Company's assets measured at fair value on a non-recurring basis relating to an intangible assets impairment charge recognized during 2016 primarily related to the customer lists, developed technology and trademarks acquired in the 2014 acquisition of PECO and FGC in the APC technology segment, as more fully described in Note 1.

	Level 1	Level 2	Level 3	Impairment Losses	Fair Value at December 31, 2016
Other intangible assets, net	$ —	$ —	$ 5,525	$ (2,074)	$ 3,451
	$ —	$ —	$ 5,525	$ (2,074)	$ 3,451

15. RESTRUCTURING ACTIVITIES

The Company recorded no restructuring charge for the twelve-months ending December 31, 2018. The Company recorded a charge of approximately $700 in 2017 in connection with the workforce reduction. This charge included $581 related to severance and benefit continuation costs due to the suspension of all operations associated with the Fuel Conversion business segment. The Company recorded a charge of $1,428 in 2016 in connection with the domestic workforce reduction. The charge consisted primarily of one-time severance payments and benefit continuation costs. The following is a reconciliation of the accrual for the workforce reduction that is included within the "Accrued Liabilities" line of the consolidated balance sheets twelve-months ending December 31, 2018.

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	Twelve Months Ended		
	2018	2017	2016
Restructuring liability at January 1,	$391	$309	$—
Amounts expensed	—	119	1,428
Amounts expensed - discontinued operations	—	581	—
Amounts paid	(326)	(618)	(1,119)
Restructuring liability at December 31,	$65	$391	$309

16. Unaudited Quarterly Financial Data

Set forth below are the unaudited quarterly financial data for the fiscal years ended December 31, 2018 and 2017.

For the quarters ended	March 31	June 30	September 30	December 31
2018				
Revenues	$12,791	$11,847	$ 16,070	$ 15,827
Cost of sales	7,766	8,125	10,654	9,926
Net income (loss) from continuing operations	(191)	(1,679)	1,055	900
Loss from discontinued operations	(25)	(74)	(10)	(4)
Net income (loss)	(216)	(1,753)	1,045	896
Basic net income (loss) per common share:			—	—
Continuing operations	(0.01)	(0.07)	0.04	0.04
Discontinued operations	—	—	—	—
Basic net income (loss) per common share:	$(0.01)	$(0.07)	$ 0.04	$ 0.04
Diluted net income (loss) per common share:				—
Continuing operations	(0.01)	(0.07)	0.04	0.04
Discontinued operations	—	—	—	—
Diluted net income (loss) per common share:	$(0.01)	$(0.07)	$ 0.04	$ 0.04
2017				
Revenues	$8,491	$9,741	$ 13,548	$ 13,386
Cost of sales	4,769	6,116	8,498	7,761
Net income (loss) from continuing operations	(1,776)	(5,585)	(178)	1,004
Loss from discontinued operations	(730)	(1,269)	(239)	(1,676)
Net loss	(2,506)	(6,854)	(417)	(672)
Basic net income (loss) per common share:				
Continuing operations	(0.07)	(0.24)	(0.01)	0.04
Discontinued operations	(0.03)	(0.05)	(0.01)	(0.07)
Basic net loss per common share:	$(0.10)	$(0.29)	$ (0.02)	$ (0.03)
Diluted net income (loss) per common share:				
Continuing operations	(0.07)	(0.24)	(0.01)	0.04
Discontinued operations	(0.03)	(0.05)	(0.01)	(0.07)
Diluted net loss per common share:	$(0.10)	$(0.29)	$ (0.02)	$ (0.03)

Refer to Note 1 for further detail related to a revision made in the previously issued financial statements as a result of an error discovered in the preparation of the current year income tax provision.

ITEM 9 - CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None

ITEM 9A - CONTROLS AND PROCEDURES

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Disclosure Controls and Procedures

Under the supervision and with the participation of our Chief Executive Officer and Principal Financial Officer, our management evaluated the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Exchange Act), as of the end of the period covered by this Annual Report on Form 10-K (the “Evaluation Date”). Based upon that evaluation, our Chief Executive Officer and Principal Financial Officer concluded that, as of the Evaluation Date, our disclosure controls and procedures are effective to ensure that information required to be disclosed in the reports that we file or submit under the Exchange Act is (i) recorded, processed, summarized and reported, within the time periods specified in the Commission’s rules and forms and (ii) accumulated and communicated to our management, including our Chief Executive Officer and Principal Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

Change in Internal Controls

Beginning January 1, 2018, we adopted ASC 606 "Revenue from Contracts with Customers". It did not have a material impact on our ongoing net income; however, we implemented changes to our processes related to revenue recognition and related internal controls. These changes included the development of new policies related to the five-step model, training, ongoing contract review requirements, and gathering of information to comply with disclosure requirements.

There were no changes in Fuel Tech's internal control over financial reporting during the year to which this report relates that have materially affected, or are reasonably likely to materially affect Fuel Tech's internal control over financial reporting.

Management’s Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rule 13a-15(f) under the Exchange Act. As required by Rule 13a-15(c) under the Exchange Act, our management has carried out an evaluation, with the participation of the Chief Executive Officer and Principal Financial Officer, of the effectiveness of its internal control over financial reporting as of the end of the last fiscal year. The framework on which such evaluation was based is contained in the report entitled “Internal Control—Integrated Framework” issued by the Committee of Sponsoring Organizations of the Treadway Commission (the “COSO Report”) in 2013.

Our system of internal control over financial reporting is 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. 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.

Based on its assessment, management has concluded that we maintained effective internal control over financial reporting as of December 31, 2018, based on criteria in “Internal Control - Integrated Framework” issued by the COSO in 2013.

ITEM 9B - OTHER INFORMATION

None

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PART III

ITEM 10 – DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Information required by this Item will be set forth under the captions “Election of Directors,” “Directors and Executive Officers of Fuel Tech,” “Compensation Committee,” “Audit Committee,” and “Financial Experts” in our definitive Proxy Statement related to the 2019 Annual Meeting of Stockholders (the “Proxy Statement”) and is incorporated by reference.

We have adopted a Code of Ethics and Business Conduct (the “Code”) that applies to all employees, officers and directors, including the Chief Executive Officer and Principal Financial Officer. A copy of the Code is available free of charge to any person on written or telephone request to our Legal Department at the address or telephone number described in Item 1 under the heading "Available Information." The Code is also available on our website at www.ftek.com.

Other information concerning our directors and executive officers and relating to corporate governance will be set forth under the captions “Election of Directors,” “Audit Committee,” “Compensation and Nominating Committee,” “Financial Experts,” “Corporate Governance” and “General” in our Proxy Statement related to the 2019 Annual Meeting of Stockholders and is incorporated by reference.

ITEM 11 - EXECUTIVE COMPENSATION

Information required by this Item will be set forth under the caption “Executive Compensation” in our definitive Proxy Statement and is incorporated by reference.

ITEM 12 - SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The following table provides information for all equity compensation plans as of the fiscal year ended December 31, 2018, under which our securities were authorized for issuance:

Plan Category	Number of Securities to be issued upon exercise of outstanding options and vesting of restricted stock units	Weighted-average exercise price of outstanding options	Number of securities remaining available for future issuance under equity compensation plan excluding securities listed in column (a)
	(a)	(b)	(c)
Equity compensation plans approved by security holders (1)	2,042,777	$ 4.68	2,133,733

(1) Includes Common Shares of Fuel Tech, Inc. authorized for awards under Fuel Tech’s 2014 Long-Term Incentive Plan adopted in May of 2014.

In addition to the plans listed above, we have a Deferred Compensation Plan for directors under which 100,000 Common Shares have been reserved for issuance as deferred compensation with respect to director's fees.

Further information required by this Item will be set forth under the caption “Principal Stockholders and Stock Ownership of Management” in the definitive Proxy Statement and is incorporated by reference.

ITEM 13 - CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Information required by this Item will be set forth under the captions “Compensation Committee Interlocks and Insider Participation” and “Certain Relationships and Related Transactions” in our definitive Proxy Statement and is incorporated by reference.

ITEM 14 - PRINCIPAL ACCOUNTANT FEES AND SERVICES

Information required by this Item will be set forth under the caption “Approval of Appointment of Auditors” in our definitive Proxy Statement and is incorporated by reference.

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PART IV

ITEM 15 - EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a)(1) Financial Statements

The financial statements identified below and required by Part II, Item 8 of this Form 10-K are set forth above.

Management's Report on Internal Control Over Financial Reporting
Report of Independent Registered Public Accounting Firm
Consolidated Balance Sheets as of December 31, 2018 and 2017
Consolidated Statements of Operations for Years Ended December 31, 2018, 2017 and 2016
Consolidated Statements of Comprehensive Loss for Years Ended December 31, 2018, 2017 and 2016
Consolidated Statements of Stockholders' Equity for the Years Ended December 31, 2018, 2017 and 2016
Consolidated Statements of Cash Flows for the Years Ended December 31, 2018, 2017 and 2016
Notes to Consolidated Financial Statements

(2) Financial Statement Schedules

All other schedules have been omitted because of the absence of the conditions under which they are required or because the required information, where material, is shown in the financial statements or the notes thereto.

(3) Exhibits

			Incorporated by Reference			
Exhibit	Description	Filed Herewith	Form	Period ending	Exhibit	Filing date
3.1	Certificate of Incorporation of Fuel Tech, Inc.		8-K		3.2	10/5/2006
3.2	Certificate of Conversion of Fuel Tech, Inc.		8-K		3.1	10/5/2006
3.3	Amended and Restated By-Laws of Fuel Tech, Inc. dated as of May 28, 2015		8-K		3.1	6/1/2015
4.1	Instrument Constituting US $19,200,000 Nil Coupon Non-Redeemable Convertible Unsecured Loan Notes of Fuel-Tech N.V., dated December 21, 1989		10-Q	9/30/2009	4.1	11/4/2009
4.2	First Supplemental Instrument Constituting US $3,000 Nil Coupon Non-Redeemable Convertible Unsecured Loan Notes of Fuel-Tech N.V., dated July 10, 1990		10-Q	9/30/2009	4.2	11/4/2009
4.3	Instrument Constituting US $6,000 Nil Coupon Non-Redeemable Convertible Unsecured Loan Notes of Fuel-Tech N.V., dated March 12, 1993		10-Q	9/30/2009	4.3	11/4/2009
4.4*	Fuel Tech, Inc. Incentive Plan as amended through June 3, 2004		S-8		4.1	10/2/2006
4.5*	Fuel Tech, Inc. 2014 Long-Term Incentive Plan		S-8		4.1	3/31/2014
4.6*	Fuel Tech, Inc. Form of Non-Executive Director Stock Option Agreement		10-K	12/31/2006	4.6	3/6/2007
4.7	Fuel Tech, Inc. Form of 2014 Long-Term Incentive Plan Non-Employee Director's Stock Option Agreement		10-Q	6/30/2014	4.2	8/11/2014
4.8*	Fuel Tech, Inc. Form of Non-Qualified Stock Option Agreement		10-K	12/31/2006	4.7	3/6/2007
4.9*	Fuel Tech, Inc. Form of Incentive Stock Option Agreement		10-K	12/31/2006	4.8	3/6/2007
4.10*	Fuel Tech, Inc. Form of Revised Restricted Stock Unit Agreement		10-K	12/31/2011	4.9	3/5/2012
4.11*			10-Q	6/30/2014	4.1	8/11/2014

	Fuel Tech, Inc. Form of Restricted Stock Unit Agreement (2014 Long-Term Incentive Plan)				
4.12*	Fuel Tech, Inc. Form of 2014 Long-Term Incentive Plan Stock Option Agreement	10-Q	3/31/2015	10.2	5/11/2015
4.13*	Fuel Tech, Inc. Form of 2016 Executive Performance RSU Award Agreement	10-K	12/31/2015	4.17	3/24/2016

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10.1	Form of Indemnity Agreement between Fuel Tech, Inc. and its Directors and Officers.	8-K		99.1	2/7/2007
10.2**	Restated Supply Agreement, dated March 4, 2009, between Fuel Tech, Inc. and Martin Marietta Magnesia Specialties, LLC.	10-K	12/31/2008	10.7	3/5/2009
10.3	Amendment No. 1 to Restated Supply Agreement, dated October 31, 2013, between Fuel Tech, Inc. and Martin Marietta Magnesia Specialties, Inc.	10-Q	9/30/2013	10.1	11/13/2013
10.4	Credit Agreement, dated as of June 30, 2009, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	9/30/2009	10.5	11/4/2009
10.5	First Amendment to Credit Agreement, dated as of October 5, 2009, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	9/30/2009	10.6	11/4/2009
10.6	Second Amendment to Credit Agreement, dated as of November 4, 2009, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	9/30/2009	10.7	11/4/2009
10.7	Third Amendment to Credit Agreement, dated as of June 30, 2011, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	6/30/2011	4.1	8/8/2011
10.8	Fourth Amendment to Credit Agreement, dated as of June 30, 2013, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	6/30/2013	4.1	8/7/2013
10.9	Fifth Amendment to Credit Agreement, dated as of June 16th, 2015, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-K	12/31/2015	10.12	3/24/2015
10.10	Sixth Amendment to Credit Agreement, dated as of June 30, 2015, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	6/30/2015	10.2	8/10/2015
10.11	Seventh Amendment to Credit Agreement, dated as of December 31, 2015, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-K	12/31/2015	10.14	3/24/2015
10.12	Eight Amendment to Credit Agreement, dated as of May 9, 2016, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	3/31/2016	10.1	5/10/2016
10.13	Ninth Amendment to Credit Agreement, dated as of June 16, 2017, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	6/30/2017	10.1	8/14/2017
10.14	Tenth Amendment to Credit Agreement, dated as of January 10, 2018, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-K	12/31/2017	10.2	3/12/2018
10.15	11th Amendment to Credit Agreement, dated as of May 15, 2018, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	6/30/2018	10.2	8/13/2018
10.16	Twelfth Amendment to Credit Agreement, dated as of September 17, 2018, by and among Fuel Tech, Inc., Fuel Tech, S.r.L, and JPMorgan Chase Bank, N.A.	10-Q	9/30/2018	10.1	11/13/2018
10.17	Thirteenth Amendment to Credit Agreement, dated as of October 19, 2018, by and among Fuel Tech, Inc., Fuel Tech S.r.L, and JPMorgan Chase Bank, N.A.	10-Q	9/30/2018	10.2	11/13/2018
10.18	Tenth Amendment to Continuing Guaranty, dated as of June 29, 2018, between JPMorgan Chase Bank, N.A., JP Chase Bank (China) Company Limited and Fuel Tech, Inc.	10-Q	6/30/2018	10.1	8/13/2018
10.19	11th Amendment to Continuing Guaranty, dated as of October 19, 2018, between JPMorgan Chase Bank, N.A., JPMorgan Chase Bank N.A., JPMorgan Chase Bank (China) Company Limited and Fuel Tech, Inc.	10-Q	9/30/2018	10.3	11/13/2018
10.20	Cash Collateral Pledge Agreement, dated as of May 27, 2016, between JPMorgan Chase Bank, N.A. and Fuel Tech, Inc.	10-Q	6/30/2016	10.1	8/9/2016
10.21	Sublease Agreement, dated December 9, 2009, between Fuel Tech, Inc. and American Bailey Corporation	10-K	12/31/2009	10.14	3/4/2010

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10.22*	2017 Executive Officer Plan of Fuel Tech, Inc.		10-K	12/31/2017	10.23	3/12/2018
10.23*	2018 Corporate Incentive Plan of Fuel Tech, Inc.		10-K	12/31/2017	10.25	3/12/2018
10.24*	2019 Corporate Incentive Plan of Fuel Tech, Inc.	X				
10.25*	2017 Fuel Tech, Inc. FUEL CHEM Officer Sales Commission Plan		10-K	12/31/2017	10.26	3/12/2018
10.26*	2018 Fuel Tech, Inc. FUEL CHEM Officer Sales Commission Plan		10-K	12/31/2017	10.27	3/12/2018
10.27*	2019 Fuel Tech, Inc. FUEL CHEM Officer Sales Commission		8-K	12/14/2018	99.2	12/14/2018
10.28*	2017 Fuel Tech, Inc. APC Officer and NSM Sales Commission Plan		10-K	12/31/2017	10.28	3/12/2018
10.29*	2018 Fuel Tech, Inc. APC Officer and NSM Sales Commission Plan		10-K	12/31/2017	10.29	3/12/2018
10.30*	2019 Fuel Tech, Inc. APC Officer and NSM Sales Commission Plan		8-K	12/14/2018	99.1	12/14/2018
10.31*	Employment Agreement dated August 31, 2009, between William E. Cummings, Jr. and Fuel Tech, Inc.		10-K	12/31/2009	10.10	3/14/2010
10.32*	Employment Agreement, dated September 20, 2010 between Vincent J. Arnone and Fuel Tech, Inc.		10-K	12/31/2011	10.21	3/5/2012
10.33*	Employment Agreement, dated March 9, 2018, between James M. Pach and Fuel Tech, Inc.		10-K	12/31/2017	10.35	3/12/2018
23.1	Consent of Independent Registered Public Accounting Firm.	X				
31.1	Certifications of Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.	X				
31.2	Certifications of principal financial officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.	X				
32	Certification of Chief Executive Officer and principal financial officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.	X				

101.1 INS XBRL Instance Document.

101.2 SCH XBRL Taxonomy Extension Schema Document.

101.3 CAL XBRL Taxonomy Extension Calculation Linkbase Document.

101.4 DEF XBRL Taxonomy Extension Definition Linkbase Document.

101.5 LAB XBRL Taxonomy Extension Label Linkbase Document.

101.6 PRE XBRL Taxonomy Extension Presentation Linkbase Document.

* Indicates a management contract or compensatory plan or arrangement.

** Portions of this document have been omitted pursuant to a request for confidential treatment and the omitted information has been filed separately with the Securities and Exchange Commission.

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SIGNATURES AND CERTIFICATIONS

Pursuant to the requirements of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

FUEL TECH, INC.

Date: March 14, 2019 By: /s/ Vincent J. Arnone
Vincent J. Arnone
President and Chief Executive Officer
(Principal Executive Officer)

Date: March 14, 2019 By: /s/ James M. Pach
James M. Pach
Vice President, Treasurer and Controller
(Principal Financial Officer)

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Pursuant to the requirements of the Securities and Exchange Act of 1934, this report has been duly signed below by the following persons on behalf of Fuel Tech, Inc. and in the capacities and on the date indicated.
Date: March 14, 2019

Signature	Title
/s/ Vincent J. Arnone Vincent J. Arnone	President and Chief Executive Officer (Principal Executive Officer)
/s/ James M. Pach James M. Pach	Vice President, Treasurer and Controller (Principal Financial Officer)
/s/ Douglas G. Bailey Douglas G. Bailey	Director
/s/ Thomas S. Shaw, Jr. Thomas S. Shaw, Jr.	Director
/s/ Dennis L. Zeitler Dennis L. Zeitler	Director
/s/ James J. Markowsky, Ph.D. James J. Markowsky, Ph.D.	Director
/s/ Sharon L. Jones Sharon L. Jones	Director