

Energy Recovery, Inc.  
Form 10-K  
March 10, 2017

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**UNITED STATES SECURITIES AND EXCHANGE COMMISSION**

**Washington D.C. 20549**

**Form 10-K**

**(Mark One)**

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

**For the fiscal year ended December 31, 2016**

**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: 001-34112**

**Energy Recovery, Inc.**

*(Exact Name of Registrant as Specified in Its Charter)*

**Delaware**

**01-0616867**

*(State or Other Jurisdiction of (I.R.S. Employer  
Incorporation or Organization) Identification No.)*

**1717 Doolittle Drive, San Leandro, CA 94577**

*(Address of Principal Executive Offices)*

**Registrant's telephone number, including area code: (510) 483-7370**

**Securities registered pursuant to Section 12(b) of the Securities Exchange Act of 1934:**

<u>Title of Each Class</u>	<u>Name of Exchange on Which Registered</u>
Common stock, \$0.001 par value	The NASDAQ Stock Market LLC

**Securities registered pursuant to Section 12(g) of the Act: None**

Indicate by check mark whether the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.

Yes No

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 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 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, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act:

Large accelerated filer	Accelerated filer
Non-accelerated filer (Do not check if a smaller reporting company)	Smaller reporting company

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

The aggregate market value of the voting stock held by non-affiliates amounted to approximately \$274 million on June 30, 2016.

The number of shares of the registrant's common stock outstanding as of February 28, 2017 was 53,880,311.

**DOCUMENTS INCORPORATED BY REFERENCE**

Parts of the Proxy Statement for the Registrant's Annual Meeting of Stockholders to be held on June 22, 2017 are incorporated by reference into Part III of this Annual Report on Form 10-K.

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## FORWARD- LOOKING INFORMATION

*This Annual Report on Form 10-K, including “Item 7 Management’s Discussion and Analysis of Financial Condition and Results of Operations” and certain information incorporated by reference, contain forward-looking statements within the “safe harbor” provisions of the Private Securities Litigation Reform Act of 1995. Forward-looking statements in this report include, but are not limited to, statements about our expectations, objectives, anticipations, plans, hopes, beliefs, intentions, or strategies regarding the future.*

*Forward-looking statements represent our current expectations about future events, are based on assumptions, and involve risks and uncertainties. If the risks or uncertainties occur or the assumptions prove incorrect, then our results may differ materially from those set forth or implied by the forward-looking statements. Our forward-looking statements are not guarantees of future performance or events.*

*Words such as “expects,” “anticipates,” “aims,” “projects,” “intends,” “plans,” “believes,” “estimates,” “seeks,” variation and similar expressions are also intended to identify such forward-looking statements. These forward-looking statements are subject to risks, uncertainties, and assumptions that are difficult to predict; therefore, actual results may differ materially and adversely from those expressed in any forward-looking statements. Readers are directed to risks and uncertainties identified under “Item 1A Risk Factors” and elsewhere in this report for factors that may cause actual results to be different from those expressed in these forward-looking statements. Except as required by law, we undertake no obligation to revise or update publicly any forward-looking statements for any reason.*

*Forward-looking statements in this report include, without limitation, statements about the following:*

*our belief that levels of gross profit margin are sustainable to the extent that volume grows, we experience a favorable product mix, pricing remains stable, and we continue to realize cost savings through production efficiencies and enhanced yields;*

*our plan to improve our existing energy recovery devices and to develop and manufacture new and enhanced versions of these devices;*

*our belief that our PX<sup>®</sup> energy recovery devices are the most cost-effective energy recovery devices over time and will result in low life-cycle costs;*

*our belief that our turbocharger devices have long operating lives;*

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*our objective of finding new applications for our technology and developing new products for use outside of desalination, including oil & gas applications;*

*our expectation that our expenses for research and development and sales and marketing may increase as a result of diversification into markets outside of desalination;*

*our expectation that we will continue to rely on sales of our energy recovery devices in the desalination market for a substantial portion of our revenue and that new desalination markets, including the United States, will provide revenue opportunities to us;*

*our ability to meet projected new product development dates, anticipated cost reduction targets, or revenue growth objectives for new products;*

*our belief that we can commercialize the VorTeq<sup>TM</sup> hydraulic fracturing system;*

*our belief that customers will accept and adopt our new products;*

*our belief that our current facilities will be adequate for the foreseeable future;*

*our expectation that sales outside of the United States will remain a significant portion of our revenue;*

*the timing of our receipt of payment for products or services from our customers;*

*our belief that our existing cash balances and cash generated from our operations will be sufficient to meet our anticipated liquidity needs for the foreseeable future, with the exception of a decision to enter into an acquisition and/or fund investments in newly developed technology arising from rapid market adoption that could require us to seek additional equity or debt financing;*

*our expectation that, as we expand our international sales, a portion of our revenue could continue to be denominated in foreign currencies;*

*our belief that new markets will grow in the water desalination market;*

*our expectation that we will be able to enforce our intellectual property rights; and*

*other factors disclosed under Items 1 – Business, Item 1A- Risk Factors, Item 2 – Properties, Item 7 – Management’s Discussion and Analysis of Financial Condition and Results of Operation, Item 7A – Quantitative and Qualitative Disclosures about Market Risks and elsewhere in this Form 10-K.*



*You should not place undue reliance on these forward-looking statements, which reflect management's opinions only as of the date of the filing of this Annual Report on Form 10-K. All forward-looking statements included in this document are subject to additional risks and uncertainties further discussed under "Item 1A Risk Factors" and are based on information available to us as of March 9, 2017. We assume no obligation to update any such forward-looking statements. It is important to note that our actual results could differ materially from the results set forth or implied by our forward-looking statements. The factors that could cause our actual results to differ from those included in such forward-looking statements are set forth under the heading "Item 1A – Risk Factors" and our results disclosed from time to time in our reports on Forms 10-Q and 8-K and our Annual Reports to Stockholders.*



## PART I

### Item 1 — Business

#### Overview

Energy Recovery, Inc. (the “Company,” “Energy Recovery,” “our,” “us,” and “we”) is an energy solutions provider to industrial fluid flow markets worldwide. Our core competencies are fluid dynamics and advanced material science. Our products make industrial processes more operational and capital expenditure efficient. Our solutions convert wasted pressure energy into a reusable asset and preserve or eliminate pumping technology in hostile processing environments. Our solutions are marketed and sold in fluid flow markets, such as water desalination, oil & gas, and chemical processing, under the trademarks ERI<sup>®</sup>, PX<sup>®</sup>, Pressure Exchanger<sup>®</sup>, PX Pressure Exchanger<sup>®</sup>, AT<sup>™</sup>, AquaBold<sup>™</sup>, VorTeq<sup>™</sup>, IsoBoost<sup>®</sup>, and IsoGen<sup>®</sup>. Our solutions are owned, manufactured, and/or developed, in whole or in part, in the United States of America (“U.S.”) and the Republic of Ireland.

Energy Recovery was incorporated in Virginia in 1992, reincorporated in Delaware in 2001, and became a public company in July 2008. Our headquarters and primary manufacturing center is located at 1717 Doolittle Drive, San Leandro, California 94577, and we have four (4) wholly-owned subsidiaries: ERI Energy Recovery Holdings Ireland Limited; ERI Energy Recovery Ireland Ltd.; Energy Recovery Iberia, S.L.; and Energy Recovery Canada Corp. We also have sales offices in Dubai, United Arab Emirates and Shanghai, Peoples Republic of China. Our main telephone number is (510) 483-7370.

The Energy Recovery website is [www.energyrecovery.com](http://www.energyrecovery.com). We use the Investor Relations section of our website as a routine channel for distribution of important information, including news releases, presentations, and financial statements. We intend to use the Investor Relations section of our website as a means of complying with our disclosure obligations under Regulation FD. Accordingly, investors should monitor our Investor Relations website in addition to press releases, Securities and Exchange Commission (“SEC”) filings, and public conference calls and webcasts. Our Annual Report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, all amendments to those reports, and the Proxy Statement for our Annual Meeting of Stockholders are made available, free of charge, in the Investor Relations section of our website, as soon as reasonably practicable after the reports have been filed with or furnished to the SEC. The information contained on our website or any other website is not part of this report nor is it considered to be incorporated by reference herein or with any other filing we make with the SEC.

#### Fluid Flow Markets

Our primary industrial fluid flow markets are water desalination and oil & gas. We have been and continue to be the technology leader for energy recovery devices (“ERDs”) in the water desalination market with our proprietary Pressure Exchanger (“PX”) and turbocharger technologies. We also provide high-performance and high-efficiency pumps to facilitate a packaged solution for our customers. Building on our leading technology, we have expanded our technology solutions offering into other fluid flow markets, such as those found in upstream, midstream, and downstream applications of the oil & gas industry, and are exploring other end markets for which our solutions may be applicable. We offer the VorTeq hydraulic fracturing system (“VorTeq”), IsoBoost, and IsoGen product lines to the oil & gas market.

### ***Water Desalination***

Water desalination has been our core market for revenue generation to date. The water desalination market ranges from small water desalination plants such as those used in cruise ships and resorts, to mega-project desalination plant deployments globally. Because of the geographical location of many significant desalination projects, geopolitical and economic events can have an effect on the timing of expected projects. In addition, population and economic growth in countries such as India and China are driving water demand for human, agricultural, and industrial use. We anticipate that markets traditionally not associated with water desalination, including the United States, will inevitably develop and provide further revenue growth opportunities. Our solutions leverage our PX, turbocharger, and pump technologies providing our customers significant operational efficiency and energy savings.

## *Oil & Gas*

Across the oil & gas upstream, midstream and downstream markets, highly pressurized fluid flows are required to extract and process oil and gas. These pressurized fluid flows are both a necessity and liability to the oil & gas industry.

Within the oil & gas upstream sector, hydraulic fracturing is a well-stimulation technique in which pressurized liquid containing a highly abrasive, proppant-laden fluid is injected into a wellbore to create cracks in deep-rock formations thereby permitting oil & gas extraction. Oilfield service providers utilize high-pressure hydraulic fracturing pumps to pressurize the fracturing fluid at treating pressures up to 15,000 psi. These pumps are routinely destroyed by the abrasive fluids during the hydraulic fracturing process causing significant oilfield service operator costs associated with excessive downtime, repairs, maintenance, and capital equipment redundancy. Our VorTeq leverages our PX technology to isolate high-pressure hydraulic fracturing pumps from abrasive fracturing fluid thereby enabling oilfield service operators to realize immediate and long-term savings.

Within the oil & gas midstream and downstream sectors, pressure energy becomes a waste product at different stages of oil and gas processing. It is at these stages that our IsoBoost and IsoGen technology enables the recovery of pressure energy in the fluid flow either through the exchange of pressure within the application or by converting it to electricity. Our technology enables gas processing plant and pipeline owners and operators to achieve immediate and long-term energy savings with little or no operational disruption.

## **OUR SOLUTIONS**

Energy, repairs, maintenance, and capital costs are major cost drivers in the water desalination and oil & gas markets. Energy Recovery has developed proprietary technology solutions to address these major cost drivers. In the water desalination market, our energy recovery solutions reduce plant operating costs by capturing and reusing the otherwise lost pressure energy from the reject stream of the desalination process. In the oil & gas market, our hydraulic fracturing solution reduces operating and capital equipment costs by isolating high cost pumping equipment from highly abrasive fracturing fluids; while our centrifugal solutions reduce plant or pipeline operating costs by capturing and reusing otherwise lost pressure energy.

## *Water Desalination*

Our water desalination ERDs are categorized into two technology groups: PX Pressure Exchangers and turbochargers. The first technology group is comprised of our patented PX ERD technology consisting of ceramic rotors and almost frictionless hydrodynamic bearings. Our PX ERDs enable water desalination plant operators to capture wasted hydraulic pressure energy from a high-pressure fluid flow and transfer the energy to a low-pressure fluid flow, thereby recovering wasted pressure energy. Our PX ERDs perform with up to 98% efficiency and unmatched uptime in the desalination industry, and can reduce a desalination plant's energy costs by up to 60%.

The second technology group is comprised of turbochargers ("AT Turbochargers") designed for low-pressure brackish and high-pressure seawater reverse osmosis systems. Our AT Turbochargers provide premium efficiency with state-of-the-art engineering and configuration. Designed for reliability and optimum efficiency, our turbochargers offer substantial savings, and the custom-designed hydraulics and 3-D geometry allow for optimum performance. Also, the patent-protected technology for volute inserts allows field flexibility.

Complementing both our PX ERDs and AT Turbochargers are our high-performance, high-efficiency pumps.

### *Oil & Gas*

In the oil & gas market, we design and manufacture innovative solutions that preserve or eliminate pumping technology in hostile processing environments and convert wasted pressure energy into a reusable asset. Our core technology solutions are the VorTeq and our centrifugal line of products, the IsoBoost and the IsoGen.

The VorTeq is an enabling technology for oilfield service ("OFS") companies to isolate and preserve costly hydraulic fracturing pumps by re-routing hostile fracturing fluid away from these critical pumps. These hydraulic fracturing pumps will then process only water, which leads to reduced repairs and maintenance costs, increased fleet revenue, and reduced capital costs by extending pump life expectancy and eliminating redundant capital equipment. The VorTeq further allows for the migration to increasingly efficient pumping technology that could lead to the revolutionizing of the hydraulic fracturing system.

During 2015, we conducted VorTeq field trials with Liberty Oil Field Services, our early stage test partner, culminating in the successful delivery of proppant to a well located in the Bakken Formation. In October 2015, through our subsidiary ERI Energy Recovery Ireland, Ltd., we entered into a fifteen-year license agreement with Schlumberger Technology Corporation (the “VorTeq Licensee”) for the exclusive, worldwide right to use the VorTeq for hydraulic fracturing onshore operations. The VorTeq is currently in the research and development stage and we are actively working towards commercialization.

IsoBoost and IsoGen technologies were commercialized in 2012. Our IsoBoost energy recovery systems are comprised of hydraulic turbo chargers and related controls and automation systems. The IsoBoost enable oil & gas operators to capture wasted hydraulic pressure energy from a high-pressure fluid flow and transfer the energy to a low-pressure fluid flow, thereby recovering wasted pressure energy. Our IsoGen energy recovery systems are comprised of hydraulic turbines, generators, and related controls and automation systems. The IsoGen enables oil & gas operators to capture hydraulic energy and generate electricity from high-pressure fluid flows. Additionally, our energy recovery and power generation systems result in lower capital costs for oil & gas operators by minimizing the need for high-pressure pumps that consume large amounts of energy.

We have contracted and delivered oil and gas solutions, as pilot projects, to customers in North America, Asia, and the Middle East for use in gas processing and ammonia processing applications. In 2015, we commissioned our first IsoGen unit in a major gas processing plant in the Middle East. In 2016, we received our first major purchase order for multiple units of our IsoBoost technology for integration into a major gas processing plant to be constructed in the Middle East. The contract is for approximately \$7 million worth of equipment and services with an option for an additional \$4 million to be determined at a later date, which may or may not be exercised. The optional supply may not be confirmed by the customer until the latter portion of 2017.

### *Services*

We provide a portfolio of services tailored to our customers’ needs. Specifically, we assist our customers in the early stages of planning and design by leveraging our broad experience in fluid flows and advanced material science. We also provide engineering, technical support, and training to customers during installation and commissioning. Additionally, we offer preventive maintenance and support services as well as reinstallation services. To date, the revenue from these services has not represented a significant portion of our revenue.

### **CUSTOMERS**

### *Water Desalination*

Our water desalination customers include major international engineering, procurement, and construction (“EPC”) firms that design and build large desalination plants; original equipment manufacturers (“OEM”) which are companies that supply equipment and packaged solutions for small- to medium-sized desalination plants; and national, state and local municipalities worldwide.

### *Large Engineering, Procurement and Construction Firms*

A significant portion of our revenue historically has come from sales of our ERD solutions to large EPC firms worldwide that have the required desalination expertise to engineer, undertake procurement for, construct, and sometimes own and operate, large desalination plants or mega-projects (“MPD”). We work with these firms to specify our solutions for their plants. The time between project tender and shipment can range from sixteen (16) to thirty-six (36) months. Each MPD project typically represents a revenue opportunity of \$1 million to \$10 million.

A limited number of these EPC firms can account for 10% or more of our product revenue. Revenue from customers representing 10% or more of product revenue varies from year to year. For the years ended December 31, 2016 and 2015, one customer, Acciona Agua, S.A.U., accounted for approximately 11% and 14%, respectively, of total product revenue. For the year ended December 31, 2014, one customer, IDE Americas, Inc., accounted for approximately 14% of total product revenue.

### *Original Equipment Manufacturers*

We also sell our solutions and services to OEM suppliers of pumps and other water-related equipment for assembly and use in small- to medium-sized desalination plants located in hotels, power plants, cruise ships, farm operations, island bottlers, mobile and containerized water desalination solutions, and small municipalities. These OEMs also purchase our solutions for “quick water” or emergency water solutions. The time from project tender and shipment can range from one (1) to twelve (12) months. OEM projects typically represent revenue opportunities of \$0.01 million to \$1 million.

Our OEM customer base accounted for approximately 39%, 45%, and 57% of our total revenues, for the years ended December 31, 2016, 2015, and 2014, respectively. We typically sell and promote our packaged solutions to this sales channel represented by a product mix of PX Pressure Exchangers, turbochargers, high-pressure pumps, and circulation “booster” pumps.

### *Oil & Gas*

Our oil & gas customers include international oil companies (“IOC”), national oil companies (“NOC”), exploration and production companies (“E&P”), oilfield service companies (“OFS”), and EPC firms that design and build oil & gas processing plants.

### Upstream

OFS companies provide the infrastructure, equipment, intellectual property, and services needed by the oil & gas industry to explore for, extract, and transport crude oil and natural gas. OFS hydraulic fracturing operators face significant pressure to reduce costs as oil & gas companies curtail capital expenditures and seek operational efficiencies in response to lower commodity prices. We developed the VorTeq which enables these operators to isolate pumps from fracturing fluid thereby reducing operating and capital costs.

In the third quarter of 2014, we entered into a strategic partnership with Liberty Oil Field Services to pilot and conduct field trials with the VorTeq. These field trials commenced in the second quarter of 2015 and were completed in the fourth quarter of 2015 with the successful delivery of proppant to a well located in the Bakken Formation. In October 2015, we entered into a fifteen-year license agreement with the VorTeq Licensee for the exclusive, worldwide right to use our VorTeq technology for hydraulic fracturing onshore operations.

One customer, Schlumberger Technology Corporation, accounted for 100% of our license and development revenue for 2016 and 2015, which represented 9% and 2% of our total revenue for the years ended December 31, 2016 and 2015, respectively. There was no license and development revenue recognized for 2014.

### Midstream and Downstream

We have contracted and delivered gas and oil solutions, as pilot projects, to customers in North America, Asia, and the Middle East for use in gas processing and/or ammonia processing applications. In 2015, we commissioned our first IsoGen unit in a major gas processing plant in the Middle East. In 2016, we received our first major purchase order for multiple units of our IsoBoost technology for integration into a major gas processing plant to be constructed in the Middle East.

For the year ended December 31, 2016, we recognized Oil & Gas Segment revenue from our licensing agreement with the VorTeq Licensee and from a purchase order for multiple units of our IsoBoost technology. For the year ended December 31, 2015, we recognized Oil & Gas Segment revenue from the license agreement with the VorTeq Licensee, a cancellation fee of an IsoBoost purchase order, and from the commissioning of an IsoGen system. For the year ended December 31, 2014, we recognized Oil & Gas Segment rental income from the operating lease and subsequent lease buy-out of an IsoGen system.

While one customer, Tecnicas Reunidas, accounted for 100% of our 2016 Oil & Gas Segment product revenue, no Oil & Gas Segment customer accounted for more than 10% of our total product revenue for the years ended December 31, 2016, 2015, and 2014, respectively.

Additional information regarding our product revenue by segment is included in Note 13 to the Consolidated Financial Statements in Part II, Item 8 of this Form 10-K.

## **COMPETITION**

### ***Water Desalination***

The market for ERDs and pumps in the water desalination market is competitive. As the demand for fresh water increases and the market expands, we expect competition to persist and intensify.

We have three main competitors for our ERDs: Flowserve Corporation (“Flowserve”), Fluid Equipment Development Company (“FEDCO”), and Danfoss Group (“Danfoss”). We compete with these companies on the basis of price, quality, efficiency, lead time, life expectancy, downtime, and maintenance costs. Although these companies may offer competing solutions at lower initial price, our solutions offer a competitive advantage because we believe that they provide the lowest life-cycle cost and are therefore the most cost-effective ERDs for the reverse osmosis desalination industry over time.





In the market for large desalination projects, our PX ERDs and large turbochargers compete primarily with Flowserve's DWEER product. We believe that our PX ERDs have a competitive advantage over DWEER devices because our devices are made with highly durable and corrosion-resistant ceramic parts that are designed for a life of more than 25 years, are warranted for high efficiencies, cause no unplanned downtime, and offer lower lifecycle costs. Additionally, the PX ERDs offer optimum scalability with a quick startup as well as minimal maintenance. We believe that our large turbocharger solutions also have a competitive advantage over Flowserve's Pelton Turbine product, particularly in countries where energy costs are low and upfront capital costs are a critical factor in purchase decisions, because our turbocharger solutions have lower upfront capital costs, a simple design with one rotating assembly, a small physical footprint, and a long operating life that leads to low total lifecycle costs.

In the market for small-to-medium-sized desalination plants, our solutions compete with FEDCO's turbochargers and Danfoss's ERDs. We believe that our PX ERDs have a competitive advantage over these solutions because our devices provide up to 98% energy efficiency, have lower lifecycle maintenance costs, and are made of highly durable and corrosion-resistant ceramic parts. We also believe that our turbochargers compete favorably with FEDCO's turbochargers on the basis of efficiency and price and because our turbochargers have design advantages that enhance efficiency, field flexibility, and serviceability.

In the market for high-pressure pumps, our solutions compete with pumps manufactured by Clyde Union Ltd.; Dichtung Pumpen Maschinenfabrik GmbH & Co KG; FEDCO; Flowserve; KSB Aktiengesellschaft; Torishima Pump Mfg. Co., Ltd.; Sulzer Pumps, Ltd.; and other companies. We believe that our pump solutions are competitive with these solutions because our pumps are developed specifically for reverse osmosis desalination, are highly efficient, and feature product-lubricated bearings.

### *Oil & Gas*

The market for our technology in the oil & gas market is competitive. As demand for our products increase, we expect competition to intensify.

Within the oil & gas upstream market, OFS hydraulic fracturing operators utilize high-pressure hydraulic fracturing pumps to pressurize fracturing fluid. This fluid is sent through traditional missile manifolds into the wellbore to create cracks in the deep-rock formations thereby permitting oil & gas extraction. Our VorTeq is a hydraulic pumping system that replaces the traditional missile manifold used by OFS hydraulic fracturing operators. There are many manufacturers of the traditional missile manifolds.

We believe our VorTeq technology represents a competitive advantage over existing missile manifold technology because our solution re-routes abrasive proppant away from high-pressure pumps, thereby extending pump lifespan, reducing repairs and maintenance costs, and decreasing the need for redundant capital equipment. In addition, because our VorTeq technology isolates the high-pressure pumps from abrasive proppant, OFS hydraulic fracturing operators have the ability to transition to more robust, longer lived centrifugal pumps thereby further decreasing operating and capital costs.

Within the oil & gas midstream and downstream markets, acid gas removal — also known as amine gas treating — refers to a process that utilizes solvents such as an amine solution to remove acid gasses, specifically hydrogen sulfide (H<sub>2</sub>S) and carbon dioxide (CO<sub>2</sub>) from natural gas, synthesis gas, or other hydrocarbon streams. Our IsoBoost and IsoGen technologies integrate into acid gas removal systems to reduce energy consumption and increase the reliability and uptime of the amine circulation system. Currently, most acid gas removal plants use pumps and valves to pressurize and depressurize the amine solution and the depressurization of the cleansing fluid (e.g. amine) provides an opportunity for the use of ERDs.

Our IsoBoost system is based partly on hydraulic turbocharger technology. While to our knowledge the only turbocharger systems presently utilized in acid gas removal applications are manufactured by Energy Recovery, there is at least one established competitor, FEDCO, which makes a similar hydraulic turbocharger for desalination applications. We combine our highly competitive turbocharger technology with process equipment and control systems to make a unique, proprietary, and highly competitive offering for oil & gas and petrochemical plants.

Our IsoGen system is partly based on hydraulic turbine technology which converts recovered energy to electric power. Many other companies make hydraulic turbines for a broad range of applications. For acid gas removal plants, our competitors utilize reverse running pumps (also called hydraulic power recovery turbines or HPRTs) to perform the same energy recovery function that our IsoGen systems provide. These reverse running pumps are typically part of a large “skid-mounted” system, incorporating a multi-stage pump and motor, all rotating about a common shaft. Flowserve, Sulzer Pumps, Ltd, and Shin Nippon Machinery are known to have supplied these systems and other major pump companies may have built systems for this application as well. We believe most of our competitors’ reverse running pump systems present concerns related to reliability, operational flexibility, and low energy efficiency, as compared to our IsoGen solution.

## **Sales and Marketing**

Energy Recovery has historically offered its products through a direct sales force and a capital sale procurement model. In 2015, the Company evolved its business model to a hybrid of direct capital sales and technology licensing. In 2016, the Company further expanded its procurement offerings to include energy service agreements, operating leases, and various forms of project financing.

We market and sell our solutions directly to customers through our direct sales organization and, in some countries, through authorized, independent sales agents. Our current sales organization consists of two groups: Water Desalination and Oil & Gas.

The Water Desalination group targets MPD, OEM, and aftermarket opportunities within the reverse osmosis desalination market. MPD opportunities are for desalination projects exceeding 50,000 cubic meters per day. OEM opportunities include sales of PX ERDs, turbochargers, and pumps for plants typically designed to produce less than 50,000 cubic meters per day. Aftermarket opportunities include new and replacement parts and products, as well as technical support, training, product installation, and plant commissioning.

Our Oil & Gas group targets IOCs, NOCs, E&Ps, OFSs, or EPCs on behalf of oil producers and chemical producers who have applications for our solutions and services.

Our sales branch in Dubai, United Arab Emirates serves the Middle East, where many water and oil & gas customers are located. We have a sales force in Spain focused on the Spain and European markets. We also have a sales office in Shanghai, China to address this emerging market for our energy recovery solutions. In North America, our sales office along with our corporate headquarters is located in San Leandro, California. As opportunities and diversification

dictate, particularly in oil & gas, we will look to expand our geographical presence.

A significant portion of our revenue is from outside of the United States. Additional segment and geographical information regarding our product revenue is included in Note 13 to the Consolidated Financial Statements in Part II, Item 8 of this Form 10-K.

## **Manufacturing**

Our primary Water Segment product manufacturing facility is located in San Leandro, California, where our ERDs and pumps are produced, assembled, and tested. We produce the majority of our ceramic components for our PX solutions in our advanced ceramics manufacturing facility, as well as complete machining and assemble of all ceramic components for our PX devices. In addition, many components of our turbochargers and pumps are also manufactured in San Leandro to protect the proprietary nature of our manufacturing methods and product designs and to maintain premium quality standards.

Our Oil & Gas Segment product manufacturing, assembly, and testing is conducted through our operations in Ireland. To produce our Oil & Gas Segment products, we utilize multiple supply chain partners and complete many machining, assembly, and testing operations in house to protect the proprietary nature of our manufacturing methods and product designs and to maintain premium quality standards. Our Ireland operations are also responsible for overseeing the commercialization of the VorTeq and expanding our manufacturing activities in Europe.

## Research and Development

When developing products and ultimately markets for our products, we seek three distinct process criteria: (1) high rates of fluid flow; (2) large pressure differentials; and (3) high degrees of capital intensity, specifically in the form of pumping assets. Based on these criteria, our product development strategy is to identify fluid flow applications where pumps are being destroyed and/or where pressure energy is being wasted. Our technologies isolate pumping assets from hostile process fluids, or recover otherwise wasted pressure energy. Our research and development effort is therefore focused on (1) advancing new products in markets beyond desalination, with a specific and immediate emphasis on oil & gas, where our technology is utilized to preserve pumping assets; and (2) enhancing our existing energy recovery device and pumps for the water desalination market.

Energy Recovery developed a robust, multi-year product development road map which guides our research and development resource allocation. Specific to new product development, our focus is overwhelmingly on our proprietary pressure exchanger technology given its prohibitive nature and broad technical application. Our corporate objective is to achieve proof of concept of one new derivative of the pressure exchanger annually.

To support our product strategy, we have and will continue to invest in identifying and hiring strong engineering talent with expertise in fluid physics and advanced material science. In addition, to enable increasingly complex and shorter-cycle product development, we have invested in advanced numerical modeling and analysis infrastructure allowing for three-dimensional, multi-phase, multiphysics, computational fluid dynamics; this coupled with our existing structural interaction analytical capabilities supports our objective of achieving the proof of concept of one new derivative of the pressure exchanger each year.

Within our Water Segment, research and development investments have produced the latest and most efficient energy recovery device, the PX Prime. In addition, we continue to advance our turbocharger and pump technologies to better service our water end markets.

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