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

ACE

Term	Definition
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 ele