UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
Form 10-K

☑ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended December 31, 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 1-06732

COVANTA HOLDING CORPORATION

(Exact name of registrant as specified in its charter)

Delaware	**95-6021257**
(State or other jurisdiction of incorporation or organization)	*(I.R.S. Employer Identification Number)*
445 South Street, Morristown, NJ	**07960**
(Address of principal executive offices)	*(Zip Code)*

Registrant's telephone number, including area code: (862) 345-5000
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Common Stock, $0.10 par value per share	New York Stock Exchange

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 ☐

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 every Interactive Data File required to be submitted 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," "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	Smaller reporting company	Emerging growth company
☑	☐	☐	☐	☐
		(Do not check if a smaller reporting 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. ☐

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

As of June 30, 2018 , the aggregate market value of the registrant's common stock held by non-affiliates of the registrant was $1.9 billion . The aggregate market value was computed by using the closing price of the common stock as of that date on the New York Stock Exchange. (For purposes of calculating this amount only, all directors and executive officers of the registrant have been treated as affiliates.)

Class	Outstanding at February 8, 2019
Common Stock, $0.10 par value	131,059,818

Documents Incorporated By Reference:

Part of Form 10-K of Covanta Holding Corporation	Documents Incorporated by Reference
Part III	Portions of the Proxy Statement to be filed with the Securities and Exchange Commission in connection with the 2019 Annual Meeting of Stockholders.

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

Certain statements in this Annual Report on Form 10-K may constitute “forward-looking” statements as defined in Section 27A of the Securities Act of 1933 (the “Securities Act”), Section 21E of the Securities Exchange Act of 1934 (the “Exchange Act”), the Private Securities Litigation Reform Act of 1995 (the “PSLRA”) or in releases made by the Securities and Exchange Commission (“SEC”), all as may be amended from time to time. Such forward-looking statements involve known and unknown risks, uncertainties and other important factors that could cause the actual results, performance or achievements of Covanta Holding Corporation and its subsidiaries (“Covanta”) or industry results, to differ materially from any future results, performance or achievements expressed or implied by such forward-looking statements. Statements that are not historical fact are forward-looking statements. Forward-looking statements can be identified by, among other things, the use of forward-looking language, such as the words “plan,” “believe,” “expect,” “anticipate,” “intend,” “estimate,” “project,” “may,” “will,” “would,” “could,” “should,” “seeks,” or “scheduled to,” or other similar words, or the negative of these terms or other variations of these terms or comparable language, or by discussion of strategy or intentions. These cautionary statements are being made pursuant to the Securities Act, the Exchange Act and the PSLRA with the intention of obtaining the benefits of the “safe harbor” provisions of such laws. Covanta cautions investors that any forward-looking statements made by us are not guarantees or indicative of future performance. Important factors, risks and uncertainties that could cause actual results to differ materially from those forward-looking statements include, but are not limited to:

- seasonal or long-term fluctuations in the prices of energy, waste disposal, scrap metal and commodities;
- our ability to renew or replace expiring contracts at comparable prices and with other acceptable terms;
- adoption of new laws and regulations in the United States and abroad, including energy laws, environmental laws, tax laws, labor laws and healthcare laws;
- failure to maintain historical performance levels at our facilities and our ability to retain the rights to operate facilities we do not own;
- our ability to avoid adverse publicity or reputational damage relating to our business;
- advances in technology;
- difficulties in the operation of our facilities, including fuel supply and energy delivery interruptions, failure to obtain regulatory approvals, equipment failures, labor disputes and work stoppages, and weather interference and catastrophic events;
- difficulties in the financing, development and construction of new projects and expansions, including increased construction costs and delays;
- our ability to realize the benefits of long-term business development and bear the cost of business development over time;
- limits of insurance coverage;
- our ability to avoid defaults under our long-term contracts;
- performance of third parties under our contracts and such third parties' observance of laws and regulations;
- concentration of suppliers and customers;
- geographic concentration of facilities;
- increased competitiveness in the energy and waste industries;
- changes in foreign currency exchange rates;
- limitations imposed by our existing indebtedness and our ability to perform our financial obligations and guarantees and to refinance our existing indebtedness;
- exposure to counterparty credit risk and instability of financial institutions in connection with financing transactions;
- the scalability of our business;
- our ability to attract and retain talented people;
- failures of disclosure controls and procedures and internal controls over financial reporting;
- our ability to utilize net operating loss carryforwards;
- general economic conditions in the United States and abroad, including the availability of credit and debt financing;
- restrictions in our certificate of incorporation and debt documents regarding strategic alternatives; and
- other risks and uncertainties affecting our business described in *Item 1A. Risk Factors* of this Annual Report on Form 10-K and in other filings by Covanta with the SEC.

Although we believe that our plans, intentions and expectations reflected in or suggested by such forward-looking statements are reasonable, actual results could differ materially from a projection or assumption in any of our forward-looking statements. Our future financial condition and results of operations, as well as any forward-looking statements, are subject to change and inherent risks and uncertainties. The forward-looking statements contained in this Annual Report on Form 10-K are made only as of the date hereof and we do not have, or undertake, any obligation to update or revise any forward-looking statements whether as a result of new information, subsequent events or otherwise, unless otherwise required by law.

AVAILABILITY OF INFORMATION

Information about Covanta is available on the Company's website at www.covanta.com. On this website, Covanta makes available, free of charge, its annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and any amendments to those reports. All such reports are available as soon as reasonably practicable after they are electronically filed with, or electronically furnished to, the SEC. Printed copies of these documents may be requested, free of charge, by contacting the Corporate Secretary, Covanta, 445 South Street, Morristown, NJ 07966, telephone 973-345-5000. The information contained on Covanta's website is not part of this Annual Report on Form 10-K and is not incorporated by reference in this document. References to website addresses are provided as inactive textual references only. The SEC also maintains a website at www.sec.gov that contains reports, proxy and information statements, and other information regarding the Company that have been filed electronically with the SEC, including this Form 10-K.

PART I

Item 1. *BUSINESS*

The terms “we,” “our,” “ours,” “us,” “Covanta” and “Company” refer to Covanta Holding Corporation and its subsidiaries and the term “Covanta Energy” refers to our subsidiary Covanta Energy, LLC and its subsidiaries.

About Covanta Holding Corporation

We are organized as a holding company, which was incorporated in Delaware on April 16, 1992. We conduct all of our operations through subsidiaries, which are engaged predominantly in the business of waste and energy services.

Our mission is to provide sustainable waste and energy solutions. We seek to do this through a variety of service offerings, including our core business of owning and operating infrastructure for the conversion of waste to energy (known as “energy-from-waste” or “EfW”).

EfW facilities produce energy through the combustion of non-hazardous municipal solid waste (“MSW”) in specially-designed power plants. Most of our facilities are “mass-burn” facilities, which combust the MSW on an as-received basis without any pre-processing such as shredding, sorting or sizing. The process reduces the waste to an inert ash while extracting ferrous and non-ferrous metals for recycling. In addition to our mass-burn facilities, we own and/or operate additional facilities that use other processes or technologies, such as refuse-derived fuel facilities which process waste prior to combustion.

EfW serves two key markets as both a sustainable waste management solution that is environmentally superior to landfilling and as a source of clean energy that reduces overall greenhouse gas (“GHG”) emissions. EfW is considered renewable under the laws of many states and under federal law. Our facilities are critical infrastructure assets that allow our customers, which are principally municipal entities, to provide an essential public service through sustainable practices.

Our EfW facilities earn revenue from both the disposal of waste and the generation of electricity, generally under long-term contracts, as well as from the sale of metals recovered during the EfW process. We operate and/or have ownership positions in 44 EfW facilities, the majority of which are in North America. In total, these facilities process approximately 22 million tons of solid waste annually, equivalent to 9% of post-recycled MSW generated in the United States. Our facilities produce approximately 10 million megawatt hours (“MWh”) of baseload electricity annually. We also operate waste management infrastructure, including 16 waste transfer stations, 20 material processing facilities, four landfills (primarily for ash disposal), one metals processing facility, and one ash processing facility (currently under construction), all of which are complementary to our core EfW business.

Outside of North America, we operate and/or have equity interests in EfW projects in Ireland, Italy and the United Kingdom (currently in development and/or under construction). We intend to pursue additional international EfW projects where the regulatory and market environments are attractive, primarily through our joint ventures with Green Investment Group ("GIG"). For additional information see *Execution on Strategy* below, and *Item 8. Financial Statements and Supplementary Data- Note 3. New Business and Asset Management* . Ownership and operation of facilities in foreign countries potentially involves greater political and financial uncertainties than we experience in the United States, as described below and discussed in *Item 1A. Risk Factors* .

We have one reportable segment, which comprises our entire operating business. Additional information about our reportable segment and our operations by geographic area is contained in *Item 8. Financial Statements And Supplementary Data — Note 6. Business Segment and Geographic Information* .

Environmental Benefits of Energy-from-Waste

We believe that EfW offers solutions to public sector leaders around the world for addressing two key issues: sustainable management of waste and renewable energy generation. We believe that the environmental benefits of EfW, as an alternative to landfilling, are clear and compelling: by processing municipal solid waste in EfW facilities, we reduce GHG emissions, lower the risk of groundwater contamination, and conserve land. EfW facilities reduce GHG emissions by displacing fossil-fuel fired grid electricity, recycling metals, and diverting MSW from landfills, which are the 3 rd largest source of man-made methane, a GHG over 80 times more potent than carbon dioxide (“CO2”) over a 20-year period. At the same time, EfW generates clean, reliable energy from a renewable fuel source, thus reducing dependence on fossil fuels, the combustion of which is itself a major contributor of GHG emissions. The United States Environmental Protection Agency (“EPA”), using lifecycle tools such as its own Municipal Solid Waste Decision Support Tool, has found that, on average, approximately one ton of CO2-equivalent is reduced relative to landfilling for every ton of waste processed. Compared with fossil-fuel based generation, each ton of waste processed eliminates the need to consume approximately one barrel of oil or one-quarter ton of coal, in order to generate the equivalent amount of

electricity. We believe EfW is also an important component of business and community efforts to divert post-recycled waste from landfills as part of their GHG, zero-waste-to-landfill, circular economy, and other sustainability initiatives. As public planners and commercial and industrial companies address their needs for more environmentally sustainable waste management and energy generation in the years ahead, we believe that EfW will be an increasingly attractive alternative.

Other Environmental Services Offerings

In addition to our core EfW business, we offer a variety of sustainable waste management solutions in response to customer demand, including on site clean-up services, wastewater treatment, pharmaceutical and healthcare solutions, reverse distribution, transportation and logistics, recycling and depackaging. Together with our processing of non-hazardous "profiled waste" for purposes of assured destruction or sustainability goals in our EfW facilities, we offer these services under our Covanta Environmental Solutions ("CES") brand. Through acquisitions and organic growth initiatives, we have expanded our network of facilities to enable us to provide a range of services to industrial customers for the treatment, recycling and/or disposal of their non-hazardous materials. These businesses are highly synergistic with our existing profiled waste business, offer us the opportunity to expand the geographical sourcing of our waste streams and expand our presence in the environmental services sector, allowing us to drive higher margin profiled waste volumes into our EfW facilities and access additional revenue growth opportunities.

STRATEGY

Each of our service offerings responds to customer demand for sustainable waste management services that are superior to landfilling according to the “waste hierarchy" and assists our customers in meeting their own zero-waste, zero-waste-to-landfill, circular economy, and other sustainability goals. As indicated above, each of our service offerings is focused on providing cost effective and sustainable solutions that leverage our extensive network of EfW facilities and transfer stations in North America.

We intend to pursue our mission through the following key strategies:

- *Preserve and grow the value of our existing portfolio.* We intend to maximize the long-term value of our existing portfolio of facilities by continuously improving safety, health and environmental performance, working to provide superior customer service, continuing to operate at our historic production levels, maintaining our facilities in optimal condition, extending waste and service contracts, and conducting our business more efficiently. We intend to achieve organic growth by expanding our customer base, service offerings and metal recovery, adding waste, service or energy contracts, investing in and enhancing the capabilities of our existing assets, and deploying new or improved technologies, systems, processes and controls, all targeted at increasing revenue or reducing costs.
- *Expand through project development and/or acquisitions in selected attractive markets.* We seek to grow our portfolio, primarily through development of new facilities or businesses, competitive bids for new contracts, and acquisitions, where we believe that market opportunities will enable us to utilize our skills and/or invest our capital at attractive risk-adjusted rates of return. We focus these efforts in markets where we currently have projects in operation or under construction, and in other markets with strong economic fundamentals and predictable legal and policy support. In addition to our focus on EfW and related waste sourcing activities, we are seeking to expand our environmental service offerings through both organic growth and acquisitions.
  We believe that our approach to these opportunities is highly-disciplined, both with regard to our required rates of return on invested capital and the manner in which potential acquired businesses or new projects will be structured and financed.
- *Develop and commercialize new technology.* We believe that our efforts to protect and expand our business will be enhanced by the development of additional technologies in such fields as recycling, alternative waste treatment processes, combustion controls, emission controls and residue recycling, reuse or disposal. We have advanced our research and development efforts in some of these areas relevant to our EfW business, and have patents and patents pending for advances in controlling emissions.
- *Advocate for public policy favorable to EfW and other sustainable waste and materials management solutions.* We seek to educate policymakers and regulators about the environmental and economic benefits of EfW and advocate for policies and regulations that appropriately reflect these benefits. Our business is highly regulated, and as such we believe that it is critically important for us, as an industry leader, to play an active role in the debates surrounding potential policy developments that could impact our business.
- *Maintain a focus on sustainability.* Providing sustainable waste, materials, and energy services to our customers is the cornerstone of our business. Our corporate culture is focused on the triple bottom line of sustainability (people, planet, prosperity) in support of our mission. In addition to robust financial reporting, we are committed to transparently reporting our environmental, social and governance standards, policies, and performance through our corporate sustainability report. We seek to continuously improve our performance across these aspects to remain an industry leader.
- *Allocate capital efficiently for long-term shareholder value.* We plan to allocate capital to maximize shareholder value by: investing in our existing businesses to maintain and enhance assets; investing in new projects and strategic acquisitions that offer attractive returns on invested capital and further our strategic goals; maintaining a strong balance sheet; and consistently returning capital to our shareholders.

EXECUTION ON STRATEGY

Consistent with our strategy, we have executed on the following during 2018 :

Capital Allocation

Our key capital allocation activities in 2018 included the following:

- $133 million declared in dividends to stockholders; and

- $130 million for growth investments, including $16 million for business development in the UK, $13 million in preparation for services to be provided to a second marine transfer station under our New York City transportation and disposal contract, $50 million for acquisitions, and $24 million for various organic growth investments, which included metals recovery projects, ash processing technology and investments related to our profiled waste and environmental services businesses.

New Business Development

GIG Joint Venture

In December 2017, we entered into an arrangement with GIG, a subsidiary of Macquarie Group Limited, to develop, fund and own EfW projects in the UK and Ireland. This arrangement between Covanta and GIG creates a platform to develop waste infrastructure projects and pursue new opportunities for EfW project development or acquisitions on a 50/50 basis. In February 2018, GIG invested in our Dublin EfW facility, acquiring 50% ownership for €136 million, while we retained a 50% equity interest, through a joint venture, and retained our role as operations and maintenance ("O&M") service provider for the facility. As additional projects in the development pipeline reach financial close and move into the construction phase, we and GIG will acquire the available ownership in each project, with a premium payable to the partner that originally developed and/or contributed the project. We are the preferred O&M service provider for all projects where we co-invest with GIG, on market competitive terms.

In December 2018, financial close was reached on a second project, the Earls Gate Energy Centre project ("Earls Gate"), an EfW facility to be constructed in Grangemouth, Scotland. Covanta and GIG together will hold a 50% equity ownership with co-investor and developer Brockwell Energy owning the remaining 50% stake. The Earls Gate facility is expected to commence operations in late 2021.

Other Business Development

During the first quarter of 2018, we acquired one environmental services business located in Toronto, Canada for approximately $4 million, expanding the capabilities and client service offerings of our CES business in Canada.

In March 2018, we received notice to proceed from the Department of Sanitation of New York City ("DSNY") to develop the infrastructure supporting the East 91st Street Marine Transfer Station ("MTS"). We expect to commence operations in the second quarter of 2019. The MTS is the second in a pair of marine transfer stations under a 20-year waste transport and disposal agreement between Covanta and DSNY.

In September 2018, we acquired the Palm Beach Resource Recovery Corporation ("PBRRC") for $46 million . PBRRC holds long-term contracts for the operation and maintenance of two EfW facilities located in Palm Beach County, Florida.

In January 2019, we commenced construction of our first Total Ash Processing System located in Fairless Hills, Pennsylvania, adjacent to our metal processing facility. This technology separates the combined ash from EfW facilities into its component parts enabling increased recycling of small metal fractions and the recovery of aggregate for reuse as construction material while reducing the volume of ash requiring landfill disposal. Operational start-up is expected in the second half of 2019.

Contract Extensions

We reached agreements to extend several material contracts in 2018, including:

- Service fee operating contract at our Huntington facility for an additional 5 years through 2024;
- Service fee operating contract at our Huntsville facility for an additional 5 years through 2023;
- Service fee operating contract at our Montgomery County facility for an additional 5 years through 2026; and
- Power purchase agreement at our Marion County facility for an additional 15 years through 2034.

Other Significant Events

During 2018, we commenced a fleet optimization program with the goals of improving overall operating profit and cash flow from our portfolio, reducing risk, and focusing resources on our most profitable and strategically important businesses. We identified a population of EfW facilities where local market conditions, operating and maintenance costs, and other factors challenge facility economics, and we began exploring strategic alternatives for these assets, which may include contract renegotiation, sale, or facility closure. We anticipate that this program will continue over the next several years. The following activities occurred during 2018 as part of this effort:

- During the second quarter of 2018, we made a decision to cease operations at our EfW facility in Warren County, New Jersey due to ongoing challenges with the economic performance of the facility. The shutdown is expected to occur in mid-2019. For further information see in *Item 8. Financial Statements And Supplementary Data — Note 10. Supplementary Information* .

- In July 2018, we sold our equity interests in a hydroelectric facility located in the state of Washington for proceeds of approximately $12 million . For further information see in *Item 8. Financial Statements And Supplementary Data — Note 4. Dispositions and Assets Held for Sale* .

- In September 2018, we amended our service agreement with the City of Long Beach, California. Under the amendment, the City of Long Beach will invest approximately $9 million and we will invest an additional $5 million for facility maintenance which will allow for opportunities to process higher-value waste. These capital investments aim to ensure continued sustainable operation of the facility.

In March of 2018, our service contract with Hennepin County to operate the Hennepin Energy Recovery Center expired.

Continuous Improvement

In 2018, we advanced our continuous improvement initiative utilizing Lean Six Sigma methodologies. The focus of this data-driven effort is on achieving stable operations at high performance levels, improved process efficiency and standardization across all of our facilities. We have established a team that includes external experts and internal top performers. This effort advances beyond previous efficiency initiatives, and enhances and complements the outage optimization efforts that we have undertaken over the past several years.

Sustainability Goals

We continued to advance our performance against a series of sustainability goals aligned with our business goals and mission. Set in the areas of safety and health, environment, materials management, human resources, finance, governance, and community affairs, each goal has an assigned champion on our senior leadership team to ensure their full integration into our business. We believe attaining these goals helps us respond to our customers' increasing interest in sustainability and the sustainable solutions we provide, mitigate certain risks, and gain a competitive advantage in business development opportunities.

ENERGY-FROM-WASTE-PROJECTS

Our EfW projects generate revenue primarily from three sources: (1) fees charged for operating facilities or processing waste received; (2) the sale of electricity and/or steam; and (3) the sale of ferrous and non-ferrous metals that are recovered from the waste stream as part of the EfW process. We may also generate additional revenue from the construction, expansion or upgrade of a facility, when a public sector client owns the facility. Our customers for waste services or facility operations are principally public sector entities, though we also market disposal capacity at certain facilities to commercial customers. Our facilities primarily sell electricity, either to utilities at contracted rates or, in situations where a contract is not in place, at prevailing market rates in regional markets (primarily PJM, NEPOOL and NYISO in the Northeastern United States), and in some cases sell steam directly to industrial users.

We also operate and/or have ownership positions in environmental services businesses, transfer stations, and landfills (primarily for ash disposal) that are ancillary and complementary to our EfW projects and generate additional revenue from disposal or service fees.

EfW Contract Structures

Most of our EfW projects were developed and structured contractually as part of competitive procurement processes conducted by public sector entities. As a result, many of these projects have common features. However, each contractual agreement is different, reflecting the specific needs and concerns of a client community, applicable regulatory requirements and/or other factors.

Our EfW projects can generally be divided into three categories, based on the applicable contract structure at a project as described in the table below. Notwithstanding distinctions among these general classifications in contract structures, in all cases we focus on a consistent set of performance indicators to optimize service to customers and operating results:(i) boiler availability; (ii) turbine availability; (iii) safety and environmental performance measures; (iv) tons processed; (v) steam sold; (vi) megawatt hours sold; and (vii) recycled metal tons sold.

The following summarizes the typical contractual and economic characteristics of the three project structures our EfW projects located in North America:

	Tip Fee	**Service Fee (Covanta Owned)**	**Service Fee (Client Owned)**
Number of facilities:	20	4	18
Client(s):	Host community and municipal and commercial waste customers	Host community, with limited merchant capacity in some cases	Dedicated to host community exclusively
Waste or service revenue:	Per ton “tipping fee”	Fixed fee, with performance incentives and inflation escalation	
Energy revenue:	Covanta retains 100%	Share with client (Covanta retains approximately 20% on average)	
Metals revenue:	Covanta retains 100%	Share with client (Covanta typically retains approximately 50%)	
Operating costs:	Covanta responsible for all operating costs	Pass through certain costs to client (e.g. ash disposal)	
Project debt service:	Covanta project subsidiary responsible	Paid by client explicitly as part of service fee	Client responsible for debt service
After service contract expiration:	N/A	Covanta owns the facility; clients have certain rights set forth in contracts; facility converts to Tip Fee or remains Service Fee with new terms	Client owns the facility; extend with Covanta or tender for new contract

We are principally responsible for capital costs in facilities that we own; however, client communities may have a contractual obligation to fund a portion of certain capital costs, particularly if required by a change in law. We also may be required to participate in capital improvements for non-owned facilities that we operate, which would be accounted for as operating expense. In contracts with our client communities, we agree to operate the facility and meet minimum performance standards. Typically, these include waste processing, energy efficiency standards, energy production and environmental standards. Unexcused failure to meet these requirements or satisfy the other material terms of our agreement, may result in damages charged to us or, if the breach is substantial, continuing and unremedied, termination of the applicable agreement. If one or more contracts were terminated for our default, these contractual damages may be material to our cash flow and financial condition. To date, we have not incurred material liabilities under such performance guarantees.

Contracted and Merchant Revenue

We generated 75% of our waste and service revenue in 2018 under contracts at set rates, while 25% was generated at prevailing market prices. Our waste disposal / service contracts expire at various times between 2019 and 2038 . As of December 31, 2018 , the volume weighted average contract life of our service fee contracts and tip fee contracts is 9.4 and 5.3 years, respectively. Our energy contracts expire at various times between 2019 and 2034 . As our contracts expire, we become subject to greater market risk in maintaining and enhancing our revenue. To date, we have been successful in extending the majority of our existing contracts to operate EfW facilities owned by public sector clients. We project the percentage of 2019 contracted waste and service revenue to approximate 2018 levels.

As our waste service agreements at facilities that we control expire, we intend to seek replacement or additional contracts, and because project debt on these facilities will be paid off at such time, we expect to be able to offer rates that will attract sufficient quantities of waste while providing acceptable revenue to us. The expiration of existing energy contracts at these facilities will require us to sell our output either into the local electricity grid at prevailing rates or pursuant to new contracts. We expect that multi-year contracts for waste supply at these facilities will continue to be available on acceptable terms in the marketplace, at

least for a substantial portion of facility capacity, as municipalities continue to value long-term committed and sustainable waste disposal capacity. We also expect that an increasing portion of system capacity will be contracted on a shorter-term basis, and so we will have more frequent exposure to waste market risk. We expect that multi-year contracts for energy sales will generally be less available than in the past, thereby increasing our exposure to energy market prices upon expiration. As our existing contracts have expired and our exposure to market energy prices has increased, we entered into hedging arrangements in order to mitigate our exposure to near-term (one to three years) revenue fluctuations in energy markets, and we expect to continue to do so in the future. Our efforts in this regard will involve only mitigation of price volatility for the energy we produce in order to limit our energy revenue "at risk," and will not involve speculative energy trading.

See *Item 1A. Risk Factors — Our results of operations may be adversely affected by market conditions existing at the time our contracts expire.* Over time, we will seek to renew, extend or sign new waste and service contracts and pursue opportunities with commercial customers and municipalities that are not necessarily stakeholders in our facilities in order to maintain a significant majority of our waste and service revenue (and EfW fuel supply) under multi-year contracts.

In addition, we are focused on expanding our environmental service offerings through both organic growth and acquisitions. The acquisitions will allow us to establish a greater presence in the environmental services sector, expand the geographical sourcing of our waste streams and drive non-hazardous profiled waste volumes into our EfW facilities. These acquired businesses typically accept waste under short-term contractual arrangements.

Summary information regarding our energy-from-waste operations located in North America is provided in the following table:

		Location	Design Capacity Waste Processing (TPD)	Design Capacity Gross Electric (MW)	Nature of Interest	Service Contract Expiration
	TIP FEE STRUCTURES					
1.	Fairfax County [1]	Virginia	3,000	93.0	Owner/Operator	
2.	Southeast Massachusetts [1][2]	Massachusetts	2,700	78.0	Owner/Operator	
3.	Delaware Valley [1]	Pennsylvania	2,688	87.0	Owner/Operator	
4.	Hempstead	New York	2,505	72.0	Owner/Operator	
5.	Indianapolis [3]	Indiana	2,362	6.5	Owner/Operator	
6.	Niagara [3]	New York	2,250	50.0	Owner/Operator	
7.	Essex County [1]	New Jersey	2,277	66.0	Owner/Operator	
8.	Haverhill [1]	Massachusetts	1,650	44.6	Owner/Operator	
9.	Union County [1]	New Jersey	1,440	42.1	Lessee/Operator	
10.	Plymouth [1]	Pennsylvania	1,216	32.0	Owner/Operator	
11.	Tulsa [1][3]	Oklahoma	1,125	16.8	Owner/Operator	
12.	Camden [1]	New Jersey	1,050	21.0	Owner/Operator	
13.	Alexandria/Arlington [1]	Virginia	975	22.0	Owner/Operator	
14.	Stanislaus County [1]	California	800	22.4	Owner/Operator	
15.	Southeast Connecticut [1][4]	Connecticut	689	17.0	Owner/Operator	
16.	Bristol [1]	Connecticut	650	16.3	Owner/Operator	
17.	Lake County	Florida	528	14.5	Owner/Operator	
18.	Warren County [1]	New Jersey	450	13.5	Owner/Operator	
19.	Springfield [1]	Massachusetts	400	9.4	Owner/Operator	
20.	Pittsfield [3]	Massachusetts	240	0.9	Owner/Operator	
	SERVICE FEE (COVANTA OWNED) STRUCTURES					
21.	Onondaga County	New York	990	39.2	Owner/Operator	2035
22.	Huntington	New York	750	24.3	Owner/Operator	2024
23.	Babylon	New York	750	16.8	Owner/Operator	2019
24.	Marion County	Oregon	550	13.1	Owner/Operator	2019
	SERVICE FEE (CLIENT OWNED) STRUCTURES					
25.	Pinellas County	Florida	3,150	75.0	Operator	2024
26.	Miami-Dade County [1][2]	Florida	3,000	77.0	Operator	2023
27.	Honolulu [2][5]	Hawaii	2,950	90.0	Operator	2032
28.	Lee County [5]	Florida	1,836	57.3	Operator	2024
29.	Montgomery County [1][5]	Maryland	1,800	63.4	Operator	2026
30.	Hillsborough County	Florida	1,800	46.5	Operator	2029
31.	Long Beach	California	1,380	36.0	Operator	2024
32.	York County [1]	Pennsylvania	1,344	42.0	Operator	2035
33.	Palm Beach I	Florida	2,178	62.0	Operator	2029
34	Palm Beach II	Florida	2,740	95.0	Operator	2035
35.	Lancaster County [1] [3]	Pennsylvania	1,200	33.1	Operator	2032
36.	Pasco County	Florida	1,050	29.7	Operator	2024
37.	Harrisburg [1]	Pennsylvania	800	20.8	Operator	2032
38.	Burnaby	British Columbia, Canada	800	23.9	Operator	2025
39.	Huntsville [3]	Alabama	690	—	Operator	2023
40.	Kent County	Michigan	625	16.8	Operator	2023
41.	MacArthur	New York	486	12.0	Operator	2030
42.	Durham-York	Durham Region, Canada	480	17.4	Operator	2036
		SUBTOTAL	60,344	1,616.3		

(1) These facilities either sell electricity into the regional power pool at prevailing market rates or have contractual arrangements to sell electricity at prevailing market rates

(2) These facilities use a refuse-derived fuel technology.

(3) These facilities have been designed to export steam for sale. See table below for the equivalent electric output. The equivalent electric output is part of, not in addition to, the design capacity megawatts ("MW") listed in the table above.

Facility	Equivalent Electric Output (MW)
Niagara	66
Indianapolis	52
Tulsa	25
Huntsville	15
Pittsfield	5
Lancaster	5

(4) This facility transitioned from a service fee (owned) to a tip fee contract effective February 2017.

(5) The client has a termination option under the service agreement.

Summary information regarding our equity investments in EfW projects outside of North America is provided in the following table:

			Design Capacity		
	Project	Location	Waste Processing (Metric TPD)	Gross Electric (MW)	Nature of Interest
1.	Dublin [(1)(2)]	Ireland	1,800	58.0	50% Owner/Operator
2.	Trezzo	Italy	500	18.0	13% Owner/JV Operator
3.	Earls Gate [(1)(3)]	UK	650	21.5	25% Owner [(3)]
		SUBTOTAL	2,950	97.5	

(1) For additional information see *Item 8. Financial Statements and Supplementary Data- Note 3. New Business and Asset Management ,-Green Investment Group Limited ("GIG") Joint Ventures.*

(2) We have a 50% indirect ownership of Dublin EfW, through our 50/50 joint venture with GIG, Covanta Europe Assets Ltd.

(3) Facility currently under construction with operations expected to commence in late 2021. Covanta will provide technical oversight services during construction and operations. Waste secured under long-term agreements total 75% of capacity and 100% of electricity and steam output will be sold under a long-term agreement with industrial site host. The facility is designed to export steam at the equivalent electric output of 11 MW. The equivalent electric output is part of, not in addition to, the design capacity megawatts MW listed in the table above.

We have a 25% indirect ownership of Earls Gate, through our 50/50 joint venture with GIG, Covanta Green Jersey Assets Ltd., which owns 50% of Earls Gate.

MARKETS, COMPETITION AND BUSINESS CONDITIONS

Waste Services

Post-recycled municipal solid waste generation in the United States is approximately 250 million tons per year, of which the EfW industry processes approximately 12% (of which we process approximately three-quarters).

EfW is an important part of the waste management infrastructure of the United States, particularly in regions with high population density but limited availability of land for landfilling, with 75 facilities currently in operation that collectively process approximately 29 million tons of post-recycled solid waste and serve the needs of over 30 million people and produce enough electricity for the equivalent of 1.3 million homes. The use of EfW is even more prevalent in Western Europe and many countries in Asia, such as Japan. China has doubled its EfW capacity over the past five years and plans to further expand capacity through 2020. Over 1,200 EfW facilities are in use today around the world, with a capacity to process approximately 260 million tons of waste per year. In the waste management hierarchies of the United States EPA and the European Union ("EU"), EfW is designated as a superior solution to landfilling.

Renewable Energy

Public policy in the United States, at both the state and national levels, has developed over the past several years in support of increased generation of renewable energy as a means of combating the potential effects of climate change, as well as increasing domestic energy security. Today in the United States, approximately 17% of electricity is generated from renewable sources, approximately half of which is hydroelectric power.

EfW is designated as renewable energy in 31 states, the District of Columbia, and Puerto Rico, as well as in several federal statutes and policies. Unlike most other renewable resources, EfW generation can serve base-load demand and is more often located near population centers where demand is greatest, minimizing the need for expensive incremental transmission infrastructure.

General Business Conditions

Economic - Changes in the economy affect the demand for goods and services generally, which affects overall volumes of waste requiring management and the pricing at which we can attract waste to fill available capacity. We receive the majority of our revenue under short- and long-term contracts, which limits our exposure to price volatility, but with adjustments intended to reflect changes in our costs. Where our revenue is received under other arrangements and depending upon the revenue source, we have varying amounts of exposure to price volatility.

The largest component of our revenue is waste revenue, which has generally been subject to less price volatility than our revenue derived from the sale of energy and metals. Waste markets tend to be affected, both with respect to volume and price, by local and regional economic activity, as well as state and local waste management policies.

At the same time, United States natural gas market prices influence electricity and steam pricing in regions where we operate, and thus affect our revenue for the portion of the energy we sell that is not under fixed-price contracts. Energy markets tend to be affected by regional supply and demand, as well as national economic activity and regulations.

The following are various published pricing indices relating to the US economic drivers that are relevant to those aspects of our business where we have market exposure; however, there is not a precise correlation between our results and changes in these metrics.

	As of December 31,			
	2018	2017	2016	2015
Consumer Price Index [1]	1.9%	2.1%	2.1%	0.7%
PJM Pricing (Electricity) [2]	$ 34.75	$ 28.84	$ 24.85	$ 36.00
NE ISO Pricing (Electricity) [3]	$ 44.06	$ 33.27	$ 29.74	$ 42.93
Henry Hub Pricing (Natural Gas) [4]	$ 3.17	$ 2.99	$ 2.52	$ 2.60
#1 HMS Pricing (Ferrous Metals) [5]	$ 328	$ 268	$ 197	$ 217
Scrap Metals - Old Cast Aluminum Scrap [6]	$ 0.57	$ 0.61	$ 0.57	$ 0.63

(1) Represents the year-over-year percent change in the Headline CPI number. The Consumer Price Index (CPI-U) data is provided by the US Department of Labor Bureau of Labor Statistics.
(2) Average price per MWh for full year. Pricing for the PJM PSEG Zone is provided by the PJM ISO.
(3) Average price per MWh for full year. Pricing for the Mass Hub Zone is provided by the NE ISO.
(4) Average price per MMBtu for full year. The Henry Hub Pricing data is provided by the Natural Gas Weekly Update, Energy Information Administration, Washington, DC.
(5) Average price per gross ton for full year. The #1 Heavy Melt Steel ("HMS") composite index ($/gross ton) price is published by American Metal Market.
(6) Average price per pound for full year. Calculated using the high price of Old Cast Aluminum Scrap ($/lb.) published by American Metal Market.

Seasonal - Our quarterly operating income within the same fiscal year typically differs substantially due to seasonal factors, primarily as a result of the timing of scheduled plant maintenance. We conduct scheduled maintenance periodically each year, which requires that individual boiler and/or turbine units temporarily cease operations. During these scheduled maintenance periods, we incur material repair and maintenance expense and receive less revenue until the boiler and/or turbine units resume operations. This scheduled maintenance usually occurs during periods of off-peak electric demand and/or lower waste volumes, which can vary regionally. The scheduled maintenance period in the first half of the year (primarily first quarter and early second quarter) is typically the most extensive, while the third quarter scheduled maintenance period is the least extensive. Given these factors, we normally experience our lowest operating income from our projects during the first half of each year.

Our operating income may also be affected by seasonal weather extremes during summers and winters. Increased demand for electricity and natural gas during unusually hot or cold periods may affect certain operating expense and may trigger material price increases for a portion of the electricity and steam we sell.

Performance - Our EfW facilities have historically demonstrated consistent reliability; our average boiler availability was 91.2% in 2018 . We have historically met our operating obligations without experiencing material unexpected service interruptions or incurring material increases in costs. In addition, with respect to many of our contracts, we generally have limited exposure for risks not within our control. Across our fleet of facilities, we operate and maintain a large number of combustion units, turbine generators, and air-cooled condensers, among other systems. On an ongoing basis, we assess the effectiveness of our preventative maintenance programs, and implement adjustments to those programs in order to improve facility safety, reliability and performance. These assessments are tailored to each facility's particular technologies, age, historical performance and other factors. As our facilities age, we expect that the scope of work required to maintain our portfolio of facilities will increase in order to replace or extend the useful life of facility components and to ensure that historical levels of safe, reliable performance continue. For additional information about such risks and damages that we may owe for unexcused operating performance failures, see *Item 1A. Risk Factors - Operation of our businesses involves significant risks, which could have an adverse effect on our cash flows and results of operations.* In monitoring and assessing the ongoing operating and financial performance of our businesses, we focus on certain key factors: tons of waste processed, electricity and steam sold, boiler availability, plant operating expense and safety and environmental performance.

Waste, Energy and Metals Markets - We compete in waste markets that are highly competitive. In the United States, the market for waste management is almost entirely price-driven and is greatly influenced by economic factors within regional waste markets. These factors include:

- regional population and overall waste production rates;
- the number of waste disposal sites (including principally landfills, other EfW facilities and transfer stations) in existence or in the planning or permitting process;
- the available disposal capacity (in terms of tons of waste per day) that can be offered by other regional disposal sites;
- the extent to which local governments seek to control transportation and/or disposal of waste within their jurisdictions;
- the extent to which local governments and businesses continue to value sustainable approaches to handling of wastes; and
- the availability and cost of transportation options (e.g., rail, inter-modal, trucking) to provide access to more distant disposal sites, thereby affecting the size of the waste market itself.

Waste service providers seek to obtain waste supplies for their facilities by competing on price (usually on a per-ton basis) with other service providers. At our facilities, where a service fee structure exists, we typically do not compete in this market because we do not have the contractual right to solicit merchant waste. At these facilities, the client community is responsible for obtaining the waste, if necessary by competing on price to obtain the tons of waste it has contractually promised to deliver to us. At our EfW facilities governed by tip fee structures and our waste procurement services businesses, we are responsible for obtaining waste supply, and therefore, actively compete in these markets to enter into spot, medium- and long-term contracts. These EfW projects are generally in densely-populated areas, with high waste generation rates and numerous large and small participants in the regional market. Our waste operations are largely concentrated in the northeastern United States. See *Item 1A. Risk Factors — Our waste operations are concentrated in one region and expose us to regional economic or market declines* for additional information concerning this geographic concentration. Certain of our competitors in these markets are vertically-integrated waste companies, which include waste collection operations, and thus have the ability to control supplies of waste, which may restrict our ability to offer services at attractive prices. Our business does not include traditional waste collection operations.

If a long-term contract expires and is not renewed or extended by a client community, our percentage of contracted processing capacity will decrease and we will need to compete in the regional market for waste supply at the facilities we own, from both municipal and commercial services. At that point, we will compete on price with landfills, transfer stations, other EfW facilities and other waste technologies that are then offering disposal or other services in the region.

Our sustainable service offerings seek to respond to increasing customer demand for environmentally preferred waste handling and disposal, as well as specific business risk mitigation requirements for certain materials. For these services, we compete with many large and small companies offering these services, in local and regional waste markets that are similarly influenced by the factors noted above which affect the broader waste markets.

We currently sell a portion of our electricity and other energy product output pursuant to contracts, and for this portion of our energy output we do not compete on price. As these contracts expire, we will sell an increasing portion of our energy output into competitive energy markets or pursuant to short-term contracts and, as such, generally expect to have a growing exposure to energy market price volatility.

We have entered into hedging arrangements in order to mitigate our exposure to this volatility, and we expect to continue to do so in the future. Our efforts in this regard will involve only mitigation of price volatility for the energy we produce and will not involve speculative energy trading.

For the portion of our portfolio that is exposed to electricity markets, we expect prices will be driven by several factors including natural gas supply/demand conditions, regional electricity supply/demand factors, regional transmission and natural gas supply capacity and system conditions, weather conditions, and emerging environmental regulations. All of these factors will have national and regional impacts that affect electricity and steam prices.

Electricity and steam prices in the markets where the majority of our facilities are located are heavily impacted by movements in natural gas prices. The substantial increase in unconventional or shale gas supply has created downward pressure on gas prices relative to historical levels and therefore on prices for the electricity we sell that is not under contract. However, when demand for gas is high during certain seasons or weather conditions, the gas pipeline system has been limited in its ability to transport enough gas to certain regions, such as New England and California. As result, gas prices can experience short-term spikes, and electricity prices follow.

Several long-term trends are expected to affect US natural gas prices; including shale gas production, storage capacity, liquefied natural gas exports, regulation, coal plant retirements, as well as industrial, transportation and residential demand. Furthermore, regional natural gas prices, especially in the Northeast are expected to be affected by changes in regional production and transportation capacity.

We generally enter into short-term contracts for sales of recovered ferrous and non-ferrous metals with processors and end-users (i.e., mills). We compete with other suppliers who are generally not in the EfW industry and whose product may be less costly to process than metals from EfW sources. Recycled metal prices for both ferrous and non-ferrous materials are impacted directly and indirectly by tariff and trade actions by the US and other countries. Recent efforts by the US government to place tariffs on imported steel and aluminum have increased domestic demand for our ferrous products. The ultimate impact of these tariffs is unclear, as retaliation to these tariffs by foreign counties could reduce or eliminate any benefits to us.

Markets for New Project Development - Market conditions for new EfW project development are generally more favorable in select International markets, such as the UK, as compared to the United States. This is due to a variety of factors which exist in these markets including higher prevailing market tip fees and/or energy revenues, the absence of available land for alternative disposal techniques (i.e., landfilling), and regulatory policy support which favors technologies such as EfW. Therefore, our ongoing EfW project development initiatives are generally outside of the United States. We have and expect to continue to pursue opportunities for project development in the United States, such as facilities for metals, ash processing and recycling, in order to enhance the efficiency and competitiveness of our EfW operations.

Brexit Implications - In March, 2017, the UK notified the EU of its intention to leave the EU (so-called “Brexit”). The parties negotiated a proposed agreement covering rights and obligations during a transition period and future relations between the UK on a range of issues, however, the proposed agreement was rejected by Britain's Parliament and the parties are considering next steps. We have studied and consulted with local experts regarding the potential market and economic impacts of Brexit on the UK, with a particular focus on potential impacts to the waste and energy markets as they might affect our plans to expand our business with GIG. (For further information see *Item 8. Financial Statements and Supplementary Data - Note 3. New Business and Asset Management - Green Investment Group Limited (“GIG”) Joint Venture)* . The government of the UK has shown no indication of an intention to rollback or reverse its policy support for environmental protection generally, the renewables market, or for EfW specifically. As such, while Brexit may have some impact on construction costs for new UK EfW projects, we do not believe Brexit, if it occurs, will materially impact the key market and economic drivers for investment in the combined pipeline of EfW projects we are pursuing jointly with GIG.

Technology, Research and Development

In our EfW business, we own and/or operate EfW facilities that utilize various technologies from several different vendors, including mass-burn combustion technologies and refuse-derived fuel technologies which include pre-combustion waste processing not required with a mass-burn design. As we continue our efforts to develop and/or acquire additional EfW projects internationally, we will consider mass-burn combustion and other technologies that best fit the needs of the local environment of a particular project.

In addition, we will continue to consider technologies better suited than mass-burn combustion for smaller scale applications, including gasification technologies.

We believe that all forms of EfW technologies offer an environmentally superior solution to post-recycled waste management and energy challenges faced by leaders around the world, and that our efforts to expand our business will be enhanced by the development of additional technologies in such fields as emission controls, residue disposal, alternative waste treatment processes, gasification, and combustion controls. We have advanced our research and development efforts in these areas and have developed new and cost-effective technologies that represented major advances in controlling NO_x emissions. These technologies, for which patents have been granted, have been tested at existing facilities and we are now operating and/or installing such systems at a number of our facilities. We intend to maintain a focus on research and development of technologies in these and other areas that we believe will enhance our competitive position, and offer new technical solutions to waste and energy problems that augment and complement our business.

A number of other companies are similarly engaged in new technology development focused on extracting energy from waste materials through a variety of technical approaches, including: gasification, pyrolysis or other combustion designs; converting waste to fuels or other commodities; or processing waste to enable co-firing in larger power plants or industrial boilers. Firms engaged in these activities generally are less well-capitalized than Covanta, although some engage in joint ventures with larger and well-capitalized companies. To date, we believe such efforts have not produced technologies that offer economically attractive alternatives in the absence of policy support.

REGULATION OF BUSINESS

Regulations Affecting Our Business

Environmental Regulations — General

Our business activities in the United States are extensively regulated pursuant to federal, state and local environmental laws. Federal laws, such as the Clean Air Act and Clean Water Act, and their state counterparts, govern discharges of pollutants to air and water. Other federal, state and local laws comprehensively govern the generation, transportation, storage, treatment and disposal of solid and hazardous waste and also regulate the storage and handling of chemicals and petroleum products (such laws and regulations are referred to collectively as the "Environmental Regulatory Laws").

Other federal, state and local laws, such as the Comprehensive Environmental Response Compensation and Liability Act (commonly known as "CERCLA" and collectively referred to with such other laws as the "Environmental Remediation Laws") make us potentially liable on a joint and several basis for any on site or off site environmental contamination which may be associated with our activities and the activities at our sites. These include landfills we have owned, operated or leased, or at which there has been disposal of residue or other waste generated, handled or processed by our facilities. Some state and local laws also impose liabilities for injury to persons or property caused by site contamination. Some service agreements provide us with indemnification from certain liabilities.

The Environmental Regulatory Laws prohibit disposal of regulated hazardous waste at our municipal solid waste facilities. The service agreements recognize the potential for inadvertent and improper deliveries of hazardous waste and specify procedures for dealing with hazardous waste that is delivered to a facility. Under some service agreements, we are responsible for some costs related to hazardous waste deliveries. We have not incurred material hazardous waste disposal costs to date.

The Environmental Regulatory Laws also require that many permits be obtained before the commencement of construction and operation of any waste or renewable energy project, and further require that permits be maintained throughout the operating life of the facility. We can provide no assurance that all required permits will be issued or re-issued, and the process of obtaining such permits can often cause lengthy delays, including delays caused by third-party appeals challenging permit issuance. Our failure to meet conditions of these permits or of the Environmental Regulatory Laws can subject us to regulatory enforcement actions by the appropriate governmental authority, which could include fines, penalties, damages or other sanctions, such as orders requiring certain remedial actions or limiting or prohibiting operation. See *Item 1A. Risk Factors — Compliance with environmental laws, including changes to such laws, could adversely affect our results of operations*. To date, we have not incurred material penalties, been required to incur material capital costs or additional expense, or been subjected to material restrictions on our operations as a result of violations of Environmental Regulatory Laws or permit requirements.

While we believe that we are in compliance with existing Environmental Regulatory and Remediation Laws, we may be identified, along with other entities, as being among parties potentially responsible for contribution to costs associated with the correction and remediation of environmental conditions at disposal sites subject to CERCLA and/or analogous state Environmental Remediation Laws. Our ultimate liability in connection with such environmental claims will depend on many factors, including our volumetric share of waste, the total cost of remediation, and the financial viability of other companies that have also sent waste to a given site and, in the case of divested operations, our contractual arrangement with the purchaser of such operations.

The Environmental Regulatory Laws may change. New technology may be required or stricter standards may be established for the control of discharges of air or water pollutants, for storage and handling of petroleum products or chemicals, or for solid or hazardous waste or ash handling and disposal. Thus, as new technology is developed and proven, we may be required to incorporate it into new facilities or make major modifications to existing facilities. This new technology may be more expensive than the technology we use currently.

Environmental Regulations — Recent Developments

Domestic

Maximum Achievable Control Technology ("MACT") Rules — EPA is authorized under the Clean Air Act to issue rules periodically which tighten air emission requirements to achievable standards, as determined under a specified regulatory framework. EPA is required to establish these MACT rules for a variety of industries, including new and existing municipal waste combustion ("MWC") units, industrial boilers and solid waste incinerators. All of our facilities comply with all applicable MACT rules currently in effect.
EPA is currently conducting a combined Risk and Technology Review for the large MWC source category and will subsequently propose revised MWC MACT rules. While the scope of and timing for implementation of these rules is uncertain, the revised MWC MACT may lower existing MWC MACT emission limits for most, if not all, regulated air pollutants emitted by our facilities, and may require capital improvements and/or increased operating costs. We are unable at this time, to estimate the magnitude of such costs, which may be material, or to determine the potential impact on the profitability of our MWC facilities.

In some cases, the costs incurred to meet the revised MACT rules at facilities may be recovered from public sector clients and other users of our facilities through increased fees permitted to be charged under applicable contracts; however, to the extent we incur costs at other of our facilities to meet the applicable MACT rules, such costs are not subject to contractual recovery and instead will be borne directly by the affected facilities.

Revised Ground Level Ozone Standards — On October 26, 2015, EPA published a final rule to revise and strengthen the National Ambient Air Quality Standards for ground-level ozone or "smog". If implemented as published by EPA and affected states, this rule could impact changes to our existing air permits that we may pursue in the future.

International

Implementation of a revised Best Available Techniques Reference Document for Waste Incineration (BREF) — In the EU, legislation affects our business primarily in the form of "Directives" which are binding on member states and which are implemented through national enabling legislation. The EU is currently finalizing an Industrial Emissions Directive (the so-called "BREF Directive") which will affect emissions from large industrial installations, including EfW facilities. Once finalized, this will impact future permitting of new facilities or expansions of existing facilities in member states, as well as other jurisdictions that base their requirements on EU Directives (which would include the UK if it leaves the EU). Based on the final draft proposal, we do not believe that the BREF Directive will have a material adverse effect on the Dublin EfW facility or our ability to execute on our plans to develop EfW projects in the UK.

Energy Regulation

Our businesses are subject to the provisions of federal, state and local energy laws applicable to the development, ownership and operation of facilities located in the United States. The Federal Energy Regulatory Commission ("FERC"), among other things, regulates the transmission and the wholesale sale of electricity in interstate commerce under the authority of the Federal Power Act ("FPA"). In addition, under existing regulations, FERC determines whether an entity owning a generation facility is an Exempt Wholesale Generator ("EWG"), as defined in the Public Utility Holding Company Act of 2005 ("PUHCA 2005"). FERC also determines whether a generation facility meets the technical and other criteria of a Qualifying Facility (cogeneration facilities and other facilities making use of non-fossil fuel power sources, such as waste, which meet certain size and other applicable requirements, referred to as "QFs"), under the Public Utility Regulatory Policies Act of 1978, as amended ("PURPA"). Each of our United States generating facilities has either been determined by FERC to qualify as a QF or is otherwise exempt from the relevant regulations, or the subsidiary owning the facility has been determined to be an EWG.

Federal Power Act — The FPA gives FERC exclusive rate-making jurisdiction over the wholesale sale of electricity and transmission of electricity in interstate commerce. Under the FPA, FERC, with certain exceptions, regulates the owners of facilities used for the wholesale sale of electricity or transmission of electricity in interstate commerce as public utilities. The FPA also gives FERC jurisdiction to review certain transactions and numerous other activities of public utilities. Most of our QFs are currently exempt from FERC's rate regulation under the FPA because (i) the QF is 20 MW or smaller; (ii) its sales are made pursuant to a state regulatory authority's implementation of PURPA; (iii) the QF is owned by a municipality or subdivision thereof; or (iv) its sales are made pursuant to a contract executed on or before March 17, 2006. Our QFs that are not exempt, or that lose these exemptions from rate regulation, are or would be required to obtain market-based rate authority from FERC or otherwise make sales pursuant to rates on file with FERC.

Under the FPA, public utilities are required to obtain FERC's acceptance of their rate schedules for the wholesale sale of electricity. Our generating companies in the United States that are not otherwise exempt from FERC's rate regulation make sales of electricity pursuant to market-based rates or other rates authorized by FERC. With respect to our generating companies with market-based rate authorization, FERC has the right to suspend, revoke or revise that authority and require our sales of energy to be made on a cost-of-service basis if FERC subsequently determines that we can exercise market power, create barriers to entry, or engage in abusive affiliate transactions. In addition, amongst other requirements, our market-based rate sellers are subject to certain market behavior and market manipulation rules and, if any of our subsidiaries were deemed to have violated any one of those rules, such subsidiary could be subject to potential disgorgement of profits associated with the violation and/or suspension or revocation of market-based rate authority, as well as criminal and civil penalties. If the market-based rate authority for one (or more) of our subsidiaries was revoked or it was not able to obtain market-based rate authority when necessary, and it was required to sell energy on a cost-of-service basis, it could become subject to the full accounting, record keeping and reporting requirements of FERC. Even where FERC has granted market-based rate authority, FERC may impose various market mitigation measures, including price caps, bidding rules and operating restrictions where it determines that potential market power might exist and that the public interest requires such potential market power to be mitigated. A loss of, or an inability to obtain, market-based rate authority could have a material adverse impact on our business. We can offer no assurance that FERC will not revisit its policies at some future time with the effect of limiting market-based rate authority, regulatory waivers, and blanket authorizations.

Under the Energy Policy Act of 2005 ("EPAct 2005"), FERC has approved the North American Electric Reliability Corporation, or "NERC," to address the development and enforcement of mandatory reliability standards for the wholesale electric power system. Certain of our subsidiaries are responsible for complying with the standards in the regions in which we operate. NERC also has the ability to assess financial penalties for non-compliance. In addition to complying with NERC requirements, certain of our subsidiaries must comply with the requirements of the regional reliability council for the region in which that entity is located. Compliance with these reliability standards may require significant additional costs, and noncompliance could subject us to regulatory enforcement actions, fines, and increased compliance costs.

Public Utility Holding Company Act of 2005 — PUHCA 2005 provides FERC with certain authority over and access to books and records of public utility holding companies not otherwise exempt by virtue of their ownership of EWGs, QFs, and Foreign Utility Companies, as defined in PUHCA 2005. We are a public utility holding company, but because all of our generating facilities have QF status, are otherwise exempt, or are owned through EWGs, we are exempt from the accounting, record retention, and reporting requirements of PUHCA 2005 and FERC's right to access our books and records is limited in scope.

Public Utility Regulatory Policies Act — PURPA was passed in 1978 in large part to promote increased energy efficiency and development of independent power producers. PURPA created QFs to further both goals, and FERC is primarily charged with administering PURPA as it applies to QFs. FERC has promulgated regulations that exempt QFs from compliance with certain provisions of the FPA, PUHCA 2005, and certain state laws regulating the rates charged by, or the financial and organizational activities of, electric utilities. The exemptions afforded by PURPA to QFs from regulation under the FPA and most aspects of state electric utility regulation are of great importance to us and our competitors in the EfW and independent power industries.

PURPA also initially included a requirement that utilities must buy and sell power to QFs. Among other things, EPAct 2005 eliminated the obligation imposed on utilities to purchase power from QFs at an avoided cost rate where the QF has non-discriminatory access to wholesale energy markets having certain characteristics, including nondiscriminatory transmission and interconnection services. In addition, FERC has established a regulatory presumption that QFs with a capacity greater than 20 MW have non-discriminatory access to wholesale energy markets in most geographic regions in which we operate. As a result, many of our expansion, renewal and development projects must rely on competitive energy markets rather than PURPA's historic avoided cost rates in establishing and maintaining their viability.

RTOs and ISOs — Many of our projects operate in or have access to organized energy markets, known as regional transmission organizations, or ("RTOs"), or independent system operators, or ("ISOs"). Each organized market subject to FERC jurisdiction administers centralized energy, capacity and ancillary services markets pursuant to tariffs approved by FERC. These tariffs and

rules prescribe requirements on how the energy, capacity and ancillary service markets operate, how market participants bid, clear, are dispatched, make bilateral sales with one another, and how entities with market-based rates are compensated. Certain of these markets set prices, referred to as Locational Marginal Prices that reflect the value of energy, capacity or certain ancillary services, based upon geographic locations, transmission constraints, and other factors. Each market is subject to market mitigation measures designed to limit the exercise of market power. These market structures may affect the bidding, operation, dispatch and sale of energy, capacity and ancillary services from our projects that rely on competitive energy markets rather than PURPA's avoided cost rates.

Policy Debate Regarding Climate Change and Renewable Energy

The public and political debate over GHG emissions (principally CO_2 and methane) and their contribution to climate change continues both internationally and domestically. Any resulting regulations could in the future affect our business. As is the case with all combustion, our facilities emit CO_2, however EfW is recognized as creating net reductions in GHG emissions and is otherwise environmentally beneficial, because it:

- avoids CO_2 emissions from fossil fuel power plants;
- avoids methane emissions from landfills; and
- avoids GHG emissions from mining and processing metal because it recovers and recycles metals from waste.

In addition, EfW facilities are a resilient domestic source of baseload energy, preserve land, and are typically located close to the source of the waste and thus typically reduce fossil fuel consumption and air emissions associated with long-haul transportation of waste to landfills.

For policy makers at the local level who make decisions on sustainable waste management alternatives, we believe that using EfW instead of landfilling will result in significantly lower net GHG emissions, while also introducing more control over the cost of waste management and supply of local electrical power. We are actively engaged in encouraging policy makers at state and federal levels to enact legislation that supports EfW as a superior choice for communities to avoid both the environmental harm caused by landfilling waste, and reduce local reliance on fossil fuels as a source of energy.

Many of these same policy considerations apply equally to other renewable technologies. The extent to which such potential legislation and policy initiatives will affect our business will depend in part on whether EfW and our other renewable technologies are included within the range of clean technologies that could benefit from such legislation.

Several initiatives have been developed at the state or regional levels, and some initiatives exist in regions where we have projects. For example:

- The Regional Greenhouse Gas Initiative ("RGGI") is an operating regional "cap-and-trade" program focused on fossil fuel-fired electric generators which does not directly affect EfW facilities. We operate one fossil-fuel fired boiler at our Niagara facility included in the RGGI program.
- California's Global Warming Solutions Act of 2006 ("AB 32"), seeks to reduce GHG emissions in California to 1990 levels by 2020, through an economy-wide "cap-and-trade" program. EfW facilities were exempt from the cap-and-trade program through the end of 2017. Resolutions passed by the Board of the California Air Resources Board ("CARB") direct the agency to provide transition assistance to EfW facilities beginning in 2018. The specific degree of assistance to be provided is uncertain at this time.

International Climate Change Policies

Certain international markets in which we compete have recently adopted regulatory or policy frameworks that encourage EfW projects as important components of GHG emission reduction strategies, as well as waste management planning and practice.

The European Union

Historically, the EU has adopted legislation which requires member states to reduce the utilization of and reliance upon landfill disposal, including (1) Directive 1999/31/EC concerning the landfill of waste (known as the "Landfill Directive") which imposes operational and technical controls on landfills and restricts, on a reducing scale, the amount of biodegradable municipal waste which member states may dispose of to landfill; and (2) Directive 2008/98/EC on waste (known as the revised "Waste Framework Directive") which enshrines the waste hierarchy to divert waste from landfill and underpins a preference for efficient energy-from-waste for the recovery of value from residual wastes.

In July 2018, the EU finalized its Circular Economy Package (CEP), amending several of the Directives described above to advance a more circular economy. Included within the CEP are the continued preference for efficient energy recovery over landfilling, increased targets for recycling and reuse, and new limits on landfilling.

With respect to the UK and its Brexit plans, we have studied and consulted with local experts regarding the potential regulatory impacts, with a particular focus on potential impacts to the waste and energy markets as they might affect our plans to expand our business with GIG. (For further information see *Item 8. Financial Statements And Supplementary Data — Note 3. New Business and Asset Management — Green Investment Group Limited ("GIG") Joint Venture*). The government of the UK has shown no indication of an intention to rollback or reverse its policy support for environmental protection generally, the renewables market, or for EfW specifically, including with respect to the Directives described above. As such, while we can provide no assurance, we do not believe Brexit, if it occurs, will materially impact the key regulatory drivers for investment in the combined pipeline of EfW projects we are pursuing jointly with GIG.

Employee Health and Welfare

We are subject to numerous regulations enacted to protect and promote worker health and welfare through the implementation and enforcement of standards designed to prevent illness, injury and death in the workplace. The primary law relating to employee health and welfare applicable to our business in the United States is the Occupational Safety and Health Act of 1970 ("OSHA"), which establishes certain employer responsibilities including maintenance of a workplace free of recognized hazards likely to cause illness, death or serious injury, compliance with standards promulgated by OSHA, and assorted reporting and record keeping obligations, as well as disclosure and procedural requirements. Various OSHA standards apply to certain aspects of our operations.
Employee health and welfare laws governing our business in foreign jurisdictions include the Workplace Health and Safety Directive and the Directive concerning ionizing radiation in the EU, and various provisions of the Canada Labour Code and related regulations in Canada.

EMPLOYEES

As of December 31, 2018 , w e employed approximately 4,000 full-time employees, the majority of which were employed in the United States. Approximately 7% of our employees are covered by collective bargaining agreements with various expiration dates through 2021 .

EXECUTIVE OFFICERS OF THE REGISTRANT

A list of our executive officers and their business experience follows. Ages shown are as of February 1, 2019 .

Name and Title	Age	Experience
Stephen J. Jones President and Chief Executive Officer	57	President and Chief Executive Officer since 2015. Prior to joining Covanta, Mr. Jones was employed by Air Products and Chemicals, Inc. (“Air Products”), a global supplier of industrial gases, equipment and services from 1992 through 2014. Mr. Jones served as Senior Vice President and General Manager, Tonnage Gases, Equipment and Energy, from 2009 through 2014. Mr. Jones also served as Air Products’ China President from 2011 through 2014 at Air Products’ office in Shanghai. He was also a member of Air Products’ Corporate Executive Committee from 2007 through 2014. Mr. Jones joined Air Products in 1992 as an attorney in the Law Group representing various business areas and functions and in 2007 he was appointed Senior Vice President, General Counsel and Secretary.
Bradford J. Helgeson Executive Vice President and Chief Financial Officer	42	Executive Vice President and Chief Financial Officer since 2013. Mr. Helgeson served as Vice President and Treasurer from 2007 to 2013. Prior to joining Covanta in 2007, Mr. Helgeson was Vice President, Finance and Treasurer at Waste Services, Inc., a publicly-traded environmental services company with operations in the United States and Canada, from 2004 to 2007. Prior to these roles, Mr. Helgeson held positions in the investment banking departments at Lehman Brothers from 2000 to 2004 and at Donaldson, Lufkin & Jenrette from 1998 to 2000.
Michael J. de Castro Executive Vice President, Supply Chain	56	Executive Vice President, Supply Chain since 2015. Mr. de Castro was employed by Air Products from 2006 to 2010, serving in various operational capacities including Director, Global Operations Americas. Mr. de Castro was Chief Executive Officer of Interstate Waste Services ("IWS") from 2010 to 2013 when he returned to Air Products, serving as Director, Global Operations Strategic Development and as Fulfillment Director in the Performance Materials Division. Prior to his tenure at IWS and Air Products, Mr. de Castro held a variety of positions at American Ref-Fuel Company for 16 years, including of Vice President, Operations.
Derek W. Veenhof Executive Vice President, Asset Management	52	Executive Vice President since 2013. Mr. Veenhof served as Senior Vice President (2011-2013) and Vice President (2007-2010) of Covanta commercial subsidiaries managing contracting and market development efforts in waste and metals recycling. From 2002 to 2006, Mr. Veenhof was Covanta’s Area Manager responsible for the Metro NY, NJ and Philadelphia market areas. Mr. Veenhof joined Covanta in 1997, serving as the Niagara Facility Business Manager from 1997-2001.
Timothy J. Simpson Executive Vice President, General Counsel and Secretary	60	Executive Vice President, General Counsel and Secretary since 2007. Mr. Simpson served as Senior Vice President, General Counsel and Secretary from 2004 to 2007. Previously, he served as Senior Vice President, General Counsel and Secretary of Covanta Energy from March 2004 to October 2004. Mr. Simpson joined Covanta in 1992.
Matthew R. Mulcahy Executive Vice President and Head of Corporate Development	55	Executive Vice President and Head of Corporate Development since 2017. Mr. Mulcahy served as Senior Vice President and Head of Corporate Development for Covanta from 2012 to 2016 and Senior Vice President of Business Development from 2007 through 2011. From 2003 to 2007, Mr. Mulcahy served as Vice President of Covanta Secure Service and TransRiver Marketing, a Covanta subsidiary. From 2000 to 2003, Mr. Mulcahy was Covanta’s Vice President, Project Implementation. Mr. Mulcahy joined Covanta in 1990.
Paul E. Stauder Senior Vice President and President, Covanta Environmental Solutions	53	Senior Vice President since 2016 and President of Covanta Environmental Solutions, a subsidiary of Covanta Energy, since 2015. Mr. Stauder served as Senior Vice President of Business Management for Covanta Energy from 2008 to 2014, with primary responsibility for all commercial and client aspects of Covanta’s EFW facilities. Prior to that role, Mr. Stauder served in a number of positions with Covanta Energy, including Regional Vice President, overseeing EfW plants and independent power plants. Mr. Stauder joined Covanta in 1997.
Virginia D. Angilello Senior Vice President and Chief Human Resources Officer	49	Ms. Angilello was appointed Senior Vice President and Chief Human Resources Officer in 2018. Prior to joining Covanta, she worked for more than 17 years in roles of increasing responsibility at Honeywell International. Most recently, she served as Vice President, Human Resources for Performance Materials & Technologies (PMT), Integrated Supply Chain from 2015 to 2018. PMT was a $10 billion business within Honeywell, with more than 90 manufacturing facilities globally. Prior to this position she gained extensive experience in human resources leadership in both HR business partner and HR operations roles from 2007 - 2014, including having led the Honeywell HR Services, Global Operations teams.
Manpreet Grewal Vice President and Chief Accounting Officer	40	Vice President and Chief Accounting Officer since 2017. Prior to joining Covanta, he was the Senior Director, Global Financial & Operational Audits from 2016 through 2017 for Johnson Controls plc, a leading provider in building technologies and solutions and automotive batteries globally. Prior to this position, Mr. Grewal spent 13 years working in a variety of finance and accounting roles at Tyco International plc, prior to Tyco’s 2016 merger with Johnson Controls. From 2014 through 2015 Mr. Grewal was the Director, Internal Audit and from 2012 to 2013, he was the Sr. Manager, Accounting Research & Shared Processes for Tyco.

Item 1A. ***RISK FACTORS***

The following risk factors could have a material adverse effect on our business, financial condition and results of operations.

Exposure to energy, waste disposal, recycled metal and commodity prices may affect our results of operations.

Some of the electricity and steam we sell and all of the recycled metals we sell, are subject to market price volatility. Changes in the market prices for electricity and steam in particular can be affected by changes in natural gas prices, weather conditions and other market variables, while recycled metals prices are affected by general economic conditions and global demand for construction, goods and services. Similarly, the portion of waste processing capacity which is not under contract may be subject to volatility, principally as a result of general economic activity and waste generation rates, as well as the availability of alternative disposal sites and the cost to transport waste to alternative disposal. Volatility with respect to each of these revenue categories could adversely impact our businesses' profitability and financial performance. We may not be successful in our efforts to mitigate our exposure to price swings relating to these revenue streams.

We may experience volatility in the market prices and availability of commodities we purchase, such as reagents, chemicals and fuel. Any price increase, delivery disruption or reduction in the availability of such supplies could affect our ability to operate the facilities and impair our cash flow and results of operations. We may not be successful in our efforts to mitigate our exposure to supply and price swings for these commodities.

Compliance with environmental laws, including changes to such laws, could adversely affect our results of operations.

Our businesses are subject to extensive environmental laws and regulations by federal, state, local and foreign authorities, primarily relating to air, waste (including residual ash from combustion) and water. Costs relating to compliance with these laws and regulations are material to our business. If our businesses fail to comply with these regulations, our cash flow and profitability could be adversely affected, and we could be subject to civil or criminal liability, damages and fines.

In addition, lawsuits or enforcement actions by federal, state, local and/or foreign regulatory agencies may materially increase our costs. Stricter environmental regulation of air emissions, solid waste handling or combustion, residual ash handling and disposal, and waste water discharge could materially affect our cash flow and profitability. Certain environmental laws make us potentially liable on a joint and several basis for the remediation of contamination at or emanating from properties or facilities we currently or formerly owned or operated or properties to which we arranged for the disposal of hazardous substances. Such liability is not limited to the cleanup of contamination we actually caused. We cannot provide any assurance that we will not incur liability relating to the remediation of contamination, including contamination we did not cause. For additional information on environmental regulation, see *Item 1. Business — Regulation of Business.*

Existing environmental laws and regulations have been and could be revised or reinterpreted, and future changes in environmental laws and regulations are expected to occur. This may materially increase the amount we must invest to bring our facilities into compliance, impose additional expense on our operations, limit our ability to operate at capacity, or at all, or otherwise impose structural changes to markets which would adversely affect our competitive positioning in those markets.

Contracts to provide new services or services through new or different methods involves significant risks, which could have an adverse effect on our cash flows and results of operations.

As we enter into contracts to provide new services or services through new or different methods, such as our waste transportation and disposal contract with New York City, our acquired environmental services businesses, or new facilities for processing metals and/or ash, we may face additional operating risks. These may include:

- performance by multiple contractors critical to our ability to perform under our new customer agreements;
- logistics associated with transportation of waste via barge, rail or other methods with which we have limited experience;
- reliance on joint venture parties or technology providers with whom we have limited experience; and
- risks associated with providing new materials handling or treatment services.

Operation of our businesses involves significant risks, which could have an adverse effect on our cash flows and results of operations.

The operation of our businesses involves many risks, including:

- supply or transportation interruptions;
- the breakdown, failure or unplanned maintenance or repair of equipment or processes;
- difficulty or inability to find suitable replacement parts for equipment;
- the unavailability of sufficient quantities of waste or fuel;
- fluctuations in the heating value of the waste we use for fuel at our EfW facilities;
- failure or inadequate performance by subcontractors;
- disruption in the transmission of electricity generated;
- labor disputes and work stoppages;
- unforeseen engineering and environmental problems;
- unanticipated cost overruns;
- weather interferences and catastrophic events including fires, explosions, earthquakes, droughts, pandemics and acts of terrorism; and
- the exercise of the power of eminent domain.

We cannot predict the impact of these risks on our business or operations. One or more of these risks, if they were to occur, could prevent us from meeting our obligations under our operating contracts and have an adverse effect on our cash flows and results of operations.

Our results of operations may be adversely affected by market conditions existing at the time our contracts expire.

For the EfW facilities that we own or lease, the contracts pursuant to which we provide waste services and sell energy output expire on various dates between 2019 and 2038 . Expiration of these contracts subjects us to greater market risk in entering into new or replacement contracts at pricing levels that may not generate comparable revenue. We cannot assure that we will be able to enter into renewal or replacement contracts on favorable terms, or at all. We also expect that medium- and long-term contracts for sales of energy may be less available than in the past, and so after expiration of existing contracts we expect to sell our energy output either in short-term transactions or on a spot basis or pursuant to new contracts which may subject us to greater market risk in maintaining and enhancing revenue. As a result, following the expiration of our existing long-term contracts, we may have more exposure on a relative basis to market risk, and therefore revenue fluctuations, in energy markets than in waste markets.

Where we have leasehold interests, we cannot assure that market conditions prevailing when such interests expire will allow us to enter into an extension or that the terms available in the market at the time will be favorable to us.

Significant policy shifts from the Trump Administration could have a material adverse effect on us.

The Trump Administration has made substantial changes in the areas of fiscal and tax policy, regulatory oversight of businesses, and restrictions on free trade, including significant increases in tariffs on goods imported into the United States, particularly from China. These changes and other similar proposals espoused by President Trump may result in changes to social, political, regulatory and economic conditions in the United States or in laws and policies affecting investment in countries where we currently conduct business, including retaliatory tariffs imposed by those countries. In addition, these changes could result in additional costs associated with growing our international business, and negative sentiments towards the United States among non-US customers and among non-US employees or prospective employees. We cannot predict the impact, if any, of these changes to our business. However, it is possible that these changes could adversely affect our business. It is likely that while some policies adopted by the Trump administration will benefit us, others will negatively affect us.

Changes in public policies and legislative initiatives could materially affect our business and prospects.

There has been substantial debate recently in the United States and abroad in the context of environmental and energy policies affecting climate change, the outcome of which could have a positive or negative influence on our existing business and our prospects for growing our business. Congress and several states have considered legislation and/or regulations designed to increase the proportion of the nation's electricity that is generated from technologies considered "clean" or "renewable", through mandatory generation levels, tax incentives, and other means. For those sources of GHG emissions that are unable to meet the required limitations, such legislation could impose substantial financial burdens. The Trump administration has indicated that it generally favors traditional energy technologies. Our business and future prospects could be adversely affected if renewable technologies we use were either (i) disfavored in any new laws or regulations pursued by the Trump administration, or (ii) not included among those technologies identified in any final laws or regulations as favoring renewable technologies, or not included in the state plans to reduce carbon emissions, and therefore not entitled to the benefits of such laws, regulations, or plans.

Our substantial indebtedness could adversely affect our business, financial condition and results of operations and our ability to meet our payment obligations under our indebtedness.

The level of our consolidated indebtedness could have significant consequences on our future operations, including:

- making it difficult for us to meet our payment and other obligations under our outstanding indebtedness;
- limiting our ability to obtain additional financing to fund working capital, capital expenditures, new projects, acquisitions and other general corporate purposes;
- subjecting us to the risk of increased sensitivity to interest rate increases on indebtedness under our credit facilities;
- limiting our flexibility in planning for, or reacting to, and increasing our vulnerability to, changes in our business, the industries in which we operate and the general economy; and
- placing us at a competitive disadvantage compared to our competitors that have less debt or are less leveraged.

Any of the above-listed factors could have an adverse effect on our business, financial condition and results of operations and our ability to meet our payment obligations under our consolidated debt, and the price of our common stock.

We cannot assure that our cash flow from operations will be sufficient to service our indebtedness, which could have a material adverse effect on our financial condition.

Our ability to meet our obligations under our indebtedness depends on our ability to receive dividends and distributions from our subsidiaries in the future. This, in turn, is subject to many factors, some of which are beyond our control, including the following:

- the continued operation and maintenance of our facilities, consistent with historical performance levels;
- maintenance or enhancement of revenue from renewals or replacement of existing contracts and from new contracts to expand existing facilities or operate additional facilities;
- market conditions affecting waste disposal and energy pricing, as well as competition from other companies for contract renewals, expansions and additional contracts, particularly after our existing contracts expire;
- the continued availability of the benefits of our net operating loss carryforwards; and
- general economic, financial, competitive, legislative, regulatory and other factors.

We cannot assure that our business will generate cash flow from operations, or that future borrowings will be available to us under our credit facilities or otherwise, in an amount sufficient to enable us to meet our payment obligations under our outstanding indebtedness and to fund other liquidity needs. If we are not able to generate sufficient cash flow to service our debt obligations, we may need to refinance or restructure our debt, sell assets, reduce or delay capital investments, or seek to raise additional capital. If we are unable to implement one or more of these alternatives, we may not be able to meet our payment obligations under our outstanding indebtedness, which could have a material adverse effect on our financial condition.

Our credit facilities and the indentures for our other corporate debt contain covenant restrictions that may limit our ability to operate our business.

Our credit facilities and the indentures for our other corporate debt contain operating and financial restrictions and covenants that impose operating and financial restrictions on us and require us to meet certain financial tests. Complying with these covenant restrictions may limit our ability to engage in certain transactions or activities, including incurring additional indebtedness, making certain investments, and distributions, and selling certain assets.

As a result of these covenant restrictions, our ability to respond to changes in business and economic conditions and to obtain additional financing, if needed, may be restricted, and we may be prevented from engaging in transactions that might otherwise be beneficial to us.

Our ability to comply with these covenants is dependent on our future performance, which will be subject to many factors, some of which are beyond our control, including prevailing economic conditions. In addition, the failure to comply with these covenants may result in a default under our credit facilities and other corporate debt. Upon the occurrence of such an event of default, the lenders under our credit facilities could elect to declare all amounts outstanding under such credit facilities, together with accrued interest, to be immediately due and payable. If the lenders accelerate the payment of the indebtedness under our credit facilities, we cannot assure that the assets securing such indebtedness would be sufficient to repay in full that indebtedness and our other indebtedness, which could have a material adverse effect on our financial condition.

Dislocations in credit and capital markets and increased capital constraints on banks may make it more difficult for us to borrow money or raise capital needed to finance the construction of new projects, expand existing projects, acquire certain businesses and refinance our existing debt.

Our business is capital intensive, and we seek to finance a significant portion of our existing assets, as well as our investments in new assets, with debt capital to the extent that we believe such financing is prudent and accretive to stockholder value.

As of December 31, 2018 , we had approximately $ 2.5 billion in long-term debt and project debt. Prolonged instability or deterioration in the bank credit and/or debt and equity capital markets may adversely affect our ability to obtain refinancing of our existing debt on favorable terms, or at all. Such circumstances could adversely affect our business, financial condition, and/or the share price of our common stock.

We intend to grow our business through the development of new projects, the expansion and/or enhancement of existing facilities, and opportunistic acquisitions of projects or businesses. Such investments may be large enough to require capital in excess of our cash on hand and availability under our existing credit facilities. Prolonged instability or deterioration in the credit markets may adversely impact our access to capital on terms that we find acceptable, thereby impacting our ability to execute our strategy to grow our business.

Our revenue and cash flows may decline if we are not successful in retaining rights or such rights terminate to operate facilities after our contracts expire.

We operate some facilities owned by public sector clients, under long-term contracts. If, when existing contracts expire, we are unable to reach agreement with our municipal clients on the terms under which they would extend our operating contracts, this may adversely affect our revenue, cash flow and profitability. We cannot assure that we will be able to enter into such contracts or that the terms available in the market at the time will be favorable to us.

At a limited number of facilities we operate that are owned by public sector clients, our clients have certain rights to terminate such contracts without cause. If any such terminations were to occur, this may adversely affect our revenue, cash flow and profitability. We cannot assure that such contract terminations will not occur in the future.

Development and construction of new projects and expansions may not commence as anticipated, or at all.

Development and construction involves many risks including:

- difficulties in identifying, obtaining and permitting suitable sites for new projects;
- the inaccuracy of our assumptions with respect to the cost of and schedule for completing construction;
- difficulty, delays or inability to obtain financing for a project on acceptable terms;
- delays in deliveries of, or increases in the prices of, equipment sourced from other countries;
- the unavailability of sufficient quantities of waste or other fuels for startup;
- permitting and other regulatory issues, license revocation and changes in legal requirements;
- labor disputes and work stoppages;
- unforeseen engineering and environmental problems;
- interruption of existing operations;
- unanticipated cost overruns or delays; and
- weather interferences and catastrophic events including fires, explosions, earthquakes, droughts, pandemics and acts of terrorism.

In addition, new facilities have no operating history and may employ recently developed technology and equipment. A new facility may be unable to fund principal and interest payments under its debt service obligations or may operate at a loss. In certain situations, if a facility fails to achieve commercial operation, at certain levels or at all, termination rights in the agreements governing the facilities financing may be triggered, rendering all of the facility's debt immediately due and payable. As a result, the facility may be rendered insolvent and we may lose our interest in the facility.

Construction activities may cost more and take longer than we estimate.

The design and construction of new projects or expansions requires us to contract for services from engineering and construction firms, and make substantial purchases of equipment such as boilers, turbine generators and other components that require large quantities of steel to fabricate. These are complex projects that include many factors and conditions which may adversely affect our ability to successfully compete for new projects, or construct and complete such projects on time and within budget.

Our revenue and cash flows may be subject to greater volatility if we extend or renew our contracts under tip fee structures more often than service fee structures.

Our revenue and cash flows may be subject to greater volatility if we extend or renew our contracts under tip fee structures more often than under service fee structures. Due to the nature of tip fee structures, if that were to occur, we may be exposed to greater performance and price risk on the energy we sell.

Some of our EfW projects involve greater risk of exposure to performance levels which, if not satisfied, could result in materially lower revenue.

At our EfW facilities where tip fee structures exist, we receive 100% of the energy revenue they generate. As a result, if we are unable to operate these facilities at their historical performance levels for any reason, our revenue from energy sales could materially decrease.

Weakness in the economy may have an adverse effect on our revenue, cash flow and our ability to grow our business.

Our business is directly affected by economic slowdowns and general reduction in demand for goods and services. A weak economy generally results in reduced overall demand for waste disposal, recycled metal and energy production. Under such conditions, the pricing we are able to charge for our waste management services, and for our energy and recycled metals, may decline and/or experience increased volatility. In addition, many of our customers are municipalities and other public sector entities which may be adversely affected in an economic downturn due to reduced tax revenue. Consequently, some of these entities could be unable to pay amounts owed to us or renew contracts with us for similar volumes or at previous or increased rates.

Furthermore, lower prices for waste disposal and energy production, particularly in the absence of energy policies which encourage renewable technologies such as EfW, may also make it more difficult for us to sell waste and energy services at prices sufficient to allow us to grow our business through developing and building new projects. These factors could have a material adverse effect on our profitability and cash flow.

Changes in climate conditions could materially affect our business and prospects.

Significant changes in weather patterns and volatility could have a negative influence on our existing business and our prospects for growing our business. Such changes may cause episodic events (such as floods or storms) that are difficult to predict or prepare for, or longer-term trends (such as droughts or sea-level rise). These or other meteorological changes could lead to increased operating costs, capital expense, disruptions in facility operations or supply chains, changes in waste generation and interruptions in waste deliveries, limited availability of water for plant cooling operations, and changes in energy pricing, among other effects.

Our reputation could be adversely affected if we are unable to operate our businesses in compliance with laws, or if our efforts to grow our business results in adverse publicity.

If we encounter regulatory compliance issues in the course of operating our businesses, we may experience adverse publicity, which may intensify if such non-compliance results in civil or criminal liability. This adverse publicity may harm our reputation, and result in difficulties in attracting new customers, or retaining existing customers.

With respect to our efforts to grow and maintain our business globally, we sometimes experience opposition from advocacy groups or others intended to halt our development or on-going business. Such opposition is often intended to discourage third parties from doing business with us and may be based on misleading, inaccurate, incomplete or inflammatory assertions. Our reputation may be adversely affected as a result of adverse publicity resulting from such opposition. Such damage to our reputation could adversely affect our ability to grow and maintain our business.

Exposure to foreign currency fluctuations may affect our results from operations or construction costs of facilities we develop in international markets.

We have sought to participate in projects where the host country has allowed the convertibility of its currency into US dollars and repatriation of earnings, capital and profits subject to compliance with local regulatory requirements. As and if we grow our business in other countries and enter new international markets, we expect to invest substantial amounts in foreign currencies to pay for the construction costs of facilities we develop, or for the cost to acquire existing businesses or assets. Currency volatility in those markets, as well as the effectiveness of any currency hedging strategies we may implement, may impact the amount we are required to invest in new projects, as well as our reported results.

Our growth could strain our resources and cause our business to suffer.

We have made and may continue to plan and execute acquisitions and take other actions to grow our business. Acquisitions present significant challenges and risks relating to the integration of the business into the company. If we make acquisitions, it could place a strain on our management systems, infrastructure and resources, as well as present new or different risks to our business. We expect that we will need to continually evaluate and maintain our financial and managerial controls, reporting systems and procedures. We will also need to expand, train and manage our workforce worldwide. We can provide no assurances that the company will manage and integrate acquisitions successfully.

Changes in technology may have a material adverse effect on our profitability.

Our company and others have recognized the value of the traditional waste stream as a potential resource. Research and development activities are ongoing to provide alternative and more efficient technologies to manage waste, produce or extract by-products from waste, or to produce power. We and many other companies are pursuing these technologies, and capital is being invested to find new approaches to waste management, waste treatment, and renewable power generation. It is possible that this deployment of capital may lead to advances in these or other technologies which will reduce the cost of waste management or power production to a level below our costs and/or provide new or alternative methods of waste management or energy generation that become more accepted than those we currently utilize. Unless we are able to participate in these advances, any of these changes could have a material adverse effect on our revenue, profitability and the value of our existing facilities.

Our ability to optimize our operations depends in part on our ability to compete for and obtain fuel for our facilities, and our failure to do so may adversely affect our financial results.

Our EfW facilities depend on solid waste for fuel, which provides a source of revenue. For some of our EfW facilities, the availability of solid waste to us, as well as the tipping fee that we charge to attract solid waste to our facilities, depends upon competition from a number of sources such as other EfW facilities, landfills and transfer stations competing for waste in the market area. In addition, we may need to obtain waste on a competitive basis as our long-term contracts expire at our owned facilities. There has been consolidation, and there may be further consolidation, in the solid waste industry that would reduce the number of solid waste collectors or haulers that are competing for disposal facilities or enable such collectors or haulers to use wholesale purchasing to negotiate favorable below-market rates. The consolidation in the solid waste industry has resulted in companies with vertically integrated collection activities and disposal facilities. Such consolidation may result in economies of scale for those companies, as well as the use of disposal capacity at facilities owned by such companies or by affiliated companies. Such activities can affect both the availability of waste to us for processing at some of our EfW facilities and market pricing, which could have a material adverse effect on our results of operations.

Our ability to successfully manage organizational, process and cost-efficiency initiatives could strain our resources and affect our profitability.

We have made and may continue to undertake organizational, process and cost efficiency changes intended to improve our business. These changes, which may include implementation of new systems and processes, staff adjustments and reassignments of responsibilities, are important to our business success. Failure or delay in implementing these actions, or ineffective implementation could strain our resources and systems, resulting in disruption to our business and/or adversely affecting our results.

Our businesses generate their revenue primarily under long-term contracts and must avoid defaults under those contracts in order to service their debt and avoid material liability to contract counterparties.

We must satisfy performance and other obligations under contracts governing EfW facilities. These contracts typically require us to meet certain performance criteria relating to amounts of waste processed, energy generation rates per ton of waste processed, residue quantity and environmental standards. Our failure to satisfy these criteria may subject us to termination of operating contracts. If such a termination were to occur, we would lose the cash flow related to the projects and incur material termination damage liability, which may be guaranteed by us. In circumstances where the contract has been terminated due to our default, we may not have sufficient sources of cash to pay such damages. We cannot assure that we will be able to continue to perform our respective obligations under such contracts in order to avoid such contract terminations, or damages related to any such contract termination, or that if we could not avoid such terminations that we would have the cash resources to pay amounts that may then become due.

We have provided guarantees and financial support in connection with our projects.

We are obligated to guarantee or provide financial support for our projects in one or more of the following forms:

- support agreements in connection with construction, service or operating agreement-related obligations;
- direct guarantees of certain debt relating to our facilities;
- contingent obligations to pay lease payment installments in connection with certain of our facilities;
- agreements to arrange financing for projects under development;
- contingent credit support for damages arising from performance failures;
- environmental indemnities; and
- contingent capital and credit support to finance costs, in most cases in connection with a corresponding increase in service fees, relating to uncontrollable circumstances.

Many of these contingent obligations cannot readily be quantified, but, if we were required to provide this support, it could have a material adverse effect on our cash flow, results of operations and financial condition.

Our businesses depend on performance by third parties under contractual arrangements.

Our waste and energy services businesses depend on a limited number of third parties to, among other things, purchase the electric and steam energy produced by our facilities, supply and deliver the waste and other goods and services necessary for the operation of our energy facilities, and purchase the metals we recover. The viability of our facilities depends significantly upon the performance by third parties in accordance with long-term and short-term contracts, and such performance depends on factors which may be beyond our control. If those third parties do not perform their obligations, or are excused from performing their obligations because of nonperformance by our waste and energy services businesses or other parties to the contracts, or due to force majeure events or changes in laws or regulations, our businesses may not be able to secure alternate arrangements on substantially the same terms, or at all. In addition, the bankruptcy or financial stability of third parties with whom we do business could result in nonpayment or nonperformance of that party's obligations to us.

We are subject to counterparty and market risk with respect to transactions with financial and other institutions.

Following the expiration of our initial contracts to sell electricity from our projects, we expect to have on a relative basis more exposure to market risk, and therefore revenue fluctuations, in energy markets than in waste markets. Consequently, we may enter into futures, forward contracts, swaps or options with financial institutions to hedge our exposure to market risk in energy markets. We can provide no assurances as to the financial stability or viability of these financial and other institutions.

Concentration of suppliers and customers may expose us to heightened financial exposure.

Our waste and energy services businesses often rely on single suppliers and single customers at our facilities, exposing such facilities to financial risks if any supplier or customer should fail to perform its obligations.

For example, our businesses often rely on a single supplier to provide waste, fuel, water and other services required to operate a facility and on a single customer or a few customers to purchase all or a significant portion of a facility's output. The financial performance of these facilities depends on such customers and suppliers continuing to perform their obligations under their long-term agreements. A facility's financial results could be materially and adversely affected if any one customer or supplier fails to fulfill its contractual obligations and we are unable to find other customers or suppliers to produce the same level of profitability. We cannot assure that such performance failures by third parties will not occur, or that if they do occur, such failures will not have a material adverse effect on the cash flows or profitability of our businesses.

In addition, we rely on the public sector clients as a source not only of waste for fuel, but also of revenue from the fees for waste services we provide. Because our contracts with public sector clients are generally long-term, we may be adversely affected if the credit quality of one or more of our public sector clients were to decline materially.

Our waste operations are concentrated in one region and expose us to regional economic or market declines.

The majority of our waste disposal facilities are located in the northeastern United States, primarily along the Washington, D.C. to Boston, Massachusetts corridor. Adverse economic developments in this region could a regional waste generation rates and demand for waste management services provided by us. Adverse market developments caused by additional waste processing capacity in this region could adversely affect waste disposal pricing. Either of these developments could have a material adverse effect on our profitability and cash generation.

Exposure to international economic and political factors may have a material adverse effect on our international businesses.

Our international operations expose us to political, legal, tax, currency, inflation, convertibility and repatriation risks, as well as potential constraints on the development and operation of potential business, any of which can limit the benefits to us from international projects.

The financing, development and operation of projects outside the United States can entail significant political and financial risks, which vary by country, including:

- changes in law or regulations;
- changes in electricity pricing;
- changes in foreign tax laws and regulations;
- changes in United States federal, state and local laws, including tax laws, related to foreign operations;
- compliance with United States federal, state and local foreign corrupt practices laws;
- changes in government policies or personnel;
- changes in general economic conditions affecting each country, including conditions in financial markets;
- changes in treaties among countries affecting importation of equipment or movement of people across borders;
- changes in labor relations in operations outside the United States;
- political, economic or military instability and civil unrest;
- expropriation and confiscation of assets and facilities; and
- credit quality of entities that pay for our services or purchase our power.

The legal and financial environment in foreign countries in which we currently own assets or projects could also make it more difficult for us to enforce our rights under agreements relating to such projects.

Any or all of the risks identified above with respect to our international projects could adversely affect our profitability and cash generation. As a result, these risks may have a material adverse effect on our business, consolidated financial condition and results of operations.

Our ability to execute on our new project pipeline in the United Kingdom may be disrupted by Brexit.

There is currently substantial uncertainty regarding whether Brexit will occur, or if it does, whether any agreements negotiated as part of Brexit will have an adverse impact on the UK economy. Depending on a variety of factors, which we are currently unable to predict, Brexit could have adverse consequences on our ability to implement our development plans in the UK. This may include (i) disruptions in our ability to access the debt markets on favorable terms to finance our pipeline of new EfW projects in the UK, (ii) increases in our construction costs where they include importing equipment or use of non-UK labor pools, (iii) decreases in the value of our operating investments because of a devaluation of the British pound against other currencies, and (iv) other adverse consequences that we can not presently predict because of material uncertainties in the path Brexit might take.

Risks Related to Information Systems Security

Our information systems, and those of our third-party service providers and vendors, are vulnerable to an increasing threat of continually evolving cybersecurity risks. These risks may take the form of malware, computer viruses, cyber threats, extortion, employee error, malfeasance, system errors or other types of risks, and may occur from inside or outside of our organization. Cybersecurity risk is increasingly difficult to identify and quantify and cannot be fully mitigated because of the rapid evolving nature of the threats, targets and consequences. Additionally, unauthorized parties may attempt to gain access to these systems or our information through fraud or other means of deceiving our third-party service providers, employees or vendors. Our operations depend, in part, on how well we and our suppliers protect networks, equipment, information technology ("IT") systems and software against damage from a number of threats. We have entered into agreements with third parties for hardware, software, telecommunications and other services in connection with our operations. Our operations depend on the timely maintenance, upgrade and replacement of networks, equipment, IT systems and software. However, if we are unable or delayed in maintaining, upgrading or replacing our IT systems and software, the risk of a cybersecurity incident could materially increase. Any of these and other events could result in information system failures, delays and/or increases in capital expenses. The failure of information systems or a component of information systems could, depending on the nature of any such failure, adversely impact our reputation and results of operations.

In addition, targeted attacks on our systems (or on systems of third parties that we rely on), failure or non-availability of a key IT system or a breach of security measures designed to protect our IT systems could result in disruptions to our operations through delays or the corruption and destructions of our data, personal injury, property damage, loss of confidential information or financial or reputational risks. As the threat landscape is ever-changing, we must make continuous mitigation efforts, including: risk prioritized controls to protect against known and emerging threats; tools to provide automated monitoring and alerting; and backup and recovery systems to restore systems and return to normal operations. However, there can be no assurance that our ability to monitor for or mitigate cybersecurity risks will be fully effective, and we may fail to identify cybersecurity breaches or discover them in a timely way.

Any significant compromise or breach of our data security, whether external or internal, or misuse of data, could result in significant costs, lost sales, fines and lawsuits, as well as damage to our reputation. In addition, as the regulatory environment related to information security, data collection and use, and privacy becomes increasingly rigorous, with new and constantly changing requirements applicable to our business, compliance with those requirements could also result in additional costs. As cyber threats continue to evolve, we may be required to expend additional resources to continue to modify or enhance protective measures or to investigate and remediate any security vulnerabilities.

Our reputation could be adversely affected if our businesses, or third parties with whom we have a relationship, were to fail to comply with United States or foreign anti-corruption laws or regulations.

Some of our projects and new business may be conducted in countries where corruption has historically penetrated the economy to a greater extent than in the United States. It is our policy to comply, and to require our local partners and those with whom we do business to comply, with all applicable anti-bribery laws, such as the US Foreign Corrupt Practices Act, and with applicable local laws of the foreign countries in which we operate. Our reputation may be adversely affected if we were reported to be associated with corrupt practices or if we or our local partners failed to comply with such laws. Such damage to our reputation could adversely affect our ability to grow our business.

Energy regulation could adversely affect our revenue and costs of operations.

Our waste and energy services businesses are subject to extensive energy regulations by federal, state and foreign authorities. We cannot predict whether the federal, state or foreign governments will modify or adopt new legislation or regulations relating to the solid waste or energy industries. The economics, including the costs, of operating our facilities may be adversely affected by any changes in these regulations or in their interpretation or implementation or any future inability to comply with existing or future regulations or requirements.

If our businesses lose existing exemptions under the Federal Power Act, the economics and operations of our energy projects could be adversely affected, including as a result of rate regulation by the Federal Energy Regulatory Commission with respect to our output of electricity, which could result in lower prices for sales of electricity and increased compliance costs. In addition, depending on the terms of the project's power purchase agreement, a loss of our exemptions could allow the power purchaser to cease taking and paying for electricity under existing contracts. Such results could cause the loss of some or all contract revenue or otherwise impair the value of a project and could trigger defaults under provisions of the applicable project contracts and financing agreements. Defaults under such financing agreements could render the underlying debt immediately due and payable. Under such

circumstances, we cannot assure that revenue received, the costs incurred, or both, in connection with the project could be recovered through sales to other purchasers.

Failure to obtain regulatory approvals could adversely affect our operations.

Our waste and energy services businesses are continually in the process of obtaining or renewing federal, state, local and foreign approvals required to operate our facilities. While we believe our businesses currently have all necessary operating approvals, we may not always be able to obtain all required regulatory approvals, and we may not be able to obtain any necessary modifications to existing regulatory approvals or maintain all required regulatory approvals. If there is a delay in obtaining any required regulatory approvals or if we fail to obtain and comply with any required regulatory approvals, the operation of our facilities or the sale of electricity to third parties could be prevented, made subject to additional regulation or subject our businesses to additional costs or a decrease in revenue.

The energy industry is becoming increasingly competitive, and we might not successfully respond to these changes.

We may not be able to respond in a timely or effective manner to the changes resulting in increased competition in the energy industry in global markets. These changes may include deregulation of the electric utility industry in some markets, privatization of the electric utility industry in other markets and increasing competition in all markets. To the extent competitive pressures increase and the pricing and sale of electricity assumes more characteristics of a commodity business, the economics of our business may be subject to greater volatility and we might not successfully respond to these changes.

Future impairment charges could have a material adverse effect on our financial condition and results of operations.

In accordance with accounting guidance, we evaluate long-lived assets for impairment whenever events or changes in circumstances, such as significant adverse changes in regulation, business climate or market conditions, could potentially indicate the carrying amount may not be recoverable. Significant reductions in our expected revenue or cash flows for an extended period of time resulting from such events could result in future asset impairment charges, which could have a material adverse impact on our financial condition and results of operations.

We cannot be certain that our NOLs will continue to be available to offset our federal tax liability.

As of December 31, 2018 , we had $197 million of net operating loss carryforwards (“NOLs”). NOLs offset our consolidated taxable income and will expire in various amounts, if not used, between 2033 and 2037 The NOLs are also used to offset income from certain grantor trusts that were established as part of the reorganization in 1990 of certain of our subsidiaries engaged in the insurance business and are administered by state regulatory agencies. As the administration of these grantor trusts concludes, taxable income could result, utilizing a portion of our NOLs and accelerating the date on which we may be otherwise obligated to pay incremental cash taxes.

Our insurance and contractual protections may not always cover lost revenue, increased expense or contractual liabilities.

Although our businesses maintain insurance, obtain warranties from vendors, require contractors to meet certain performance levels and, in some cases, pass risks we cannot control to the service recipient or output purchaser, the proceeds of such insurance, warranties, performance guarantees or risk sharing arrangements may not be adequate to cover lost revenue, increased expense or contractual liabilities.

We depend on our senior management and key personnel and we may have difficulty attracting and retaining qualified professionals.

Our future operating results depend to a large extent upon the continued contributions of key senior managers and personnel. In addition, we are dependent on our ability to attract, train, retain and motivate highly skilled employees. However, there is significant competition for employees with the requisite level of experience and qualifications. If we cannot attract, train, retain and motivate qualified personnel, we may be unable to compete effectively and our growth may be limited, which could have a material adverse effect on our business, results of operations, financial condition and prospects and our ability to fulfill our debt obligations.

Our controls and procedures may not prevent or detect all errors or acts of fraud.

Any disclosure controls and procedures or internal controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must consider the benefits of controls relative to their costs. Inherent limitations within a control system include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people, or by an unauthorized override of the controls. While the design of any system of controls is to provide reasonable assurance of the effectiveness of disclosure controls, such design is also based in part upon certain assumptions about the likelihood of future events, and such assumptions, while reasonable, may not take into account all potential future conditions. Accordingly, because of the inherent limitations in a cost effective control system, misstatements due to error or fraud may occur and may not be prevented or detected.

Failure to maintain an effective system of internal controls over financial reporting may have an adverse effect on our stock price.

We have in the past discovered, and may potentially in the future discover, areas of internal control over financial reporting that may require improvement. If we are unable to assert that our internal control over financial reporting is effective now or in any future period, or if our independent auditors are unable to express an opinion on the effectiveness of our internal controls, we could lose investor confidence in the accuracy and completeness of our financial reports, which could have an adverse effect on our stock price.

Provisions of our certificate of incorporation, our credit facilities and our other corporate debt could discourage an acquisition of us by a third party.

Certain provisions of our credit facilities and our other corporate debt could make it more difficult or more expensive for a third party to acquire us. Upon the occurrence of certain transactions constituting a fundamental change, holders of our credit facilities and our other corporate debt will have the right to require Covanta Holding or Covanta Energy, as the case may be, to repurchase their corporate debt or repay the facilities, as applicable. In addition, provisions of our certificate of incorporation and bylaws, each as amended, could make it more difficult for a third party to acquire control of us. For example, our certificate of incorporation authorizes our board of directors to issue preferred stock without requiring any stockholder approval, and preferred stock could be issued as a defensive measure in response to a takeover proposal. All these provisions could make it more difficult for a third party to acquire us or discourage a third party from acquiring us even if an acquisition might be in the best interest of our stockholders.

Item 1B. *UNRESOLVED STAFF COMMENTS*

None.

Item 2. *PROPERTIES*

As of December 31, 2018 , we owned, had equity investments in and/or operated 89 facilities consisting of 44 EfW operations, 16 transfer stations, 20 material processing facilities, four landfills (primarily for ash disposal), two wood waste (biomass) energy projects, one water (hydroelectric) energy project, one regional metals recycling facility and one ash processing facility (under construction). Principal projects are described above under *Item 1. Business.* Projects that we own or lease are conducted at properties, which we also own or lease, aggregating approximately 1,753 acres, of which 1,385 acres are owned and 368 acres are leased. We lease approximately 104,000 square feet for our headquarters in Morristown, New Jersey. In addition, we own 83 acres of undeveloped land in California.

We operate projects outside of the US and have offices located in Dublin, Ireland, UK and Shanghai, China, where we lease office space of approximately 6,180 square feet. As of December 31, 2018 , we are the part owner/operator of two international projects with businesses conducted at properties that are either leased or have land rights aggregating to 12 acres. Principal projects are described above under *Item 1. Business.*

Item 3. *LEGAL PROCEEDINGS*

For information regarding legal proceedings, see *Item 8. Financial Statements And Supplementary Data — Note 17. Commitments and Contingencies* , which information is incorporated herein by reference.

Item 4. ***MINE SAFETY DISCLOSURES***

Not applicable.

PART II

Item 5. ***MARKET FOR THE REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES***

Our common stock is traded on the New York Stock Exchange under the symbol “CVA”. On February 8, 2019 , there were approximately 661 holders of record of our common stock.

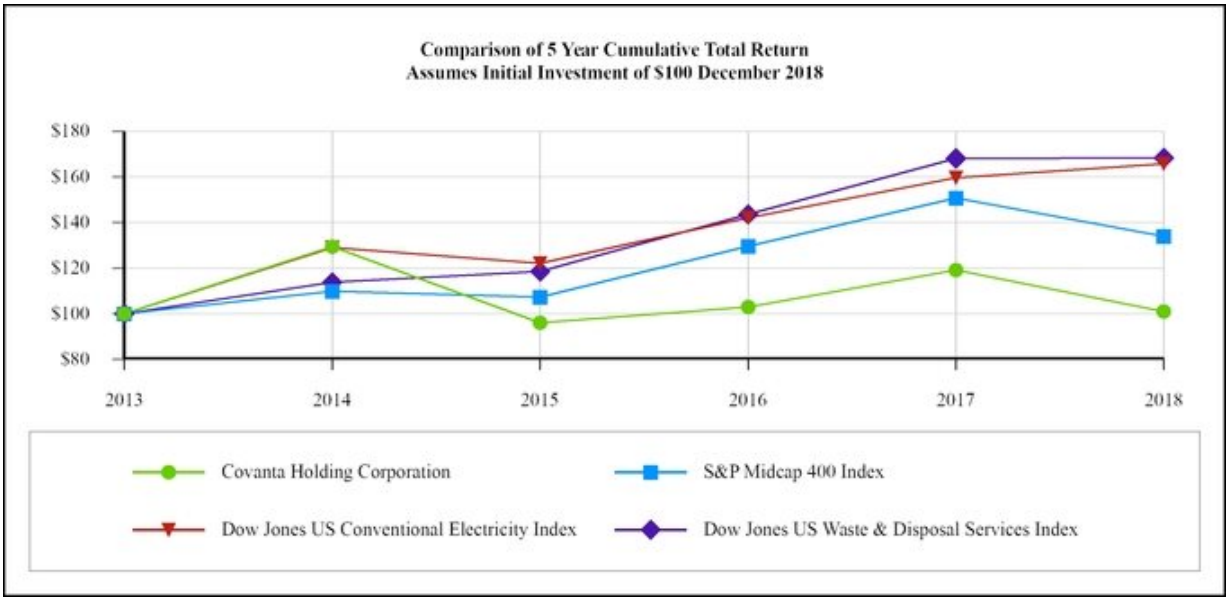
Share Repurchases

Under our share repurchase program, common stock repurchases may be made in the open market, in privately negotiated transactions from time to time, or by other available methods, at management’s discretion in accordance with applicable federal securities laws. The timing and amounts of any repurchases will depend on many factors, including our capital structure, the market price of our common stock and overall market conditions, and whether any restrictions then exist under our policies relating to trading in compliance with securities laws. As of December 31, 2018 , the amount remaining under our currently authorized share repurchase program was $66 million . There were no repurchases made under our share repurchase program during the year ended December 31, 2018 .

During the three months ended December 31, 2018 , the Company withheld 126,202 shares of restricted stock, as permitted by the applicable equity award agreements, to satisfy employee tax withholding requirements related to the vesting of restricted stock awards.

Performance Measurement Comparison

The following performance graph sets forth a comparison of the yearly percentage change in the Company’s cumulative total stockholder return on common stock with the Standard and Poor’s Midcap 400 Index*, the Dow Jones US Conventional Electricity Index**, and the Dow Jones US Waste & Disposal Services Index**. The foregoing cumulative total returns are computed assuming (a) an initial investment of $100, and (b) the reinvestment of dividends at the frequency which dividends were paid during the applicable years. The graph below reflects comparative information for the five fiscal years beginning with the close of trading on December 31, 2013 and ending December 31, 2018 .



The stockholder return reflected above is not necessarily indicative of future performance.

* The Standard and Poor’s Midcap 400 Index is a capitalization-weighted index designed to measure performance of the broad domestic economy through changes in the aggregate market value of the component stocks representing all major industries. Copyright 2019 Standard and Poor’s, Inc. All Rights Reserved.

** The Dow Jones US Waste & Disposal Services Index and the Dow Jones US Conventional Electricity Index are maintained by Dow Jones & Company, Inc. As described by Dow Jones, the Dow Jones US Waste & Services Index consists of providers of pollution control and environmental services for the management, recovery and disposal of solid and hazardous waste materials, such as landfills and recycling centers. The Dow Jones US Conventional Electricity Index consists of companies generating and distributing electricity through the burning of fossil fuels such as coal, petroleum and natural gas, and through nuclear energy. Copyright 2019 Dow Jones & Company. All Rights Reserved.

Item 6. ***SELECTED FINANCIAL DATA***

The selected financial information presented below should be read in conjunction with *Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations* and *Item 8. Financial Statements and Supplementary Data* .

	Year Ended December 31,				
	2018	2017	2016	2015	2014
	(In millions, except per share amounts)				
Statements of Operations Data:					
Operating revenue	$ 1,868	$ 1,752	$ 1,699	$ 1,645	$ 1,682
Operating expense	$ 1,805	$ 1,651	$ 1,590	$ 1,536	$ 1,528
Operating income	$ 63	$ 101	$ 109	$ 109	$ 154
Net income (loss) [1]	$ 152	$ 57	$ (4)	$ 69	$ (1)
Earnings (loss) per share: [1]					
Basic	$ 1.17	$ 0.44	$ (0.03)	$ 0.52	$ (0.01)
Diluted	$ 1.15	$ 0.44	$ (0.03)	$ 0.51	$ (0.01)
Weighted average common shares outstanding:					
Basic	130	130	129	132	130
Diluted	132	131	129	133	130
Cash dividend declared per share	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 0.86

(1) The year ended December 31, 2017 includes the significant impact of the enactment of the Tax Cuts and Jobs Act. For further information see *Item. 1. Business and Item 8. Financial Statements And Supplementary Data — Note 11. Income Taxes* .

	As of December 31,				
	2018	2017	2016	2015	2014
	(In millions)				
Balance Sheet Data:					
Cash and cash equivalents	$ 58	$ 46	$ 84	$ 94	$ 84
Property, plant and equipment, net	$ 2,514	$ 2,606	$ 3,024	$ 2,690	$ 2,607
Assets held for sale	$ 2	$ 653	$ —	$ —	$ —
Total assets	$ 3,843	$ 4,441	$ 4,284	$ 4,234	$ 4,178
Long-term debt (incl. current portion)	$ 2,342	$ 2,349	$ 2,252	$ 2,263	$ 1,948
Project debt (incl. current portion)	$ 152	$ 174	$ 383	$ 198	$ 222
Liabilities held for sale	$ —	$ 540	$ —	$ —	$ —
Total liabilities	$ 3,356	$ 4,014	$ 3,815	$ 3,594	$ 3,394
Total stockholders' equity	$ 487	$ 427	$ 469	$ 638	$ 782

Item 7. *MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS*

The terms "we," "our," "ours," "us," "Covanta" and "Company" refer to Covanta Holding Corporation and its subsidiaries; the term "Covanta Energy" refers to our subsidiary Covanta Energy, LLC and its subsidiaries.

OVERVIEW

The following discussion should be read in conjunction with our audited consolidated financial statements and the notes thereto included elsewhere in *Item 8. Financial Statements and Supplementary Data* of this Form 10-K. This discussion may contain forward-looking statements that anticipate results that are subject to uncertainty. We discuss in more detail various factors that could cause actual results to differ from expectations in *Item 1A. Risk Factors* in this Form 10-K.

For a discussion of our facilities, the energy-from-waste process and the environmental benefits of EfW, see *Item 1. Business.*

We have one reportable segment which is comprised of our entire operating business. For additional information on our reportable segment, see *Note 6. Business Segment and Geographic Information* .

For a discussion of key strategies and the execution thereof in 2018 , see *Item 1. Business — Strategy* and *Execution on Strategy.*

General Business Conditions

See *Item 1. Business — Markets, Competition and Business Conditions* for a discussion of factors affecting business conditions and financial results.

RESULTS OF OPERATIONS

The comparability of the information provided below with respect to our revenue, expense and certain other items for periods during each of the years presented was affected by several factors. As outlined in *Item 1. Business - Execution on Strategy, Item 8. Financial Statements And Supplementary Data — Note 1. Organization and Summary of Significant Accounting Policies* , *Note 3. New Business and Asset Management* and *Note 4. Dispositions and Assets Held for Sale* our business development initiatives and acquisitions resulted in various transactions, which are reflected in comparative revenue and expense. These factors must be taken into account in developing meaningful comparisons between the periods compared below.

The Results of Operations discussion below compares our revenue, expense and certain other items during each of the years presented.

The following terms used within the Results of Operations discussion are defined as follows:

- "Organic growth": reflects the performance of the business on a comparable period-over-period basis, excluding the impacts of transactions and contract transitions.
- "Transactions": includes the impacts of acquisitions, divestitures, and the addition or loss of operating contracts.
- "Contract transitions": includes the impact of the expiration of: (a) long-term major waste and service contracts, most typically representing the transition to a new contract structure, and (b) long-term energy contracts.

RESULTS OF OPERATIONS — OPERATING INCOME

Year Ended December 31, 2018 vs. Year Ended December 31, 2017

	Year Ended December 31,		
	2018	2017	Variance Increase (Decrease)
	(In millions)		
OPERATING REVENUE:			
Waste and service revenue	$ 1,327	$ 1,231	$ 96
Energy revenue	343	334	9
Recycled metals revenue	95	82	13
Other operating revenue	103	105	(2)
Total operating revenue	1,868	1,752	116
OPERATING EXPENSE:			
Plant operating expense	1,321	1,271	50
Other operating expense	65	51	14
General and administrative expense	115	112	3
Depreciation and amortization expense	218	215	3
Impairment charges	86	2	84
Total operating expense	1,805	1,651	154
Operating income	$ 63	$ 101	$ (38)

Operating Revenue

Waste and Service Revenue

In millions:	Year Ended December 31,		
	2018	2017	Variance
EfW tip fees	$ 624	$ 572	$ 52
EfW service fees	424	393	31
Environmental services	141	129	12
Municipal services [1]	207	194	13
Other	38	42	(4)
Intercompany	(107)	(99)	(8)
Total waste and service revenue	$ 1,327	$ 1,231	$ 96

(1) Consists of transfer stations and transportation component of our New York City waste transport and disposal contract.

EfW facilities - Tons (1) (in millions):	Year Ended December 31,		
	2018	2017	Variance
Tip fee - contracted	8.9	8.0	0.9
Tip fee - uncontracted	2.1	2.1	—
Service fee	9.5	8.6	0.9
Total Tons	20.5	18.7	1.8

(1) Includes solid tons only. Certain amounts may not total due to rounding.

For the twelve month comparative period, waste and service revenue increased by $96 million , primarily driven by $72 million of organic growth, the start-up of the Dublin EfW facility in the fourth quarter of 2017, and the acquisition of the Palm Beach County EfW facility operating contracts in the third quarter of 2018, partially offset by service contract transitions. Within organic growth, EfW tip fee revenue increased due to higher volume processed ($38 million) , primarily from a full period of operations at the Fairfax County EfW facility (which was not operating for a majority of the comparative period in 2017), higher average revenue per ton ($20 million) , and growth in environmental services ($12 million) and municipal services ($13 million) . For

additional information on our Fairfax County EfW facility, see *Item 8. Financial Statements And Supplementary Data - Note 10. Supplementary Information* .

Energy Revenue

In millions: [1]	Year Ended December 31, 2018	Year Ended December 31, 2017	Variance
Energy sales	$ 291	$ 288	$ 3
Capacity	52	46	6
Total energy	$ 343	$ 334	$ 9

(1) Covanta share only. Represents the sale of electricity and steam based upon output delivered and capacity provided. Certain amounts may not total due to rounding.

Total EfW (in millions):	Year Ended December 31, 2018			Year Ended December 31, 2017			Variance	
	Revenue [1]	Volume [1], [2]	% of Total Volume	Revenue [1]	Volume [1], [2]	% of Total Volume	Revenue	Volume
At Market	$ 49	1.3	20%	$ 23	0.8	13%	$ 26	0.5
Contracted	192	2.1	33%	216	2.5	41%	(24)	(0.4)
Hedged	101	3.1	47%	95	2.7	46%	6	0.4
Total EfW	$ 342	6.5	100%	$ 334	6.0	100%	$ 8	0.5

(1) Covanta share only. Represents the sale of electricity and steam based upon output delivered and capacity provided.
(2) Steam converted to MWh at an assumed average rate of 11 klbs of steam / MWh.
Certain amounts may not total due to rounding.

For the twelve month comparative period, energy revenue increased by $9 million , driven by a $25 million increase from higher production at EfW facilities as compared to prior year, primarily due to the Fairfax facility as discussed above, partially offset by lower market prices ($4 million) , the expiration of long-term energy contracts ($5 million) and the deconsolidation of the Dublin EfW facility ($6 million) . For additional information on the Dublin EfW facility see *Item 8. Financial Statements and Supplementary Data - Note 4. Dispositions and Assets Held for Sale* .

Recycled Metal Revenue

	Year Ended December 31, Metal Revenue (in millions) 2018	Metal Revenue (in millions) 2017	Tons Sold (in thousands) [1] 2018	Tons Sold (in thousands) [1] 2017	Tons Recovered (in thousands) 2018	Tons Recovered (in thousands) 2017
Ferrous Metal	$ 58	$ 48	333	302	424	396
Non-Ferrous Metal	37	34	31	31	49	38
Total	$ 95	$ 82				

(1) Represents the portion of total volume that is equivalent to Covanta's share of revenue under applicable client revenue sharing arrangements.

For the twelve month comparative period, recycled metals revenue increased by $13 million , driven primarily by higher pricing for both ferrous ($5 million) and non-ferrous ($5 million) material and an increase in ferrous volume ($6 million) , primarily due to a full year of operations at the Fairfax facility, partially offset by decreased volume of non-ferrous materials sold in the period ($2 million) .

Other Operating Revenue

Other operating revenue decreased by $2 million for the twelve month comparative period due to the resale of purchased energy under contractual energy arrangements in 2017 at facilities that did not produce power in 2017 ($12 million) , partially offset by higher construction revenue ($9 million) .

Operating Expense

Plant Operating Expense

Consolidated (in millions):	Year Ended December 31,		
	2018	**2017**	**Variance**
Plant maintenance [1]	$ 299	$ 311	$ (12)
All other	1,023	960	63
Plant operating expense	$ 1,321	$ 1,271	$ 50

(1) Plant maintenance costs include our internal maintenance team and non-facility employee costs for facility scheduled and unscheduled maintenance and repair expense.

Plant operating expenses increased by $50 million for the twelve month comparable period, primarily due to costs related to growth in our Covanta Environmental Solutions business ($11 million) and our metals processing operations ($6 million) , escalation of EfW same store expenses ($18 million) , the start-up of the Dublin EfW facility in the fourth quarter of 2017 ($15 million) , and the acquisition of the Palm Beach County EfW facility operating contracts in the third quarter of 2018 ($15 million) , offset by contract transitions ($11 million) .

Other Operating Expense

Other operating expenses increased by $14 million for the twelve month comparable period, primarily due to a gain from the settlement of our contract dispute with Hennepin County recognized in the prior year ($8 million) , increased construction expenses ($9 million) , partially offset by higher insurance recoveries which are recorded as a contra expense ($7 million) . For additional information, see *Item 8. Financial Statements And Supplementary Data - Note 10. Supplementary Information - Other Operating Expenses.*

General and Administrative Expense

General and administrative expenses increased for the twelve month comparative period by $3 million primarily due to an increase in compensation expense of $7 million , partially offset by a decrease in outside consulting expense of $5 million .

Impairment Charges

During the year ended December 31, 2018 , we identified an indicator of impairment associated with certain of our EfW facilities where the current expectation is that, more likely than not, the assets will not be operated through their previously estimated economic useful lives. We performed recoverability tests to determine if these facilities were impaired as of the respective balance sheet date. As a result, based on expected cash flows utilizing Level 3 inputs, we recorded a non-cash impairment charge for the year ended December 31, 2018 of $86 million to reduce the carrying value of the assets to their estimated fair value.

RESULTS OF OPERATIONS — OPERATING INCOME

Year Ended December 31, 2017 vs. Year Ended December 31, 2016

	Year Ended December 31,		Variance
	2017	2016	Increase (Decrease)
	(In millions)		
OPERATING REVENUE:			
Waste and service revenue	$ 1,231	$ 1,187	$ 44
Energy revenue	334	370	(36)
Recycled metals revenue	82	61	21
Other operating revenue	105	81	24
Total operating revenue	1,752	1,699	53
OPERATING EXPENSE:			
Plant operating expense	1,271	1,177	94
Other operating expense	51	86	(35)
General and administrative expense	112	100	12
Depreciation and amortization expense	215	207	8
Impairment charges	2	20	(18)
Total operating expense	1,651	1,590	61
Operating income	$ 101	$ 109	$ (8)

Operating Revenue

Waste and Service Revenue

In millions:	Year Ended December 31,		
	2017	2016	Variance
EfW tip fees	$ 572	$ 551	$ 21
EfW service fees	393	406	(13)
Environmental services	129	104	25
Municipal services [1]	194	186	8
Other	42	36	6
Intercompany	(99)	(96)	(3)
Total waste and service revenue	$ 1,231	$ 1,187	$ 44

(1) Consists of transfer stations and transportation component of our New York City waste transport and disposal contract.

EfW facilities - Tons (1) (in millions):	Year Ended December 31,		
	2017	2016	Variance
Tip fee - contracted	8.0	8.4	(0.4)
Tip fee - uncontracted	2.1	2.2	(0.1)
Service fee	8.6	8.9	(0.3)
Total Tons	18.7	19.5	(0.8)

(1) Includes solid tons only. Certain amounts may not total due to rounding.

For the twelve month comparative period, waste and service revenue increased by $44 million year-over-year, driven by $13 million of organic growth, $28 million from transactions, of which $19 million related to the start-up of the Dublin EfW facility in the fourth quarter of 2017, and $4 million resulting from contract transitions. Within organic growth, EfW tip fee revenue decreased by $16 million , with the benefit from higher average revenue per ton of $14 million , more than offset by lower volume of waste processed of $29 million , primarily due to downtime at the Fairfax County facility, while environmental services and municipal services revenue were higher by $16 million and $8 million , respectively.

Energy Revenue

In millions: [1]	Year Ended December 31, 2017	Year Ended December 31, 2016	Variance
Energy sales	$ 288	$ 321	$ (33)
Capacity	46	40	6
Other revenue	—	9	(9)
Total energy	$ 334	$ 370	$ (36)

(1) Covanta share only. Represents the sale of electricity and steam based upon output delivered and capacity provided. Certain amounts may not total due to rounding.

	Year Ended December 31,							
	2017			2016			Variance	
Total EfW (in millions):	Revenue [1]	Volume [1], [2]	% of Total Volume	Revenue [1]	Volume [1], [2]	% of Total Volume	Revenue	Volume
At Market	$ 23	0.8	13%	$ 33	1.0	17%	$ (10)	(0.2)
Contracted	216	2.5	41%	245	3.1	51%	(29)	(0.6)
Hedged	95	2.7	46%	83	1.9	32%	12	0.8
Total EfW	$ 334	6.0	100%	$ 361	6.0	100%	$ (27)	—

(1) Covanta share only. Represents the sale of electricity and steam based upon output delivered and capacity provided.
(2) Steam converted to MWh at an assumed average rate of 11 klbs of steam / MWh.
Certain amounts may not total due to rounding.

For the twelve month comparative period, energy revenue decreased by $36 million year-over-year, driven by the expiration of certain long-term energy contracts ($28 million) and lower production at EfW facilities ($15 million) , primarily due to downtime at the Fairfax County facility, which were partially offset by a favorable impact from service contract transitions ($5 million) and $2 million related to transactions.

Recycled Metal Revenue

	Year Ended December 31,					
	Metal Revenue (in millions)		Tons Sold (in thousands) [1]		Tons Recovered (in thousands)	
	2017	2016	2017	2016	2017	2016
Ferrous Metal	$ 48	$ 38	302	345	396	401
Non-Ferrous Metal	34	23	31	36	38	36
Total	$ 82	$ 61				

(1) Represents the portion of total volume that is equivalent to Covanta's share of revenue under applicable client revenue sharing arrangements.

For the twelve month comparative period, recycled metals revenue increased by $21 million year-over-year, driven by higher pricing for both ferrous ($17 million) and non-ferrous ($17 million) material, partially offset by lower volume sold ($14 million) which primarily resulted from the centralized processing of non-ferrous material and the timing of sales shipments as compared to the prior year.

Other Operating Revenue

Other operating revenue increased by $24 million for the twelve month comparative period primarily due to higher construction revenue ($12 million) and contractual energy sales related to facilities that did not produce power ($12 million) .

Operating Expense

Plant Operating Expense

In millions:	Year Ended December 31,		
	2017	2016	Variance
Plant maintenance [1]	$ 311	$ 279	$ 32
All other	960	898	62
Plant operating expense	$ 1,271	$ 1,177	$ 94

(1) Plant maintenance costs include our internal maintenance team and non-facility employee costs for facility scheduled and unscheduled maintenance and repair expense.

Plant operating expenses increased by $94 million for the twelve month comparable period, driven by higher plant maintenance expense ($32 million), escalation in other costs at our EfW facilities on a same store basis ($8 million) , and incremental costs related to growth in our Covanta Environmental Solutions business, commencement of operations at the new centralized non-ferrous metal processing facility, and the start-up of the Dublin EfW facility.

Other Operating Expense

Other operating expenses decreased by $35 million for the twelve month comparable period, primarily due to higher insurance recoveries of $26 million , which are recorded as a contra expense, and a gain of $8 million from the settlement of our contract dispute with Hennepin County. For additional information, see *Item 8. Financial Statements And Supplementary Data - Note 10. Supplementary Information - Other Operating Expenses.*

General and Administrative Expense

General and administrative expenses increased for the twelve month comparative period by $12 million , driven by third party costs incurred in the execution of the GIG transaction, accounting services and higher compensation expenses.

Impairment Charges

During the year ended December 31, 2016, we recorded non-cash impairment charges of $20 million , pre-tax, of which $13 million related to the previously planned closure of our Pittsfield EfW facility, which we continue to operate, and $3 millio n, pre-tax, related to an investment in a joint venture to recover and recycle metals. For additional information, see I *tem 8. Financial Statements And Supplementary Data — Note 10. Supplementary Information — Impairment Charges.*

CONSOLIDATED RESULTS OF OPERATIONS — NON-OPERATING INCOME ITEMS

Years Ended December 31, 2018, 2017 and 2016

Other Income (Expense):

	Year Ended December 31,			Variance Increase (Decrease)	
	2018	2017	2016	2018 vs 2017	2017 vs 2016
	(In millions)				
Interest expense	$ (145)	$ (147)	$ (138)	$ 2	$ (9)
Gain (loss) on sale of business	217	(6)	44	223	(50)
Loss on extinguishment of debt	(15)	(84)	—	69	(84)
Other (expense) income, net	(3)	1	(1)	(4)	2
Total other income (expense)	$ 54	$ (236)	$ (95)	$ 290	$ (141)

Interest expense increased by $9 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 , primarily due to the cost of non-recourse project subsidiary debt related to the Dublin EfW facility in the fourth quarter of 2017 following commencement of commercial operations. For additional information see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt* .

Gain (loss) on sale of business increased by $223 million for the year ended December 31, 2018 compared to the year ended

December 31, 2017 , primarily due to the deconsolidation of the Dublin EfW facility which resulted in a gain of $204 million . For additional information see *Item 8. Financial Statements And Supplementary Data — Note 4. Dispositions and Assets Held for Sale* .

Gain (loss) on sale of business for the year ended December 31, 2017 and 2016, is primarily due to the sale of our interests in China. For additional information see *Item 8. Financial Statements And Supplementary Data — Note 4. Dispositions and Assets Held for Sale* .

Loss on extinguishment of debt for the year ended December 31, 2018 is comprised of $12 million related to the redemption of our 2022 Senior Notes and $3 million related to the refinancing our tax-exempt bonds related to certain of our facilities in New York and Massachusetts. For additional information see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt* .

Loss on extinguishment of debt for the year ended December 31, 2017 is comprised of $13 million of charges related to the redemption of our 2020 Senior Notes and approximately $71 million in connection with the refinancing of our non-recourse project subsidiary debt related to the Dublin EfW facility. For additional information see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt* .

Equity in net income from unconsolidated investments

Equity in net income from unconsolidated investments increased by $5 million for the year ended December 31, 2018 due to a full year of operations of the Dublin EfW facility owned through a joint venture with GIG. As new international projects are completed over the next few years these investments will become a growing source of income and operating cash flow. For additional information see *Item 8. Financial Statements And Supplementary Data — Note 13. Equity Method Investments*

Income Tax (Benefit) Expense:

	Year Ended December 31,			Variance Increase (Decrease)	
	2018	2017	2016	2018 vs 2017	2017 vs 2016
	(In millions, except percentages)				
Income tax (benefit) expense	$ (29)	$ (191)	$ 22	$ 162	$ (213)
Effective income tax rate	(25)%	142%	150%		

The decrease in the effective tax rate for the year ended December 31, 2018, compared to the year ended December 31, 2017 is primarily due to the combined effects of (i) in 2017 there was a significant deferred tax revaluation due to tax reform which did not occur in 2018 (ii) no income tax associated with the gain from sale of our joint venture with GIG; (iii) the discrete tax benefits attributable to the New Jersey State Tax Law change and a state audit settlement.

The decrease in the effective tax rate for the year ended December 31, 2017, compared to the year ended December 31, 2016 is primarily due to the combined effects of (i) the recognition of tax benefit from the re-measurement of the deferred taxes and the estimated transition tax due to the enactment of the Act and (ii) the change from pre-tax income in 2016 to pre-tax loss in 2017.

For additional information see *Item 8. Financial Statements And Supplementary Data — Note 11. Income Taxes* .

Net Income (Loss) and Earnings Per Share:

	Year Ended December 31,			Variance Increase (Decrease)	
	2018	2017	2016	2018 vs 2017	2017 vs 2016
	(In millions, except per share amounts)				
Net Income (Loss)	$ 152	$ 57	$ (4)	$ 95	$ 61
Earnings (Loss) Per Share:					
Weighted Average Shares:					
Basic:	130	130	129	—	1
Diluted:	132	131	129	1	2
Earnings (Loss) Per Share:					
Basic:	$ 1.17	$ 0.44	$ (0.03)	$ 0.73	$ 0.47
Diluted:	$ 1.15	$ 0.44	$ (0.03)	$ 0.71	$ 0.47
Cash Dividend Declared Per Share [1]	$ 1.00	$ 1.00	$ 1.00	$ —	$ —

(1) For information on dividends declared to shareholders and share repurchases, see *Liquidity and Capital Resources* below.

Supplementary Financial Information — Adjusted EBITDA (Non-GAAP Discussion)

To supplement our results prepared in accordance with GAAP, we use the measure of Adjusted EBITDA, which is a non-GAAP financial measure as defined by the SEC. This non-GAAP financial measure is described below, and is not intended as a substitute and should not be considered in isolation from measures of financial performance prepared in accordance with GAAP. In addition, our use of non-GAAP financial measures may be different from non-GAAP financial measures used by other companies, limiting their usefulness for comparison purposes. The presentation of Adjusted EBITDA is intended to enhance the usefulness of our financial information by providing a measure which management internally uses to assess and evaluate the overall performance of its business and those of possible acquisition candidates, and highlight trends in the overall business.

We use Adjusted EBITDA to provide additional ways of viewing aspects of operations that, when viewed with the GAAP results provide a more complete understanding of our core business. As we define it, Adjusted EBITDA represents earnings before interest, taxes, depreciation and amortization, as adjusted for additional items subtracted from or added to net income including the effects of impairment losses, gains or losses on sales, dispositions or retirements of assets, adjustments to reflect the Adjusted EBITDA from our unconsolidated investments, adjustments to exclude significant unusual or non-recurring items that are not directly related to our operating performance plus adjustments to capital type expenses for our service fee facilities in line with our credit agreements. We adjust for these items in our Adjusted EBITDA as our management believes that these items would distort their ability to efficiently view and assess our core operating trends. As larger parts of our business are conducted through unconsolidated investments that we do not control, we adjust EBITDA for our proportionate share of the entity's depreciation and amortization, interest expense and taxes in order to improve comparability to the Adjusted EBITDA of our wholly owned entities.

Adjusted EBITDA should not be considered as an alternative to net income or cash flow provided by operating activities as indicators of our performance or liquidity or any other measures of performance or liquidity derived in accordance with GAAP.

In order to provide a meaningful basis for comparison, we are providing information with respect to our Adjusted EBITDA for the years ended December 31, 2018, 2017 and 2016 , respectively, reconciled for each such period to net income and cash flow provided by operating activities, which are believed to be the most directly comparable measures under GAAP. The following is a reconciliation of Net income (loss) to Adjusted EBITDA (in millions):

	Year Ended December 31,		
Adjusted EBITDA	**2018**	**2017**	**2016**
Net income (loss) [a]	$ 152	$ 57	$ (4)
Depreciation and amortization expense	218	215	207
Interest expense	145	147	138
Income tax (benefit) expense [a]	(29)	(191)	22
Impairment charges [b]	86	2	20
(Gain) loss on sale of business [c]	(217)	6	(44)
Loss on extinguishment of debt [d]	15	84	—
Property insurance recoveries, net [e]	(18)	(2)	—
Capital type expenditures at client owned facilities [f]	37	55	39
Debt service billings (less than) in excess of revenue recognized	(1)	5	4
Business development and transaction costs	3	5	2
Severance and reorganization costs	5	1	3
Non-cash compensation expense	24	18	16
Adjustments to reflect Adjusted EBITDA from unconsolidated investments	23	—	—
Other [g]	14	6	7
Adjusted EBITDA	$ 457	$ 408	$ 410

(a) The year ended December 31, 2017 includes a provisional net tax benefit of $183 million ($1.40 per diluted share) associated with the enactment of the Tax Cuts and Jobs Act of 2017. For additional information, see Item 8. Financial Statements And Supplementary Data — *Note 11. Income Taxes* .

(b) During the year ended December 31, 2018 , we identified indicators of impairment associated with certain of our EfW facilities and recorded a non-cash impairment charge of $86 million to reduce the carrying value of the facilities to their estimated fair value.

During the year ended December 31, 2016, we recorded a non-cash impairment totaling $20 million which primarily consisted of $13 million related to the previously planned closure of our Pittsfield EfW facility in March 2017, which we now continue to operate, and $3 million related to an investment in a joint venture to recover and recycle metals.

(c) During the year ended December 31, 2018 , we recorded a $7 million gain on the sale of our equity interests in Koma Kulshan, a $204 million gain on the sale of 50% of our Dublin EfW facility to our joint venture with the Green Investment Group Limited and a $6 million gain on the sale of our remaining interests in China.

During the year ended December 31, 2017, we recorded a $6 million charge for indemnification claims related to the sale of our interests in China, which

was completed in 2016.

During the year ended December 31, 2016, we recorded a $41 million gain on the sale of our interests in China.

(d) During the year ended December 31, 2018 , we recorded a $3 million loss related to the refinancing of our tax-exempt bonds and a $12 million loss related to the redemption of our redemption of our 2022 Senior Notes. *S ee Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt* .

During the year ended December 31, 2017, we recorded a $71 million loss related to our Dublin debt refinancing and a $13 million loss related to the redemption of our 2020 Senior Notes.

(e) During the year ended December 31, 2018 we recorded a $18 million property insurance gain related to our property insurance recoveries at Fairfax. *S ee Item 8. Financial Statements And Supplementary Data — Note 10. Supplementary Information* .

(f) Adjustment for impact of adoption of FASB ASC 853 - *Service Concession Arrangements.* These types of capital equipment related expenditures at our service fee operated facilities were historically capitalized prior to adoption of this new accounting standard effective January 1, 2015 and are capitalized at facilities that we own.

(g) Includes certain other items that are added back under the definition of Adjusted EBITDA in Covanta Energy, LLC's credit agreement.

The following is a reconciliation of cash flow provided by operating activities to Adjusted EBITDA (in millions):

	Year Ended December 31,		
	2018	**2017**	**2016**
Cash flow provided by operating activities	$ 238	$ 242	$ 264
Cash paid for interest, net of capitalized interest	136	132	135
Cash paid for taxes	2	—	(6)
Capital type expenditures at service fee operated facilities [(a)]	37	55	39
Equity in net income from unconsolidated investments	6	1	4
Dividends from unconsolidated investments	(13)	(2)	(2)
Adjustment for working capital and other	28	(20)	(24)
Adjusted EBITDA	$ 457	$ 408	$ 410

(a) See *Adjusted EBITDA - Note (f)* above.

For additional discussion related to management's use of non-GAAP measures, see *Liquidity and Capital Resources — Supplementary Financial Information — Free Cash Flow (Non-GAAP Discussion)* below.

Supplementary Financial Information — Adjusted Earnings Per Share ("Adjusted EPS") (Non-GAAP Discussion)

We use a number of different financial measures, both United States generally accepted accounting principles ("GAAP") and non-GAAP, a financial measure as defined by the Securities and Exchange Commission ("SEC"), in assessing the overall performance of our business. To supplement our results prepared in accordance with GAAP, we use the measure of Adjusted EPS, which is non-GAAP. The non-GAAP financial measure of Adjusted EPS is not intended as a substitute or as an alternative to diluted earnings per share as an indicator of our performance or any other measure of performance derived in accordance with GAAP. In addition, our non-GAAP financial measures may be different from non-GAAP financial measures used by other companies, limiting their usefulness for comparison purposes. We use the non-GAAP financial measure of Adjusted EPS to enhance the usefulness of our financial information by providing a measure which management internally uses to assess and evaluate the overall performance and highlight trends in the ongoing business.

Adjusted EPS excludes certain income and expense items that are not representative of our ongoing business and operations, which are included in the calculation of diluted earnings per share in accordance with GAAP. The following items are not all-inclusive, but are examples of reconciling items in prior comparative and future periods. They would include impairment charges, the effect of derivative instruments not designated as hedging instruments, significant gains or losses from the disposition or restructuring of businesses, gains and losses on assets held for sale, transaction-related costs, income and loss on the extinguishment of debt and other significant items that would not be representative of our ongoing business.

In order to provide a meaningful basis for comparison, we are providing information with respect to our Adjusted EPS for the years ended December 31, 2018, 2017 and 2016 , respectively, reconciled for each such period to diluted earnings per share, which is believed to be the most directly comparable measure under GAAP (in millions, except per share amounts):

	Year Ended December 31,		
	2018	**2017**	**2016**
Diluted earnings (loss) per share	$ 1.15	$ 0.44	$ (0.03)
Reconciling items [(1)]	(1.25)	(0.81)	(0.03)
Adjusted EPS	$ (0.10)	$ (0.37)	$ (0.06)

(1) Additional information is provided in the Reconciling Items table below.

	Year Ended December 31,		
	2018	2017	2016
Reconciling Items			
Impairment charges [(a)]	86	2	20
(Gain) loss on sale of business [(a)]	(217)	6	(44)
Property insurance recoveries, net	(18)	(2)	—
Severance and reorganization costs	5	1	2
Loss on extinguishment of debt [(a)]	15	84	—
Effect on income of derivative instruments not designated as hedging instruments	—	—	2
Effect of foreign exchange loss on indebtedness	3	(2)	(1)
Other	(1)	1	—
Total Reconciling Items, pre-tax	(127)	90	(21)
Pro forma income tax impact [(b)]	(19)	(4)	2
Adjustment to uncertain tax positions	—	—	14
Grantor trust activity	—	(9)	1
Impact of New Jersey state tax law change	(19)	—	—
Impact of federal tax reform rate change [(a)]	—	(204)	—
Transition tax [(a)]	—	21	—
Total reconciling Items, net of tax	$ (165)	$ (106)	$ (4)
Diluted per share impact	$ (1.25)	$ (0.81)	$ (0.03)
Weighted average diluted shares outstanding	132	131	129

(a) For additional information, see *Adjusted EBITDA* above.
(b) We calculate the federal and state tax impact of each item using the statutory federal tax rate and applicable blended state rate.

BUSINESS OUTLOOK

In 2019 and beyond, we expect that our financial results will be affected by several factors, including: market prices, contract transitions, new contracts, new project development and construction, acquisitions, and the organic growth of earnings and cash flow generated by our existing assets. In order to drive organic growth, we will be focused on growing our environmental services and profiled waste businesses, enhanced metals recovery and centralized processing, ash management, continuous improvement using Lean Six Sigma concepts, and managing facility production and operating costs.

In 2019 , the following specific factors are expected to impact our financial results as compared to 2018 (as measured by Adjusted EBITDA):

Positive factors include:

- A full year contribution from the acquisition of the Palm Beach operating contracts;
- The expected start up of the Manhattan marine transfer station; and
- Improving waste tip fee prices and increased volumes of profiled waste.

Negative factors include:

- The impact of lower energy capacity payments; and
- Higher other operating expenses due to the receipt in 2018 of insurance proceeds (recorded as a contra-expense) relating to the 2017 fire in the front end receiving portion of the Fairfax County energy from waste facility.

LIQUIDITY AND CAPITAL RESOURCES

Our principal sources of liquidity are our cash and cash equivalents, cash flow generated from our ongoing operations, and unutilized capacity under our Revolving Credit Facility, which we believe, will allow us to meet our liquidity needs. Our business is capital intensive and our ability to successfully implement our strategy is, in part, dependent on the continued availability of capital on desirable terms. For additional information regarding our credit facilities and other debt, see *Item 8. Financial Statements And Supplementary Date - Note 16. Consolidated Debt* .

In 2019 , we expect to generate net cash from operating activities which may not alone meet all of our cash requirements for both capital expenditures to maintain our existing assets, debt services and for ongoing dividends to shareholders, in which case we would utilize our Revolving Credit Facility on an interim basis. See *Results of Operations - Business Outlook* above for discussion of the factors impacting our 2019 business outlook. When and as necessary, we expect to utilize a combination of cash and cash equivalents on hand, cash expected to be generated from future operations and our Revolving Credit Facility to fund our portion of project equity investments required for the project development pipeline in the UK. We also intend to utilize expected cash flows from operations and borrowings under our Revolving Credit Facility to fund all other growth investments in our business, as necessary.

We generally intend to refinance our debt instruments prior to maturity with like-kind financing in the bank and/or debt capital markets in order to maintain a capital structure comprised primarily of long-term debt, which we believe appropriately matches the long-term nature of our assets and contracts.

The loan documentation governing the Credit Facilities contains various affirmative and negative covenants, as well as financial maintenance covenants (financial ratios), that limit our ability to engage in certain types of transactions. We were in compliance with all of the covenants under the Credit Facilities as of December 31, 2018 . Further, we do not anticipate our existing debt covenants to restrict our ability to meet future liquidity needs.

As of December 31, 2018 , Covanta Energy had $1.3 billion in senior secured credit facilities consisting of a $900 million revolving credit facility (the "Revolving Credit Facility") and a $400 million term loan (the "Term Loan") both expiring August 2023 (collectively referred to as the "Credit Facilities"). As of December 31, 2018 , our potential sources of near-term liquidity included (in millions):

	As of December 31, 2018
Cash	$ 58
Unutilized capacity under the Revolving Credit Facility	449
Total cash and unutilized capacity under the Revolving Credit Facility	$ 507

In addition, as of December 31, 2018 , we had restricted cash of $47 million , of which $16 million was designated for future payment of project debt principal. Restricted funds held in trust are primarily amounts received and held by third-party trustees relating to certain projects we own. We generally do not control these accounts and these funds may be used only for specified purposes. For additional information on restricted funds held in trust, see *Item 8. Financial Statements And Supplementary Data — Note 1. Organization and Summary of Significant Accounting Policies - Restricted Funds Held in Trust.*

Our primary future cash requirements will be to fund capital expenditures to maintain our existing businesses, service our debt, invest in the growth of our business, and return capital to our shareholders. We believe that our liquidity position and ongoing cash flow from operations will be sufficient to finance these requirements.

The following summarizes our key financing activities completed during the year ended December 31, 2018 :

- In October 2018, we sold $400 million aggregate principal amount of Senior Notes due 2027. We used the net proceeds along with cash on hand and direct borrowings under our Revolving Credit Facility to fund the optional redemption of all of our Senior Notes due 2022 on November 5, 2018. For additional information see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt - Tax-Exempt Bond Refinancing.*

- In September 2018, we issued $335 million new tax exempt bonds to refinance outstanding tax exempt bonds of the same amounts and maturities related to our facilities in New York and Massachusetts. The new bonds are unsecured obligations of Covanta Holding Corporation and are not guaranteed by any of our subsidiaries, whereas the previous bonds were guaranteed by our subsidiary, Covanta Energy LLC. The transaction lowered the weighted average coupon on the bonds

by over 40 basis points, and as a result of the removal of upstream subsidiary guarantees, lowered the leverage ratio under our senior secured credit facilities, which will result in a corresponding reduction in the cost of borrowings under the revolving credit facility by a further 12.5 basis points. For additional information see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt - Tax-Exempt Bond Refinancing.*

- In August 2018, we amended and restated Covanta Energy's Credit Facilities. For additional information see *Item 1. Financial Statements - Note 16. Consolidated Debt - Credit Facility Refinancing.*

- In June 2018, we issued 5.00% tax-exempt corporate bonds totaling $30 million. Net proceeds from the offerings were used to finance certain capital expenditures at our Virginia facilities. For additional information see *Item 1. Financial Statements - Note 16. Consolidated Debt - Virginia Tax-Exempt Bonds.*

- In February 2018, we applied a portion of the net proceeds from the sale of 50% of our Dublin EfW facility to repay borrowings under the Revolving Credit Facility. For additional information see *Item 1. Financial Statements - Note 3. New Business and Asset Management - Green Investment Group Limited ("GIG") Joint Venture.*

Share Repurchases and Dividends

For additional information on share repurchases see *Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities* and *Item 8. Financial Statements And Supplementary Data — Note 5. Equity and Earnings Per Share ("EPS")* .

Sources and Uses of Cash Flow

Year Ended December 31, 2018 vs. Year Ended December 31, 2017

Net cash provided by operating activities for the year ended December 31, 2018 decrease d $4 million from the prior year period. The net decrease was due to a net cash outflow related to changes in working capital, primarily accounts payable, offset by improved operating performance as discussed above in *Management's Discussion and Analysis of Financial Condition and Results of Operations* and dividends received from our equity method investments.

Net cash used in investing activities for the year ended December 31, 2018 decrease d $150 million from the prior year period. The net decrease in cash used was principally attributable to proceeds received from the sale of 50% of our Dublin EfW facility in 2018, as well as reduced purchases of property plant and equipment, primarily related to the construction of the Dublin EfW facility which was completed in the third quarter of 2017.

Net cash used in financing activities for the year ended December 31, 2018 increased $229 million from the prior year period primarily due to the repayment of borrowings under our Revolving Credit Facility with the proceeds from the sale of 50% of our Dublin EfW facility as noted above, as well as decreased net borrowings related to the construction of the Dublin EfW facility.

Year Ended December 31, 2017 vs. Year Ended December 31, 2016

Net cash provided by operating activities for the year ended December 31, 2017 decrease d $22 million from the prior year period. The decrease was primarily due to the operating performance as discussed in M *anagement Discussion and Analysis of Financial Condition and Results of Operations* above.

Net cash used in investing activities for the year ended December 31, 2017 increase d $35 million from the prior year period. The net increase in cash used was principally attributable to reduced proceeds from asset sales of $105 million related to the sale of our China assets in 2016 and an increase in acquisition spending of $7 million, offset by reduced purchases of property, plant and equipment of $82 million, which reflects a lower rate of spend for construction of the Dublin EfW facility as it transitioned from construction to operations.

Net cash provided by financing activities for the year ended December 31, 2017 decrease d $112 million from the prior year period primarily due to higher net borrowings under our Revolving Credit Facility of $107 million.

Supplementary Financial Information — Free Cash Flow (Non-GAAP Discussion)

To supplement our results prepared in accordance with GAAP, we use the measure of Free Cash Flow which is a non-GAAP measure as defined by the SEC. This non-GAAP financial measure is not intended as a substitute and should not be considered in isolation from measures of liquidity prepared in accordance with GAAP. In addition, our use of Free Cash Flow may be different from similarly identified non-GAAP measures used by other companies, limiting its usefulness for comparison purposes. The presentation of Free Cash Flow is intended to enhance the usefulness of our financial information by providing a measure which management internally uses to assess and evaluate the overall performance of its business and those of possible acquisition candidates, and highlight trends in the overall business.

We use the non-GAAP financial measures of Free Cash Flow as criteria of liquidity and performance-based components of employee compensation. Free Cash Flow is defined as cash flow provided by operating activities, less maintenance capital expenditures, which are capital expenditures primarily to maintain our existing facilities. We use Free Cash Flow as a measure of liquidity to determine amounts we can reinvest in our core businesses, such as amounts available to make acquisitions, invest in construction of new projects, make principal payments on debt, or return capital to our shareholders through dividends and/or stock repurchases. For additional discussion related to management's use of non-GAAP measures, see *Results of Operations — Supplementary Financial Information — Adjusted EBITDA (Non-GAAP Discussion)* above.

In order to provide a meaningful basis for comparison, we are providing information with respect to our Free Cash Flow for the years ended December 31, 2018, 2017 and 2016 , reconciled for each such period to cash flow provided by operating activities, which we believe to be the most directly comparable measure under GAAP.

The following is a reconciliation of Net cash provided by operating activities to Free Cash Flow (in millions):

	Year Ended December 31,		
	2018	**2017**	**2016**
Net cash provided by operating activities	$ 238	$ 242	$ 264
Add: Changes in restricted funds - operating [(a)]	4	1	22
Less: Maintenance capital expenditures [(b)]	(142)	(111)	(110)
Free Cash Flow	$ 100	$ 132	$ 176

(a) Adjustment for the impact of the adoption of ASU 2016-18 effective January 1, 2018. As a result of adoption, the statement of cash flows explains the change during the period in the total of cash, cash equivalents, and amounts generally described as restricted cash or restricted cash equivalents. Therefore, changes in restricted funds are eliminated in arriving at net cash, cash equivalents and restricted funds provided by operating activities.

(b) Purchases of property, plant and equipment are also referred to as capital expenditures. Capital expenditures that primarily maintain existing facilities are classified as maintenance capital expenditures.

The following table provides the components of total purchases of property, plant and equipment (in millions):

	Year Ended December 31,		
	2018	2017	2016
Maintenance capital expenditures	$ (142)	$ (111)	$ (110)
Net maintenance capital expenditures paid but incurred in prior periods	(1)	5	—
Capital expenditures associated with construction of Dublin EfW facility	(22)	(117)	(162)
Capital expenditures associated with organic growth initiatives	(24)	(37)	(79)
Capital expenditures associated with the New York City contract	(13)	—	(3)
Total capital expenditures associated with growth investments	(59)	(154)	(244)
Capital expenditures associated with property insurance events	(4)	(17)	(5)
Total purchases of property, plant and equipment	$ (206)	$ (277)	$ (359)

(c) Total growth investments represents investments in growth opportunities, including organic growth initiatives, technology, business development, and other similar expenditures.

Capital expenditures associated with growth investments	(59)	(154)	(244)
UK business development projects	(5)	(3)	—
Investment in equity affiliate	(16)	—	—
Asset and business acquisitions, net of cash acquired	(50)	(17)	(9)
Total growth investments	(130)	(174)	(253)

Available Sources of Liquidity

Cash and Cash Equivalents

Cash and cash equivalents include all cash balances and highly liquid investments having maturities of three months or less from the date of purchase. These short-term investments are stated at cost, which approximates fair value. Balances held by our international subsidiaries are not generally available for near-term liquidity in our domestic operations.

	As of December 31,	
	2018	2017
	(in millions)	
Domestic	$ 19	$ 11
International	39	35
Total Cash and Cash Equivalents	$ 58	$ 46

Credit Facilities

As of December 31, 2018, Covanta Energy's senior secured credit facilities consist of a $900 million revolving credit facility (the "Revolving Credit Facility") and a $395 million term loan (the "Term Loan") both expiring 2023 (collectively referred to as the "Credit Facilities"). For a detailed description of the terms of the Credit Facilities, see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt* .

Consolidated Debt

The face value of our consolidated debt is as follows (in millions):

	As of December 31,	
	2018	2017
Corporate Debt:		
Revolving credit facility	$ 212	$ 445
Term loan due 2019	—	191
Term loan due 2023	395	—
Senior notes	1,200	1,200
Tax-exempt bonds	494	464
Equipment financing capital leases	64	69
Total corporate debt (including current portion)	$ 2,365	$ 2,369
Project Debt:		
Domestic project debt - service fee facilities	$ 58	$ 68
Domestic project debt - tip fee facilities	3	9
Union County EfW facility capital lease	89	94
Total project debt (including current portion)	150	171
Total Debt Outstanding	$ 2,515	$ 2,540

For a detailed description of the terms of the debt instruments noted in the table above, see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt* . The loan documentation governing the Credit Facilities contains various affirmative and negative covenants, as well as financial maintenance covenants, that limit our ability to engage in certain types of transactions.

Contractual Obligations

The following table summarizes our gross contractual obligations including project debt, leases and other obligations as of December 31, 2018 .

		Payments Due by Period			
(In millions)	**Total**	**2019**	**2020 and 2021**	**2022 and 2023**	**2024 and Beyond**
RECORDED LIABILITIES:					
Project debt [1]	$ 150	$ 19	$ 16	$ 18	$ 97
Long-term debt [1]	2,301	10	20	577	1,694
Equipment financing capital leases [1]	64	5	12	12	35
Uncertainty in income tax obligations [2]	41	6	3	1	31
Interest payments	1,385	145	282	262	696
Purchase obligations [3]	22	22	—	—	—
Operating leases	78	11	17	14	36
Retirement plan obligations [4]	2	—	—	1	1
Total obligations	$ 4,043	$ 218	$ 350	$ 885	$ 2,590

(1) For a detailed description of the terms of the debt instruments , see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt* .

(2) Accounting for uncertainty in income tax obligations is based upon the expected date of settlement taking into account all of our administrative rights including possible litigation.

(3) Purchase obligations relate to capital commitments related to our New York City waste transport and disposal contract. See *Item 8. Financial Statements And Supplementary Data — Note 17. Commitments and Contingencies* for additional information .

(4) Retirement plan obligations are based on actuarial estimates for our non-qualified pension plan obligations and post-retirement plan obligations only as of December 31, 2018 .

Other Commitments

Other commitments as of December 31, 2018 were as follows (in millions):

Letters of credit issued under the Revolving Credit Facility	$	239
Surety bonds		180
Total other commitments — net	$	419

We have issued or are party to performance guarantees and related contractual obligations undertaken mainly pursuant to agreements to construct and/or operate certain energy-from-waste facilities. To date, we have not incurred material liabilities under our guarantees.

For additional information on other commitments, see *Item 8. Financial Statements And Supplementary Data — Note 17. Commitments and Contingencies - Other Matters.*

Other Factors Affecting Liquidity

Our capital structure includes obligations with various maturity dates. Depending upon market conditions and general business requirements at the time we refinance these obligations, our choice of refinancing structure could materially increase or decrease our annual cash interest expense in future periods

A substantial rise in the price of power may require us to post additional collateral, in the form of cash or letters of credit, to support hedging arrangements entered into under our energy risk management program. Such collateral posting requirements have been immaterial to date. We only enter into hedging transactions related to physical power generation, therefore we expect that any increase in obligations to hedge counterparties resulting from a rise in power prices would effectively be offset by corresponding increases in physical power sales, and as such we believe that any resulting collateral requirements would not have a material effect on our financial condition.

Insurance Coverage

We periodically review our insurance programs to ensure that our coverage is appropriate for the risks associated with our business. We have obtained insurance for our employees, assets and operations that provide coverage for what we believe are probable maximum losses, subject to self-insured retentions, policy limits and premium costs which we believe to be appropriate. However, the insurance obtained does not cover us for all possible losses, and coverage available in the market may change over time.

Off-Balance Sheet Arrangements

We are party to various lease arrangements pursuant to which we lease rolling stock in connection with our operating activities, as well as lease certain office space and equipment. We generally use operating lease treatment for all of the foregoing arrangements. A summary of our operating lease obligations is contained in *Item 8. Financial Statements And Supplementary Data — Note 9. Operating Leases* .

We have investments that are accounted for under the equity and cost methods and therefore we do not consolidate the financial information of those companies.

Supplemental Information on Unconsolidated Non-Recourse Project Debt

Below is a summary of our proportion of non-recourse project debt held by unconsolidated equity investments as of December 31, 2018 (in millions):

	Total Project Debt	Percentage Ownership	Proportionate Unconsolidated Project Debt	Project Stage
Dublin EfW (Ireland) [(1)]	$ 475	50%	$ 238	Operational
Earls Gate (UK) [(2)(3)]	—	25%	—	Under construction
Total	$ 475		$ 238	

(1) We have a 50% indirect ownership of Dublin EfW, through our 50/50 joint venture with GIG, Covanta Europe Assets Ltd.

(2) We have a 25% indirect ownership of Earls Gate, through our 50/50 joint venture with GIG, Covanta Green Jersey Assets Ltd., which owns 50% of Earls Gate.

(3) The total estimated project cost is £210 million ($267 million), £147 million ($187 million) is financed through non-recourse project-based debt, which was undrawn upon as of December 31, 2018.

For additional information on our unconsolidated equity investments see *Item 8. Financial Statements And Supplementary Data — Note 3. New Business and Asset Management* and *Note 13. Equity Method Investments* .

DISCUSSION OF CRITICAL ACCOUNTING POLICIES AND ESTIMATES

In preparing our consolidated financial statements in accordance with GAAP, we are required to use judgment in making estimates and assumptions that affect the amounts reported in our consolidated financial statements and related notes. We base our estimates on historical experience and on various other assumptions that are believed to be reasonable under the circumstances. These estimates form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Many of our critical accounting policies are subject to significant judgments and uncertainties that could potentially result in materially different results under different conditions and assumptions. Future events rarely develop exactly as forecast, and the best estimates routinely require adjustment.

Policy	Judgments and estimates	Effect if actual results differ from assumptions
Revenue and Expense Recognition The Company recognizes revenue in accordance with the ASC 606, Revenue from Contracts with Customers. The core principle of ASC 606 is that an entity will recognize revenue at an amount that reflects the consideration to which the entity expects to be entitled in exchange for transferring goods or services to a customer. Revenue is recognized by applying the five steps described below: Step 1: Identify the contract(s) with a customer. Step 2: Identify the performance obligations in the contract. Step 3: Determine the transaction price. Step 4: Allocate the transaction price to the performance obligation in the contract. Step 5: Recognize revenue when (or as) the entity satisfies a performance obligation. Covanta adopted the accounting standard on January 1, 2018.	When a performance obligation is satisfied over time, the output or input method may be used to determine an appropriate method of progress. The Output method recognize revenue on the basis of direct measurements of the value to the customer of the goods or services transferred to date relative to the remaining goods or services promised under the contract. The input method utilizes the entities inputs towards the satisfaction of a performance obligation (for example, costs incurred). Both methods may include estimates within the transaction price, contracts with customers may contain different types of variable consideration that we estimate through probability based approaches. There are certain constraining factors relating to Variable consideration that may preclude us from booking revenue in order to prevent over estimating revenue. Determining whether a factor is constrained requires judgment.	There is a degree of uncertainty that exists in determining the variable component of consideration in a contract. A significant revenue reversal is not expected but amounts recognized for revenue are adjusted based on actual performance obligations delivered which will cause fluctuations in operating income recognized. Further estimates may change on long term construction contracts based on better information becoming available which can cause fluctuations in revenue and operating income.
Purchase Accounting We allocate acquisition purchase prices to identified tangible and intangible assets acquired and liabilities assumed based on their estimated fair values at the dates of acquisition, with any residual amounts allocated to goodwill. The fair value estimates used reflect our best estimates for the highest and best use by market participants.	These estimates are subject to uncertainties and contingencies. For example, we use the discounted cash flow method to estimate the value of many of our assets, which entails developing projections of future cash flows.	If the cash flows from the acquired net assets differ significantly from our estimates, the amounts recorded could be subject to impairments. Furthermore, to the extent we change our initial estimates of the remaining useful life of the assets or liabilities, future depreciation and amortization expense could be impacted.

Policy	Judgments and estimates	Effect if actual results differ from assumptions
Equity Method Investments We evaluate our equity investments to determine if we have the ability to exercise significant influence over the entity but not control, generally assumed to be 20%-50% ownership. Under the equity method, original investments are recorded at cost and adjusted by our share of earnings or losses of these companies. Distributions received from the investee reduce our carrying value of the investment and are recorded in the consolidated statements of cash flows using the cumulative earnings approach.	The determination and degree of our ability to control, or exert significant influence over, an entity involves the use of judgment. The consolidation guidance requires qualitative and quantitative analysis to determine whether our involvement, through holding interests directly or indirectly in an entity, would give us the ability to exercise significant influence over an entity but not control.	Subsequent changes to the interests of the entity through equity ownership levels or otherwise may require a reassessment of our conclusions of whether we have the ability to exercise significant influence over the entity but not control. If upon a reassessment event we were determined to control the entities, consolidation would be required. Summarized financial information of equity method investments is included in *Item 8. Financial Statements And Supplementary Data — Note 13. Equity Method Investments.*
Long-lived Assets Our long-lived assets include property, plant and equipment; waste, service and energy contracts; amortizable intangible assets; and other assets. We evaluate the recoverability of the long-lived assets when there are indicators of possible impairment. Such indicators may include a decline in market, new regulation, recurring or expected operating losses, change in business strategy, or other changes that would impact the use or benefit received from the assets. The assessment is performed by grouping the long-lived assets at the lowest level of identifiable cash flows for the related assets or group of assets (such as the facility level). Initially the carrying value of the asset or asset group is compared to its undiscounted expected future cash flows. If the carrying value is in excess of the undiscounted cash flows, the carrying value is then compared to the fair value. Fair value may be estimated based upon the discounted cash flows, market or replacement cost methods based on the assumptions of a third-party market participant. Impairment is recognized if the fair value is less than the carrying value.	Our judgments regarding the existence of impairment indicators are based on regulatory factors, market conditions, anticipated cash flows and operational performance of our assets. When determining the fair value of our asset groupings for impairment assessments, we make assumptions regarding their fair values which are dependent on estimates of future cash flows, discount rates, and other factors.	Future events or changes in circumstances may occur that require another assessment in future periods based on cash flows and discount rates in effect at that time.

Policy	Judgments and estimates	Effect if actual results differ from assumptions
Goodwill As of December 31, 2018, we had $321 million of goodwill recorded in our one reportable segment, which is comprised of two reporting units (see *Item 8. Financial Statements And Supplementary Data — Note 15. Intangible Assets and Goodwill)* . We evaluate our goodwill annually and when an event occurs or circumstances change that could reduce the fair value of a reporting unit below its carrying value. We have the option to perform our initial assessment over the possible impairment of goodwill either qualitatively or quantitatively. Under the qualitative assessment, consideration is given to both external factors (including macroeconomic and industry conditions) and our own internal factors (including internal costs, recent financial performance, management, business strategy, customers, and stock price). During the fourth quarter of 2018 we performed the required annual impairment review of our recorded goodwill through a quantitative assessment and determined that there was no indication of impairment as the fair value of our reporting units exceeded their carrying values.	Our judgments regarding the existence of impairment indicators are based on regulatory factors, market conditions, anticipated cash flows and operational performance of our assets. When determining the fair value of our reporting unit for impairment assessments, we make assumptions regarding the fair value which is dependent on estimates of future cash flows, discount rates, and other factors.	The impairment assessment of goodwill performed in the periods presented resulted in the conclusion that the fair value was not less than the carrying value. In future years, if there is a significant change in the estimated cash flows, discount rates or other factors that cause the fair values to significantly decrease, there could be impairments which could materially impact our results of operations.
I **nsurance Reserves and Self-Insurance for Employee Benefit Plans** We retain a substantial portion of the risk related to certain general liability, workers' compensation and medical claims. However, we maintain stop-loss coverage to limit the exposure related to employee benefit plans and liability insurance over retained risks. Liabilities associated with these losses include estimates of both claims filed and losses incurred but not yet reported ("IBNR").	We use actuarial methods which consider a number of factors to estimate our ultimate cost of losses. Our insurance reserves and medical liability accrual was $16 million as of December 31, 2018 and 2017.	Our liabilities could be significantly affected if future occurrences or loss developments differ from our estimates of both claims filed and losses incurred but not yet reported.

Policy	Judgments and estimates	Effect if actual results differ from assumptions
Deferred Tax Assets As described in *Item 8. Financial Statements And Supplementary Data — Note 11. Income Taxes* , we have recorded a deferred tax asset related to our NOLs. The NOLs will expire in various amounts beginning on December 31, 2033 through December 31, 2037, if not used. Deferred tax assets are reduced by a valuation allowance if, based on available evidence, it is more likely than not that some portion or all of the deferred tax assets will not be realized.	We estimated a valuation allowance of approximately $73 million to offset our deferred tax assets related to NOLs and our tax credit carryforward balance. The amount was estimated based upon future taxable income arising from (a) the reversal of temporary differences during the period the NOLs are available and (b) future operating income expected, to the extent it is reasonably predictable. Judgment is involved in assessing whether a valuation allowance is required on our deferred tax assets.	The Tax Cuts and Jobs Act ("the Act") was enacted on December 22, 2017. The Act reduces the US federal corporate tax rate from 35% to 21%, requires companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and creates new taxes on certain foreign sourced earnings. As of December 31, 2018, we have completed our accounting for the tax effects of enactment of the Act. We re-measured our US deferred tax assets and liabilities based on the rates at which they are expected to reverse in the future, which is generally 21%. As of December 31, 2017, the provisional amount recorded related to the re-measurement of our deferred tax balance was $204 million of tax benefit. This amount is materially correct and there was no adjustment required in the year ended December 31, 2018. As of December 31, 2017, the provisional amount recorded for the transition tax was $21 million of tax liability. During the year ended December 31, 2018 we recorded a $1 million additional tax expense related to the transition tax.

RECENT ACCOUNTING PRONOUNCEMENTS

See *Item 8. Financial Statements And Supplementary Data — Note 2. Recent Accounting Pronouncements* for a summary of new accounting pronouncements.

Item 7A. *QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK*

In the normal course of business, our subsidiaries are party to financial instruments that are subject to market risks arising from changes in commodity prices, interest rates, foreign currency exchange rates, and derivative instruments. Our use of derivative instruments is very limited and we do not enter into derivative instruments for trading purposes. The following analysis provides quantitative information regarding our exposure to financial instruments with market risks. We use a sensitivity model to evaluate the fair value or cash flows of financial instruments with exposure to market risk that assumes instantaneous, parallel shifts in exchange rates and interest rate yield curves. There are certain limitations inherent in the sensitivity analysis presented, primarily due to the assumption that exchange rates change in a parallel manner and that interest rates change instantaneously. In addition, the fair value estimates presented herein are based on pertinent information available to us as of December 31, 2018 . Further information is included in *Item 8. Financial Statements And Supplementary Data — Note 12. Financial Instruments* and *Note 14. Derivative Instruments* .

Commodity Price Risk

Waste Price Risk

We have some protection against fluctuations in fuel (municipal waste) price risk because approximately 75% of our municipal waste is provided under multi-year contracts where we are paid for our fuel at fixed rates. At our tip fee energy-from-waste facilities, certain amounts of waste processing capacity are not subject to long-term contracts and, therefore, we are partially exposed to the risk of market fluctuations in the waste disposal fees we may charge for fuel. At service fee facilities, waste disposal fees generally increase annually due to annual contract price escalations intended to reflect changes in our costs. Declines in waste disposal fees at our energy-from-waste facilities are mitigated through internalizing waste disposal by utilizing our network of transfer stations located throughout the northeast United States and by increasing our profiled waste volumes, which we can sell at a higher price than municipal solid waste.

We expect that multi-year contracts for waste supply at facilities we own or lease will continue to be available on acceptable terms in the marketplace, at least for a substantial portion of facility capacity, as municipalities continue to value long-term committed and sustainable waste disposal capacity. We also expect that an increasing portion of system capacity will be contracted on a shorter-term basis, and so we will have more frequent exposure to waste market risk.

Energy Price Risk

In contrast to our waste disposal agreements, as a result of structural and regulatory changes in the energy markets over time, we expect that multi-year contracts for energy sales will generally be less available than in the past, thereby increasing our exposure to energy market price volatility upon expiration. As our historic energy contracts have expired and our service fee contracts have transitioned to tip fee contracts, our exposure to market energy prices has increased. We expect this trend to continue. In order to mitigate our exposure to near-term (one to three years) revenue fluctuations in energy markets, we enter into hedging arrangements and we expect to do so in the future.

Recycled Metals Price Risk

We recover and sell ferrous and non-ferrous metals, with pricing linked to related commodity indices. Therefore, our metals revenue is completely exposed to market price fluctuations. A 10% change in the current market rates would impact recycled metals revenue by approximately $6 million and $4 million for ferrous and non-ferrous, respectively. We are currently unable to mitigate this exposure effectively either via long-term pricing contracts or with hedging instruments as there are limited options to enter into such arrangements for this segment of the market.

Interest Rate Risk

Borrowings under the Credit Facilities bear interest, at our option, at either a base rate or a Eurodollar rate plus an applicable margin determined by a pricing grid based on Covanta Energy's leverage ratio. Base rate is defined as the higher of (i) the Federal Funds Effective Rate plus 0.50% , (ii) the rate the administrative agent announces from time to time as its per annum "prime rate" or (iii) the London Interbank Offered Rate ("LIBOR"), or a comparable or successor rate, plus 1.00% . For details as to the various election options under the Credit Facility, see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt* . As of December 31, 2018 , the outstanding balance of the Term Loan and the Revolving Credit Facility was $394 million and $212 million , respectively. We have not entered into any interest rate hedging arrangements against these balances. A hypothetical increase of 1% in the underlying December 31, 2018 market interest rates would result in a potential reduction to twelve-month future pre-tax earnings and cash provided by operations of approximately $6 million , based on balances outstanding as of December 31, 2018 . For details, see *Item 8. Financial Statements And Supplementary Data — Note 16. Consolidated Debt* .

Foreign Currency Exchange Rate Risk

We have operations and investments in various foreign markets, including Canada, Ireland, the UK and Italy. As and to the extent we grow our international business, we expect to invest in foreign currencies to pay either for the construction costs of facilities we develop, or for the cost to acquire existing businesses or assets. Currency volatility in those markets, as well as the effectiveness of any currency hedging strategies we may implement, may impact both the amount we are required to invest in new projects as well as our financial returns on these projects and our reported results. See *Item 8. Financial Statements And Supplementary Data — Note 13. Equity Method Investments* for further discussion.

Item 8. ***FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA***

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Covanta Holding Corporation

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Covanta Holding Corporation and subsidiaries (the Company) as of December 31, 2018 and 2017 , and the related consolidated statements of operations, comprehensive income (loss), equity and cash flows for each of the three years in the period ended December 31, 2018 , and the related notes and financial statement schedule listed in the Index at Item 15a (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the consolidated financial position of the Company at December 31, 2018 and 2017, and the consolidated results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2018, based on the criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated February 19, 2019 expressed an unqualified opinion thereon.

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 PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the 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/ Ernst & Young LLP

We have served as the Company's auditor since 2002.

Iselin, New Jersey
February 19, 2019

COVANTA HOLDING CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS

	For the Year Ended December 31,		
	2018	2017	2016
	(In millions, except per share amounts)		
OPERATING REVENUE:			
Waste and service revenue	$ 1,327	$ 1,231	$ 1,187
Energy revenue	343	334	370
Recycled metals revenue	95	82	61
Other operating revenue	103	105	81
Total operating revenue	1,868	1,752	1,699
OPERATING EXPENSE:			
Plant operating expense	1,321	1,271	1,177
Other operating expense, net	65	51	86
General and administrative expense	115	112	100
Depreciation and amortization expense	218	215	207
Impairment charges	86	2	20
Total operating expense	1,805	1,651	1,590
Operating income	63	101	109
OTHER INCOME (EXPENSE)			
Interest expense	(145)	(147)	(138)
Gain (loss) on sale of business	217	(6)	44
Loss on extinguishment of debt	(15)	(84)	—
Other (expense) income, net	(3)	1	(1)
Total other income (expense)	54	(236)	(95)
Income (loss) before income tax benefit (expense) and equity in net income from unconsolidated investments	117	(135)	14
Income tax benefit (expense) (Note 11)	29	191	(22)
Equity in net income from unconsolidated investments	6	1	4
NET INCOME (LOSS)	$ 152	$ 57	$ (4)
Weighted Average Common Shares Outstanding:			
Basic	130	130	129
Diluted	132	131	129
Earnings (Loss) Per Share:			
Basic	$ 1.17	$ 0.44	$ (0.03)
Diluted	$ 1.15	$ 0.44	$ (0.03)
Cash Dividend Declared Per Share:	$ 1.00	$ 1.00	$ 1.00

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

COVANTA HOLDING CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

	For the Year Ended December 31,		
	2018	2017	2016
	(In millions)		
Net income (loss)	$ 152	$ 57	$ (4)
Foreign currency translation, net of tax expense of $0, $0 and $0, respectively	1	17	(7)
Net unrealized gain (loss) on derivative instruments, net of tax benefit of $2, $0 and $8, respectively	21	(10)	(21)
Other comprehensive income (loss)	22	7	(28)
Comprehensive income (loss)	$ 174	$ 64	$ (32)

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

COVANTA HOLDING CORPORATION AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS

	As of December 31,	
	2018	2017
	(In millions, except per share amounts)	
ASSETS		
Current:		
Cash and cash equivalents	$ 58	$ 46
Restricted funds held in trust	39	43
Receivables (less allowances of $8 and $14, respectively)	338	341
Prepaid expenses and other current assets	62	73
Assets held for sale	2	653
Total Current Assets	499	1,156
Property, plant and equipment, net	2,514	2,606
Restricted funds held in trust	8	28
Intangible assets, net	279	287
Goodwill	321	313
Other assets	222	51
Total Assets	$ 3,843	$ 4,441
LIABILITIES AND EQUITY		
Current:		
Current portion of long-term debt	$ 15	$ 10
Current portion of project debt	19	23
Accounts payable	76	151
Accrued expenses and other current liabilities	333	313
Liabilities held for sale	—	540
Total Current Liabilities	443	1,037
Long-term debt	2,327	2,339
Project debt	133	151
Deferred income taxes	378	412
Other liabilities	75	75
Total Liabilities	3,356	4,014
Commitments and Contingencies (Note 17)		
Equity:		
Preferred stock ($0.10 par value; authorized 10 shares; none issued and outstanding)	—	—
Common stock ($0.10 par value; authorized 250 shares; issued 136 shares, outstanding 131 shares)	14	14
Additional paid-in capital	841	822
Accumulated other comprehensive loss	(33)	(55)
Accumulated deficit	(334)	(353)
Treasury stock, at par	(1)	(1)
Total Equity	487	427
Total Liabilities and Equity	$ 3,843	$ 4,441

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

COVANTA HOLDING CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOW

	For the Year Ended December 31,		
	2018	2017	2016
OPERATING ACTIVITIES:	(In millions)		
Net income (loss)	$ 152	$ 57	$ (4)
Adjustments to reconcile net income (loss) to net cash provided by operating activities:			
Depreciation and amortization expense	218	215	207
Amortization of long-term debt deferred financing costs	5	7	6
(Gain) loss on sale of business	(217)	6	(44)
Impairment charges	86	2	20
Loss on extinguishment of debt	15	84	—
Provision for doubtful accounts	2	9	2
Stock-based compensation expense	24	18	16
Equity in net income from unconsolidated investments	(6)	(1)	(4)
Deferred income taxes	(31)	(193)	21
Dividends from unconsolidated investments	13	2	2
Other, net	(10)	(13)	(1)
Change in working capital, net of effects of acquisitions:			
Receivables	7	(27)	(19)
Prepaid and other current assets	(3)	5	17
Accounts payable and accrued expenses	(16)	66	43
Changes in noncurrent assets and liabilities, net	(1)	5	2
Net cash provided by operating activities	238	242	264
INVESTING ACTIVITIES:			
Purchase of property, plant and equipment	(206)	(277)	(359)
Acquisition of businesses, net of cash acquired	(50)	(16)	(9)
Proceeds from asset sales	128	4	109
Property insurance proceeds	18	8	3
Payment of indemnification claim from sale of asset	(7)	—	—
Investment in equity affiliate	(16)	—	—
Other, net	(6)	(8)	2
Net cash used in investing activities	(139)	(289)	(254)

COVANTA HOLDING CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOW – (Continued)

	For the Year Ended December 31,		
	2018	2017	2016
		(In millions)	
FINANCING ACTIVITIES:			
Proceeds from borrowings on long-term debt	1,165	400	—
Proceeds from borrowings on revolving credit facility	740	952	744
Proceeds from insurance premium financing	25	24	—
Payments of equipment financing capital lease	(5)	(5)	(4)
Proceeds from borrowings on Dublin project financing	—	643	159
Payment related to Dublin interest rate swap	—	(17)	—
Payments on the Dublin Convertible Preferred	—	(132)	—
Payments on long-term debt	(939)	(415)	(4)
Payments on revolving credit facility	(973)	(850)	(749)
Payments on project debt	(23)	(382)	(51)
Payments of deferred financing costs	(16)	(21)	(6)
Payment of Dublin financing costs	—	(19)	—
Cash dividends paid to stockholders'	(134)	(131)	(131)
Common stock repurchased	—	—	(20)
Payment of insurance premium financing	(24)	(4)	—
Other, net	(5)	(3)	(10)
Net cash (used in) provided by financing activities	(189)	40	(72)
Effect of exchange rate changes on cash and cash equivalents	1	7	—
Net decrease in cash, cash equivalents and restricted cash	(89)	—	(62)
Cash, cash equivalents and restricted cash at beginning of period	194	194	256
Cash, cash equivalents and restricted cash at end of period	105	194	194
Less: cash, cash equivalents and restricted cash of assets held for sale at end of period	—	77	—
Cash, cash equivalents and restricted cash at end of period	$ 105	$ 117	$ 194
Reconciliation of cash, cash equivalents and restricted cash:			
Cash and cash equivalents	$ 58	$ 46	$ 84
Restricted funds held in trust- short term	39	43	56
Restricted funds held in trust- long term	8	28	54
Total cash, cash equivalents and restricted cash	$ 105	$ 117	$ 194
Cash Paid for Interest and Income Taxes:			
Interest	$ 136	$ 149	$ 150
Income taxes, net of refunds	$ 2	$ —	$ 6

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

COVANTA HOLDING CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF EQUITY

	Covanta Holding Corporation Stockholders' Equity								
	Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Loss	Accumulated Earnings (Deficit)	Treasury Stock		Noncontrolling Interests in Subsidiaries	Total
	Shares	Amount				Shares	Amount		
					(In millions)				
Balance as of December 31, 2015	**136**	**$ 14**	**$ 801**	**$ (34)**	**$ (143)**	**5**	**$ —**	**$ 2**	**$ 640**
Stock-based compensation expense	—	—	16	—	—	—	—	—	16
Dividend declared	—	—	—	—	(132)	—	—	—	(132)
Common stock repurchased	—	—	(6)	—	(11)	1	(1)	—	(18)
Shares repurchased for tax withholdings for vested stock awards	—	—	(4)	—	—	—	—	—	(4)
Exchange of China equity investments	—	—	—	—	—	—	—	(2)	(2)
Other	—	—	—	—	1	—	—	—	1
Comprehensive loss, net of income taxes	—	—	—	(28)	(4)	—	—	—	(32)
Balance as of December 31, 2016	**136**	**$ 14**	**$ 807**	**$ (62)**	**$ (289)**	**6**	**$ (1)**	**$ —**	**$ 469**
Cumulative effect change in accounting for share based payments	—	—	1	—	10	—	—	—	11
Stock-based compensation expense	—	—	18	—	—	—	—	—	18
Dividend declared	—	—	—	—	(132)	—	—	—	(132)
Shares repurchased for tax withholdings for vested stock awards	—	—	(4)	—	—	—	—	—	(4)
Shares issued in non-vested stock award	—	—	—	—	—	(1)	—	—	—
Other	—	—	—	—	1	—	—	—	1
Comprehensive income, net of income taxes	—	—	—	7	57	—	—	—	64
Balance as of December 31, 2017	**136**	**$ 14**	**$ 822**	**$ (55)**	**$ (353)**	**5**	**$ (1)**	**$ —**	**$ 427**
Cumulative effect change in accounting for revenue recognition (Note 1)	—	—	—	—	1	—	—	—	1
Stock-based compensation expense	—	—	24	—	—	—	—	—	24
Dividend declared	—	—	—	—	(133)	—	—	—	(133)
Shares repurchased for tax withholdings for vested stock awards	—	—	(6)	—	—	—	—	—	(6)
Other	—	—	1	—	(1)		—	—	—
Comprehensive income, net of income taxes	—	—	—	22	152		—	—	174
Balance as of December 31, 2018	**136**	**$ 14**	**$ 841**	**$ (33)**	**$ (334)**	**5**	**$ (1)**	**$ —**	**$ 487**

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

NOTE 1. ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The terms “we,” “our,” “ours,” “us” and “Company” refer to Covanta Holding Corporation and its subsidiaries; the term “Covanta Energy” refers to our subsidiary Covanta Energy, LLC and its subsidiaries.

Organization

Covanta is one of the world’s largest owners and operators of infrastructure for the conversion of waste to energy (known as “energy-from-waste” or “EfW”), and also owns and operates related waste transport and disposal and other renewable energy production businesses. EfW serves two key markets as both a sustainable waste management solution that is environmentally superior to landfilling and as a source of clean energy that reduces overall greenhouse gas emissions and is considered renewable under the laws of many states and under federal law. Our facilities are critical infrastructure assets that allow our customers, which are principally municipal entities, to provide an essential public service.

Our EfW facilities earn revenue from both the disposal of waste and the generation of electricity and/or steam, generally under contracts, as well as from the sale of metal recovered during the EfW process. We process approximately 22 million tons of solid waste annually. We operate and/or have ownership positions in 44 EfW facilities, which are primarily located in North America. In total, these assets produce approximately 10 million megawatt hours (“MWh”) of baseload electricity annually. We also operate a waste management infrastructure that is complementary to our core EfW business.

We have one reportable segment which is comprised of our entire operating business. For additional information on our reportable segment, see *Note 6. Business Segment and Geographic Information* .

Summary of Significant Accounting Policies

The financial statements and accompanying notes are prepared in accordance with accounting principles generally accepted in the United States of America ("GAAP"). The following is a description of our significant accounting policies.

Principles of Consolidation

The consolidated financial statements reflect the results of our operations, cash flows and financial position of our majority-owned or controlled subsidiaries. All intercompany accounts and transactions have been eliminated.

Equity and Cost Method Investments

Investments in unconsolidated entities over which we have significant influence are accounted for under the equity method of accounting. Under the equity method of accounting, the investment is initially recorded at cost, then our proportional share of the underlying net income or loss is recorded as Equity in net income from unconsolidated investments in our statement of operations with a corresponding increase or decrease to the carrying value of the investment. Distributions received from the investee reduce our carrying value of the investment and are recorded in the consolidated statements of cash flows using the cumulative earnings approach. These investments are evaluated for impairment if events or circumstances arise that indicate that the carrying amount of such assets may not be recoverable. There were no indicators of impairment related to our equity method investments for the years ended December 31, 2018 and 2017 .

Investments in entities over which we neither have significant influence nor control are accounted for using the cost method. Under the cost method, we record the investment at cost and recognize income for any dividends declared from distribution of the investments earnings. We review the cost method investments for impairment whenever events or changes in circumstances indicate that the carrying value may no longer be recoverable. We impair our cost method investments when we determine that there has been an “other-than temporary” decline in the investments' fair value compared to its carrying value. The fair value of the investment would then become the new cost basis of the investment. There were no indicators of impairment related to our cost method investments for the years ended December 31, 2018 and 2017 .

Revenue Recognition

Our EfW projects generate revenue from three primary sources: 1) fees charged for operating facilities or for receiving waste for disposal (waste and service revenue); 2) the sale of electricity and/or steam (energy revenue); and 3) the sale of ferrous and non-ferrous metals that are recovered from the waste stream as part of the EfW process (recycled metals revenue). We may also

generate other operating revenue from the construction, expansion or upgrade of a facility, when a public-sector client owns the facility. Our customers for waste services or facility operations are principally public-sector entities, though we also market disposal capacity at certain facilities to commercial customers.

We also operate and/or have ownership positions in environmental services businesses, transfer stations and landfills (primarily for ash disposal) that are ancillary and complementary to our EfW projects and generate additional revenue from disposal or service fees.

Revenue is allocated to the performance obligations in a contract on a relative standalone selling price basis. To the extent that we sell the good or service related to the performance obligation separately in the same market, the standalone selling price is the observable price that we sell the good or service separately in similar circumstances and to similar customers. The fees charged for our services are generally defined in our service agreements and vary based on contract-specific terms.

Waste and Service Revenue

Service Fee

Service fee revenue is generated from the operations and maintenance services that we provide to owned and operated EfW facilities. We provide multiple waste disposal services aimed at operating and maintaining the facilities. Service fee revenue is generally based on an expected annual operating fee in relation to annual guaranteed waste processing and excess tonnage fees. The fees charged represent one performance obligation to operate and maintain each facility. Variable consideration primarily consists of fees earned for processing excess tonnage above a minimum specified in the contract. We act as the agent in contracts for the sale of energy and metals in service fee facilities that we operate and accordingly record revenues net for those contracts.

Tip Fee

Tip fees are generated from the sale of waste disposal services at EfW facilities that we own. We earn a per ton “tipping fee”, generally under long term contractual obligations with our host community and contractual obligations with municipal and commercial waste customers. The tipping fee is generally subject to an annual escalation. The performance obligation in these agreements is to provide waste disposal services for tons of acceptable waste. Revenue is recognized when the waste is delivered to the facility.

Energy Sales

Typical energy sales consist of: (a) electricity generation, (b) capacity and (c) steam. We primarily sell electricity either to utilities at contracted rates or at prevailing market rates in regional markets and in some cases, sell steam directly to industrial users. We sell a portion of electricity and other energy product outputs pursuant to contracts. As these contracts expire, we intend to sell an increasing portion of the energy output in competitive energy markets or pursuant to short-term contracts.

Recycled Metals Revenue

Recycled metals revenue represents the sale of recovered ferrous and non-ferrous metals to processors and end-users. The majority of our metals contracts are based on both an unspecified variable unit (i.e. tonnage) and variable forward market price index, while some contracts contain a fixed unit or fixed rate to form the basis of our overall transaction price. We recognize recycled metal revenue when control transfers to the customer.

Other Operating Revenue (Construction)

We generate additional revenue from the construction, expansion or upgrade of a facility, when a municipal client owns the facility and we provide the construction services. We generally use the cost incurred measure of progress for our construction contracts because it best depicts the transfer of control to the customer. Under the cost incurred 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.

Plant Operating Expense

Plant operating expense includes facility employee costs, expense for materials and parts for facility scheduled and unscheduled maintenance and repair expense, which includes costs related to our internal maintenance team and non-facility employee costs. Plant operating expense also includes hauling and disposal expenses, fuel costs, chemicals and reagents, operating lease expense, and other facility operating related expense.

Pass Through Costs

Pass through costs are costs for which we receive a direct contractually committed reimbursement from the public sector client that sponsors an EfW project. These costs generally include utility charges, insurance premiums, ash residue transportation and disposal, and certain chemical costs. These costs are recorded net of public sector client reimbursements as a reduction to Plant operating expense in our consolidated statement of operations.

Pass through costs were as follows (in millions):

	Year Ended December 31,		
	2018	2017	2016
Pass through costs	$ 57	$ 59	$ 41

Income Taxes

Deferred income taxes are based on the difference between the financial reporting and tax basis of assets and liabilities. The deferred income tax provision represents the change during the reporting period in the deferred tax assets and deferred tax liabilities, net of the effect of acquisitions and dispositions. Deferred tax assets include tax losses and credit carryforwards and are reduced by a valuation allowance if, based on available evidence, it is more likely than not that some portion or all of the deferred tax assets will not be realized.

We file a consolidated federal income tax return for each of the periods covered by the consolidated financial statements, which include all eligible United States subsidiary companies. Foreign subsidiaries are taxed according to regulations existing in the countries in which they do business. Our federal consolidated income tax return also includes the taxable results of certain grantor trusts, which are excluded from our consolidated financial statements; however, certain related tax attributes are recorded in our consolidated financial statements since they are part of our federal tax return.

Stock-Based Compensation

Stock-based compensation awards to employees are accounted for as compensation expense based on their grant date fair values. For additional information, see *Note 8. Stock-Based Award Plans* .

Cash and Cash Equivalents

Cash and cash equivalents include all cash balances and highly liquid investments having maturities of three months or less from the date of purchase. These short-term investments are stated at cost, which approximates fair value. Balances held by our international subsidiaries are not generally available for near-term liquidity in our domestic operations.

Restricted Funds Held in Trust

Restricted funds held in trust are primarily amounts received and held by third party trustees relating to certain projects we own. We generally do not control these accounts and these funds may be used only for specified purposes. These funds include debt service reserves for payment of principal and interest on project debt. Revenue funds are comprised of deposits of revenue received with respect to projects prior to their disbursement. Other funds include escrowed debt proceeds, amounts held in trust for operations, maintenance, environmental obligations, operating lease reserves in accordance with agreements with our clients, and amounts held for future scheduled distributions. Such funds are invested principally in money market funds, bank deposits and certificates of deposit, United States treasury bills and notes, United States government agency securities, and high-quality municipal bonds.

Restricted fund balances are as follows (in millions):

	As of December 31,			
	2018		2017	
	Current	Noncurrent	Current	Noncurrent
Debt service funds - principal	$ 16	$ —	$ 10	$ 8
Debt service funds - interest	—	—	—	—
Total debt service funds	16	—	10	8
Revenue funds	4	—	4	—
Other funds	19	8	29	20
Total	$ 39	$ 8	$ 43	$ 28

Receivables and Allowance for Doubtful Accounts

Receivables consist of amounts due to us from normal business activities. Allowances for doubtful accounts are the estimated losses from the inability of customers to make required payments. We use historical experience, as well as current market information, in determining the estimate.

Property, Plant and Equipment, net

Property, plant, and equipment acquired in business acquisitions is recorded at our estimate of fair value on the date of the acquisition. Additions, improvements and major expenditures are capitalized if they increase the original capacity or extend the remaining useful life of the original asset more than one year. Maintenance repairs and minor expenditures are expensed in the period incurred. Depreciation is computed using the straight-line method over the estimated useful lives of the assets, which generally range from three years for computer equipment to 50 years for certain infrastructure components of energy-from-waste facilities. Property, plant and equipment at our service fee operated facilities are not recognized on our balance sheet and any additions, improvements and major expenditures for which we are responsible at our service fee operated facilities are expensed in the period incurred. Our leasehold improvements are depreciated over the life of the lease term or the asset life, whichever is shorter. Upon retirement or disposal of assets, the cost and related accumulated depreciation are removed from the consolidated balance sheets and any gain or loss is reflected in the consolidated statements of operations.

Property, plant and equipment, net consisted of the following (in millions):

	As of December 31,	
	2018	2017
Land	$ 26	$ 25
Facilities and equipment	4,367	4,312
Landfills (primarily for ash disposal)	75	67
Construction in progress	71	54
Total	4,539	4,458
Less: accumulated depreciation and amortization	(2,025)	(1,852)
Property, plant, and equipment — net	$ 2,514	$ 2,606

Depreciation and amortization expense related to property, plant and equipment was $199 million , $197 million , and $185 million , for the years ended December 31, 2018, 2017 and 2016 , respectively. Non-cash investing activities related to capital expenditures totaled $37 million , $18 million and $41 million as of December 31, 2018, 2017 and 2016 , respectively, and were recorded in Accrued expenses and other current liabilities on our consolidated balance sheet.

Property, plant and equipment is evaluated for impairment whenever events or changes in circumstances indicate their carrying value may not be recoverable over their estimated useful life. In reviewing for recoverability, we compare the carrying amount of the relevant assets to their estimated undiscounted future cash flows. When the estimated undiscounted future cash flows are less than the assets carrying amount, the carrying amount is compared to the assets fair value. If the assets fair value is less than the carrying amount an impairment charge is recognized to reduce the assets carrying amount to its fair value. As of December 31,

2018 , we recognized an impairment on our property, plant and equipment of $63 million . For additional information, see *Note 10. Supplementary Information - Impairment Charges* .

Asset Retirement Obligation

We recognize a liability for asset retirement obligations when it is incurred, which is generally upon acquisition, construction, or development. Our liabilities include closure and post-closure costs for landfill cells and site restoration for certain energy-from-waste and power producing sites. We principally determine the liability using internal estimates of the costs using current information, assumptions, and interest rates, but also use independent appraisals as appropriate to estimate costs. When a new liability for asset retirement obligation is recorded, we capitalize the cost of the liability by increasing the carrying amount of the related long-lived asset. The liability is accreted to its present value each period and the capitalized cost is depreciated over the useful life of the related asset. We recognize period-to-period changes in the liability resulting from revisions to the timing or the amount of the original estimate of the undiscounted cash flows.

Current and noncurrent asset retirement obligations are included in Accrued expenses and other current liabilities and Other liabilities, respectively, on our consolidated balance sheet. Our asset retirement obligation is presented as follows (in millions):

	As of December 31,	
	2018	2017
Beginning of period asset retirement obligation	$ 26	$ 25
Accretion expense	3	2
Net change [1]	—	(1)
End of period asset retirement obligation	29	26
Less: current portion	(5)	(2)
Noncurrent asset retirement obligation	$ 24	$ 24

(1) Comprised primarily of expenditures and settlements of the asset retirement obligation liability, net revisions based on current estimates of the liability and revised expected cash flows and life of the liability.

Intangible Assets and Liabilities

Our waste, service and energy contracts are intangible assets related to long-term operating contracts at acquired facilities. These intangible assets and liabilities, as well as lease interest and other finite intangible assets, are recorded at their estimated fair market values upon acquisition based primarily upon discounted cash flows in accordance with accounting standards related to business combinations.

Intangible assets with finite lives are evaluated for impairment whenever events or changes in circumstances indicate their carrying value may not be recoverable over their estimated useful life. In reviewing for recoverability, we compare the carrying amount of the relevant assets to their estimated undiscounted future cash flows. When the estimated undiscounted future cash flows are less than the assets carrying amount, the carrying amount is compared to the assets fair value. If the assets fair value is less than the carrying amount an impairment charge is recognized to reduce the assets carrying amount to its fair value. As of December 31, 2018 , we recognized an impairment on our intangible assets of $22 million . For additional information, see *Note 10. Supplementary Information - Impairment Charges* and *Note 15. Intangible Assets and Goodwill* .

Goodwill

Goodwill is the excess of our purchase price over the fair value of the net assets of acquired businesses. We do not amortize goodwill, but we assess our goodwill for impairment at least annually. The evaluation of goodwill requires the use of estimates of future cash flows to determine the estimated fair value of the reporting unit. All goodwill is related to our one reportable segment, which is comprised of two reporting units. A reporting unit is defined as an operating segment or a component of an operating segment to the extent discrete financial information is available that is reviewed by segment management which has been determined to be one level below our chief operating decision maker. For additional information see, *Note 6. Business Segment and Geographic Information* . If the carrying value of the reporting unit exceeds the fair value, an impairment charge is recognized to reduce the carrying value to the fair value. On October 1, 2018 we adopted ASU 2017-04, Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment, as discussed below under *Accounting Pronouncements Recently Adopted.*

We performed the required annual impairment review of our recorded goodwill for each reporting unit as of October 1, 2018 and determined that the fair value of our reporting units was not less than their relative carrying values. For additional information, see *Note 15. Intangible Assets and Goodwill* .

Business Combinations

We recognize the assets acquired and liabilities assumed in a business combination at fair value including any noncontrolling interest of the acquired entity; recognize any goodwill acquired; establish the acquisition-date fair value based on the highest and best use by market participants for the asset as the measurement objective; and disclose information needed to evaluate and understand the nature and financial effect of the business combination. We expense transaction costs directly associated to the acquisition as incurred; capitalize in-process research and development costs, if any; and record a liability for contingent consideration at the measurement date with subsequent remeasurement recognized in the results of operations. Any costs for business restructuring and exit activities related to the acquired company are included in the post-combination results of operations. Tax adjustments related to previously recorded business combinations, if any, are recognized in the results of operations.

Accumulated Other Comprehensive Income ("AOCI")

The changes in accumulated other comprehensive (loss) income are as follows (in millions):

	Foreign Currency Translation	Pension and Other Postretirement Plan Unrecognized Net Gain	Net Unrealized Loss on Derivatives	Total
Balance at December 31, 2016	$ (41)	$ 2	$ (23)	$ (62)
Other comprehensive income (loss) before reclassifications	17	—	(10)	7
Balance at December 31, 2017	$ (24)	$ 2	$ (33)	$ (55)
Other comprehensive loss before reclassifications	(1)	—	(6)	(7)
Amounts reclassified from accumulated other comprehensive loss	2	—	27	29
Net current period comprehensive income	1	—	21	22
Balance at December 31, 2018	$ (23)	$ 2	$ (12)	$ (33)

Amount Reclassified from Accumulated Other Comprehensive Income

Accumulated Other Comprehensive Income Component	Year Ended December 31, 2018	Affected Line Item in the Consolidated Statement of Operations
Foreign currency translation	$ 2	Gain (loss) on sale of assets [1]
Interest rate swap	27	Gain (loss) on sale of assets [1]
	29	Total before tax
	—	Tax benefit
Total reclassifications	$ 29	Net of tax

[1] For additional information see, *Note 3. New Business and Asset Management.*

Derivative Instruments

We recognize derivative instruments on the balance sheet at their fair value. We have entered into swap agreements with various financial institutions to hedge our exposure to energy price risk and interest rate risk. Changes in the fair value of the energy derivatives and the interest rate swap are recognized as a component of AOCI. For additional information, see *Note 14. Derivative Instruments* .

Foreign Currency Translation

For foreign operations, assets and liabilities are translated at year-end exchange rates and revenue and expense are translated at

the average exchange rates during the year. Unrealized gains and losses resulting from foreign currency translation are included in the consolidated statements of equity as a component of AOCI. Currency transaction gains and losses are recorded in other operating expense in the consolidated statements of operations.

Defined Contribution Plans

Substantially all of our employees in the United States are eligible to participate in the defined contribution plans we sponsor. The defined contribution plans allow employees to contribute a portion of their compensation on a pre-tax basis in accordance with specified guidelines. We match a percentage of employee contributions up to certain limits. We also provide a company contribution to the defined contribution plans for eligible employees. Our costs related to defined contribution plans were $18 million , $18 million and $17 million for the years ended December 31, 2018, 2017 and 2016 , respectively.

Share Repurchases

Under our share repurchase program, common stock repurchases may be made, from time to time, in the open market, in privately negotiated transactions, or by other available methods, at management's discretion and in accordance with applicable federal securities laws. The timing and amounts of any repurchases will depend on many factors, including our capital structure, the market price of our common stock and overall market conditions, and whether any restrictions then exist under our policies relating to trading in compliance with securities laws. Purchase price over par value for share repurchases are allocated to additional paid-in capital up to the weighted average amount per share recorded at the time of initial issuance of our common stock, with any excess recorded as a reduction to retained earnings. For additional information, see *Note 5. Equity and Earnings Per Share ("EPS")* .

Use of Estimates

The preparation of financial statements requires us to make estimates and assumptions that affect the reported amounts of assets or liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenue and expense during the reporting period. Actual results could differ from those estimates. Significant estimates include: useful lives of long-lived assets, asset retirement obligations, construction expense estimates, unbilled service receivables, fair value of financial instruments, fair value of the reporting units for goodwill impairment analysis, fair value of long-lived assets for impairment analysis, renewable energy credits, stock-based compensation, purchase accounting allocations, cash flows and taxable income from future operations, valuation allowance for deferred taxes, liabilities related to uncertain tax positions, allowances for uncollectible receivables, and liabilities related to employee medical benefit obligations, workers' compensation, severance and certain litigation.

Reclassifications

As discussed below under *Accounting Pronouncements Recently Adopted* , certain amounts have been reclassified in our prior period consolidated statements of cash flows to conform to current year presentation. Certain other amounts have been reclassified in our prior period consolidated balance sheet to conform to current year presentation. As a result, $251 million of intangible assets related to waste service and energy contracts, net, previously shown separately, are now classified within Intangible assets, net on our consolidated balance sheet as of December 31, 2017.

Accounting Pronouncements Recently Adopted

In August 2018, the Securities and Exchange Commission ("SEC") adopted the final rule under SEC Release No. 33-10532, Disclosure Update and Simplification, amending certain disclosure requirements that were redundant, duplicative, overlapping, outdated or superseded. In addition, the amendments expanded the disclosure requirements on the analysis of stockholders' equity for interim financial statements. Under the amendments, an analysis of changes in each caption of stockholders' equity presented in the balance sheet must be provided in a note or separate statement. The analysis should present a reconciliation of the beginning balance to the ending balance of each period for which a statement of comprehensive income is required to be filed. The final rule is effective on November 5, 2018, as such, the Company plans to use the new presentation of a condensed consolidated statement of stockholders' equity within its interim financial statements beginning in its Form 10-Q for the quarter ending March 31, 2019. Other than the new presentation, we do not anticipate any material impact to our consolidated financial statements and related disclosures upon adoption.

In March 2017, the Financial Accounting Standards Board ("FASB") issued Accounting Standard Update ("ASU") 2017-07, Presentation of Net Periodic Pension and Postretirement Benefit Cost, to improve the presentation of net periodic pension cost and net periodic postretirement benefit cost. The amendments require that the service cost component of the net periodic benefit

cost be presented in the same operating income line items as other compensation costs arising from services rendered by employees during the period. The non-service costs (e.g., interest cost, expected return on plan assets, amortization of actuarial gains/losses, settlements) should be presented in the income statement outside of operating income. The amendments also allow only the service cost component to be eligible for capitalization when applicable. We adopted this guidance on January 1, 2018. The amendments have been applied retrospectively for the income statement presentation requirements and prospectively for the limit on costs eligible for capitalization. The line item classification changes required by the new guidance did not have a material impact on our consolidated statement of operations.

In January 2017, the FASB issued ASU 2017-04, Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. This new standard eliminates Step 2 from the goodwill impairment test. Instead, an entity should compare the fair value of a reporting unit with its carrying amount and recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value, not to exceed the total amount of goodwill allocated to the reporting unit. We adopted this guidance on October 1, 2018. We performed our goodwill impairment test in the fourth quarter of 2018 in accordance with ASU 2017-04 and determined that the fair value of the goodwill exceeded its carrying value. The adoption of ASU 2017-04 had no impact on the result of our impairment test.

In November 2016, the FASB issued ASU 2016-18, Statement of Cash Flows (Topic 230) — Restricted Cash, which requires 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 and restricted cash equivalents. With this standard, amounts generally described as restricted cash or restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning of period and end of period total amounts shown on the statement of cash flows. We adopted this guidance on January 1, 2018, and the guidance has been retrospectively applied to all periods presented. The total of cash, cash equivalents and restricted cash is described in a supplemental table to the consolidated statements of cash flows. The changes to the beginning of period balance presented in our consolidated statement of cash flows are as follows (in millions):

	December 31, 2017		December 31, 2016	
	As adjusted	As previously reported	As adjusted	As previously reported
Cash and cash equivalents	$ 46	$ 46	$ 84	$ 84
Restricted funds classified as held for sale	77	—	—	—
Restricted funds held in trust- short term	43	—	56	—
Restricted funds held in trust- long term	28	—	54	—
Beginning of period balance presented in the statement of cash flows	$ 194	$ 46	$ 194	$ 84

The following table illustrates the effect of adoption of ASU 2016-18 on our consolidated statements of cash flows (in millions):

	Year Ended December 31, 2017		Year Ended December 31, 2016	
	As adjusted	As previously reported	As adjusted	As previously reported
Cash provided by operating activities	$ 242	$ 243	$ 264	$ 286
Cash used in investing activities	$ (289)	$ (289)	$ (254)	$ (254)
Cash provided by financing activities	$ 40	$ 3	$ (72)	$ (44)

In October 2016, the FASB issued ASU 2016-16, Income Taxes - Intra-Entity Transfers of Assets Other Than Inventory, which requires entities to recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs. The new standard must be adopted using a modified retrospective transition method, with the cumulative effect recognized as of the date of initial adoption. Effective January 1, 2018, we adopted this standard. The adoption of this new guidance did not have a material impact on our consolidated financial statements.

In May 2014, the FASB issued ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606) which supersedes nearly all existing revenue recognition guidance. Subsequent to the issuance of Topic 606, the FASB clarified the guidance through several ASUs; hereinafter the collection of revenue guidance is referred to as Accounting Standards Codification (“ASC") 606. The core principle of ASC 606 is that revenue should be recognized 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.

On January 1, 2018, we adopted ASC 606 using the modified retrospective method. Results for reporting periods beginning January 1, 2018 are presented under ASC 606, while prior period amounts were not adjusted and continue to be reported in accordance with the historic accounting guidance under ASC Topic 605, Revenue Recognition.

We recorded a net decrease of $1 million to beginning accumulated deficit as of January 1, 2018 due to the cumulative impact of adopting ASC 606. The impact to beginning accumulated deficit resulted from recognizing revenue evenly over the contract year for certain of our service fee contracts that are based on a contract year that is different from our calendar year. Contract acquisition costs are not material. For the year ended December 31, 2018 , waste and service revenue increased $1 million , as a result of the adoption of ASC 606. Therefore, comparisons of revenue and operating income between periods are not materially affected by the adoption of ASC 606. Refer to *Note 7. Revenue* for additional disclosures required by ASC 606.

NOTE 2. RECENT ACCOUNTING PRONOUNCEMENTS

The following table summarizes recent ASU's issued by the FASB that could have an impact on our consolidated financial statements.

Standard	Description	Effective Date	Effect on the financial statements or other significant matters
Update 2018-13—Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement	Entities are no longer required to disclose the amount of and reasons for transfers between Level 1 and Level 2 of the fair value hierarchy. The update also eliminates the requirement to disclose policy for timing of transfers between levels of the fair value hierarchy. Public companies will be required to disclose the range and weighted average used to develop significant unobservable inputs for Level 3 measurements. The amendments on changes in unrealized gains and losses, the range and weighted average of significant unobservable inputs used to develop Level 3 fair value measurements, and the narrative description of measurement uncertainty should be applied prospectively for only the most recent interim or annual period presented in the initial fiscal year of adoption. All other amendments should be applied retrospectively to all periods presented upon their effective date.	First quarter of 2020, early adoption is permitted.	We are currently evaluating the impact this guidance will have on our consolidated financial statements.
ASU 2018-02 Income Statement—Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income	The amendments in this update allow a reclassification from accumulated other comprehensive income ("AOCI") to retained earnings for adjustments to the tax effect of items in AOCI, that were originally recognized in other comprehensive income, related to the new statutory rate prescribed in the Tax Cuts and Jobs Act enacted on December 22, 2017, which reduces the US federal corporate tax rate from 35% to 21%. The amendments in this update should be applied either in the period of adoption or retrospectively to each period (or periods) in which the effect of the change in the US federal corporate income tax rate in the Tax Cuts and Jobs Act is recognized.	First quarter of 2019, early adoption is permitted, including adoption in any interim period.	We are currently evaluating the impact this guidance will have on our consolidated financial statements.
ASU 2016-13 Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments	The standard amends guidance on the impairment of financial instruments. The ASU estimates credit losses based on expected losses and provides for a simplified accounting model for purchased financial assets with credit deterioration. The standard requires a modified retrospective basis adoption through a cumulative-effect adjustment to retained earnings as of the beginning of the period of adoption.	First quarter of 2020, early adoption is permitted.	We are currently evaluating the impact this guidance will have on our consolidated financial statements.
ASU 2016-02 Leases (Topic 842) as amended by ASU 2018-01 and ASU 2018-11	These standards amended guidance for lease arrangements to increase transparency and comparability by providing additional information to users of financial statements regarding an entity's leasing activities. The revised guidance seeks to achieve this objective by requiring reporting entities to recognize lease assets and lease liabilities on the balance sheet for substantially all lease arrangements. The standard requires a modified retrospective basis adoption. The amendment in ASU 2018-01 permits an entity to elect an optional transition practical expedient to not evaluate land easements that exist or expired before the entity's adoption of Topic 842 and that were not previously accounted for as leases under Topic 840. The amendment in ASU 2018-11 provides entities with an additional and optional transition method in adopting the new leases standard and providing lessors with a practical expedient to not separate nonlease components from the associated lease component, similar to Topic 842 expedients for lessees.	First quarter of 2019, early adoption is permitted.	As part of our impact assessment, we performed a scoping exercise and determined our lease population. Based on an evaluation of the population, we determined the 1/1/2019 ROU Asset and ROU Liability balance to be in the range of $60-$70 million for operating leases. Additionally, we are in the process of implementing a lease accounting system and refining our internal controls and processes related to both the implementation and ongoing compliance of the new guidance. We plan to adopt the new guidance using a modified retrospective approach and upon adoption, there will be an increase to our long-term assets and liabilities reflecting the present value of our minimum lease obligations, which are disclosed in Note 9.

NOTE 3. NEW BUSINESS AND ASSET MANAGEMENT

The acquisitions discussed in the section below are not material to our consolidated financial statements individually or in the aggregate and therefore, disclosures of pro forma financial information have not been presented. The results of operations reflect the period of ownership of the acquired businesses, business development projects and dispositions.

Environmental Services Acquisitions

During 2018 , we acquired one environmental services business located in Toronto, Canada, for approximately $4 million . During 2017 , we acquired three environmental services businesses (one of which was accounted for as an asset purchase), in separate transactions, for approximately $17 million . During 2016 , we acquired two environmental services businesses, in separate transactions, for a total of $9 million .

These acquisitions expanded our Covanta Environmental Solutions capabilities and client service offerings, and allow us to direct additional non-hazardous profiled waste volumes into our EfW facilities, and therefore are highly synergistic with our existing business.

Palm Beach Resource Recovery Acquisition

In September 2018, we acquired the Palm Beach Resource Recovery Corporation ("PBRRC") for $46 million . PBRRC holds long-term contracts for the operation and maintenance of two EfW facilities located in Palm Beach County, Florida. The purchase consideration and allocation are still considered preliminary pending management's final assessment of fair values and settlement of a working capital true-up.

Green Investment Group Limited (“GIG”) Joint Ventures

Dublin EfW

During 2017, we completed construction of the Dublin EfW facility ("Dublin EfW"), a 600,000 metric ton-per-year, 58 megawatt facility in Dublin, Ireland. Operational commencement began in October 2017.

In December 2017, we entered into a strategic partnership with GIG, a subsidiary of Macquarie Group Limited, to develop EfW projects in the UK and Ireland. Our first investment with GIG, Covanta Europe Assets, Ltd ("CEAL"), is structured as a 50/50 joint venture between Covanta and GIG. As an initial step, we contributed 100% of Dublin EfW into CEAL, and GIG acquired a 50% ownership in CEAL for €136 million ($167 million). We retained a 50% equity interest in CEAL and retained our role as operations and maintenance ("O&M") service provider for the Dublin EfW.

On February 12, 2018, GIG's investment in CEAL closed and we received gross proceeds of $167 million ($98 million , net of existing restricted cash), which we used to repay borrowings under our revolving credit facility. The sale resulted in our loss of a controlling interest in Dublin EfW, which required the entity to be deconsolidated from our financial statements as of the sale date. For the year ended December 31, 2018 , we recorded a gain on the loss of a controlling interest of the business of $204 million which is included in Gain (loss) on sale of assets on our consolidated statement of operations. The gain resulted from the excess of proceeds received plus the fair value of our non-controlling interest in Dublin EfW over our carrying value.

Our 50% equity interest in CEAL is accounted for under the equity method of accounting. As of December 31, 2018 , our equity investment of $149 million is included in Other assets on our consolidated balance sheet. The fair value of our investment was determined by the fair value of the consideration received for the 50% acquired by GIG. There were no basis differences between the fair value of the acquired investment in CEAL and the carrying amounts of the underlying net assets as they were fair valued contemporaneously as of the sale date. For further information, see *Note 13. Equity Method Investments* .

Earls Gate Energy Centre

In December of 2018, financial close was reached on our second project with GIG, the Earls Gate Energy Centre project ("Earls Gate"), an EfW facility to be built in Grangemouth, Scotland. GIG and Covanta together will hold a 50% equity ownership in the project company, through a 50/50 joint venture, Covanta Jersey Assets Ltd., with co-investor and developer Brockwell Energy owning the remaining 50% stake. The Earls Gate facility is expected to commence operations in late 2021. We will account for our 50% ownership of the joint venture, which gives us a 25% indirect ownership of the project company, under the equity method

of accounting. As of December 31, 2018 , an equity investment of $10 million and a shareholder loan of $6 million related to this project are included in Other assets on our consolidated balance sheet. For further information, see *Note 13. Equity Method Investments* .

New York City Waste Transport and Disposal Contract

In March 2018, we received the notice to proceed from New York City's Department Sanitation ("DSNY") to develop the infrastructure supporting the East 91st Street Marine Transfer Station ("MTS"). We expect to commence operations in the second quarter of 2019. The MTS is the second in a pair of marine transfer stations under a 20-year waste transport and disposal agreement between Covanta and DSNY.

NOTE 4. DISPOSITIONS AND ASSETS HELD FOR SALE

Sale of Hydro Facility Investment

In July 2018, we sold our equity interests in a hydroelectric facility located in the state of Washington for proceeds of approximately $12 million . For the year ended December 31, 2018 , we recorded a gain of $7 million related to this transaction which is included in Gain (loss) on sale of assets on our consolidated statement of operations.

China Investments

Prior to 2016, our interests in China included an 85% ownership of an EfW facility located in Jiangsu Province ("Taixing"), a 49% equity interest in an EfW facility located in Sichuan Province and a 40% equity interest in Chongqing Sanfeng Covanta Environmental Industry Co., a company located in the Chongqing Municipality that is engaged in the business of providing design and engineering, procurement, construction services and equipment sales for EfW facilities in China, as well as operating services for EfW facilities. During 2016, we completed the exchange of our ownership interests in China for a 15% ownership interest in Chongqing Sanfeng Covanta Environmental Industrial Group, Co., Ltd ("Sanfeng Environment") and subsequently sold approximately 90% of the aforementioned ownership interest in Sanfeng Environment to a third-party, a subsidiary of CITIC Limited ("CITIC"), a leading Chinese industrial conglomerate and investment company, pursuant to agreements entered into in July 2015. As a result, during the year ended December 31, 2016, we recorded a pre-tax gain of $41 million . We received pre-tax proceeds of $105 million . The gain resulted from the excess of pre-tax proceeds over the cost-method book value of $70 million , plus $ 5 million of realized gains on the related cumulative foreign currency translation adjustment, that were reclassified out of other comprehensive income.

Subsequent to completing the exchange, Sanfeng Environment made certain claims for indemnification under the agreement related to the condition of the facility in Taixing. During the year ended December 31, 2017, we recorded a $6 million charge related to these claims, which is included in "Loss on asset sales" on our consolidated statement of operations.

On February 9, 2018 we sold our remaining investment in Sanfeng Environment to CITIC for proceeds of $13 million and recorded a gain on the sale of $6 million , which is included in Gain (loss) on sale of assets on our condensed consolidated statement of operations for the year ended December 31, 2018 .

Dublin EfW Project

In December 2017, as part of the joint venture transaction with GIG, we announced a plan to sell a 50% indirect interest in our Dublin project in exchange for €136 million . The transaction was completed in February 2018. For additional information see *Note 3. New Business and Asset Management - Green Investment Group Limited ("GIG") Joint Ventures.* Accordingly, during the fourth quarter of 2017, we determined that the assets and liabilities associated with our Dublin EfW facility met the criteria for classification as assets held for sale, but did not meet the criteria for classification as discontinued operations as the deconsolidation did not represent a strategic shift in our business. The assets and liabilities associated with our Dublin EfW facility are presented in our consolidated balance sheets as current Assets held for sale and current Liabilities held for sale.

The following table sets forth the assets and liabilities of the Assets held for sale included in our consolidated balance sheets as of December 31, 2017 (in millions):

Restricted funds held in trust	$ 77
Receivables	10
Property, plant and equipment, net	563
Other assets	3
Assets held for sale	$ 653
Accounts payable	1
Accrued expenses and other liabilities	22
Project debt [(1)]	510
Deferred income tax	7
Liabilities held for sale	$ 540

(1) See *Note 16. Consolidated Debt - Dublin Project Refinancing* for further information.

NOTE 5. EQUITY AND EARNINGS PER SHARE ("EPS")

Equity

In May 2014, the stockholders of the Company approved the Covanta Holding Corporation 2014 Equity Award Plan. For additional information, see *Note 8. Stock-Based Award Plans* .

Common shares repurchased were as follows (in millions, except per share amounts):

	Year Ended December 31,		
	2018	**2017**	**2016**
Total repurchases	$ —	$ —	$ 18
Shares repurchased	—	—	1.2
Weighted average cost per share	$ —	$ —	$ 15.29

As of December 31, 2018 , there were 136 million shares of common stock issued of which 131 million shares were outstanding; the remaining 5 million shares of common stock issued but not outstanding were held as treasury stock. As of December 31, 2018 , there were 3 million shares of common stock available for future issuance under equity plans.

As of December 31, 2018 , there were 10 million shares of preferred stock authorized, with none issued or outstanding. The preferred stock may be divided into a number of series as defined by our Board of Directors. The Board of Directors is authorized to fix the rights, powers, preferences, privileges and restrictions granted to and imposed upon the preferred stock upon issuance.

Earnings Per Share

We calculate basic EPS using net earnings for the period and the weighted average number of outstanding shares of our common stock, par value $0.10 per share, during the period. Diluted earnings per share computations, as calculated under the treasury stock method, include the weighted average number of shares of additional outstanding common stock issuable for stock options, restricted stock awards and restricted stock units whether or not currently exercisable. Diluted earnings per share does not include securities if their effect was anti-dilutive.

Basic and diluted weighted average shares outstanding were as follows (in millions):

	Year Ended December 31,		
	2018	**2017**	**2016**
Basic weighted average common shares outstanding	130	130	129
Dilutive effect of stock options, restricted stock and restricted stock units	2	1	—
Diluted weighted average common shares outstanding	132	131	129
Anti-dilutive stock options, restricted stock and restricted stock units excluded from the calculation of EPS	—	—	3

NOTE 6. BUSINESS SEGMENT AND GEOGRAPHIC INFORMATION

Our reportable segment reflects the manner in which our Chief Operating Decision Maker ("CODM") reviews results and allocates resources and does not reflect the aggregation of multiple operating segments.

We have one reportable segment which comprises our entire operating business. Prior to the first quarter 2018, our reportable segment, North America, was comprised exclusively of waste and energy services located in North America. During the first quarter of 2018, we contributed 100% of our Dublin EfW facility into CEAL, a joint venture with GIG, which resulted in our loss of control. See *Note 3. New Business and Asset Management - Green Investment Group Limited ("GIG") Joint Ventures* for further information. Subsequent to the sale, results from our equity method investment in CEAL and our O&M contract to operate the Dublin EfW facility are now being reviewed by our CODM on a consolidated basis with our North America results. Therefore, we now include the results of our international operations, which consist primarily of our interests in Dublin, in our one reportable segment. The results of our reportable segment are consistent with our consolidated results as presented on our consolidated statements of operations for the years ended December 31, 2018, 2017 and 2016 . See *Note 1. Organization and Summary of Significant Accounting Policies* for a description of our organization.

Our operations are principally located in the United States. A summary of operating revenue and total assets by geographic area is as follows (in millions):

	United States	Other	Total
Operating Revenue:			
Year Ended December 31, 2018	$ 1,785	$ 83	$ 1,868
Year Ended December 31, 2017	$ 1,705	$ 47	$ 1,752
Year Ended December 31, 2016	$ 1,677	$ 22	$ 1,699

	Assets Held for Sale	United States	Other	Total
Total Assets:				
As of December 31, 2018	$ 2	$ 3,633	$ 208	$ 3,843
As of December 31, 2017	$ 653	$ 3,727	$ 61	$ 4,441
As of December 31, 2016	$ —	$ 3,763	$ 521	$ 4,284

NOTE 7. REVENUES

Disaggregation of revenue

A disaggregation of revenue from contracts with customers is presented on our consolidated statements of operations for the year ended December 31, 2018, 2017 and 2016 . See *Note 6. Business Segment and Geographic Information* for a discussion of our reportable segment.

Performance Obligations and Transaction Price Allocated to Remaining Performance Obligations

The following summarizes our performance obligations, a description of how transaction price is allocated to future performance obligations and the practical expedients applied:

Revenue Type	Timing	Performance Obligations	Measure of Progress	Type	Practical Expedients
Service Fee	Over time	Operations/waste disposal	Time elapsed	Fixed & Variable	Constrained (1) & Series (2)
Tip Fee	Over time	Waste disposal	Units delivered	Fixed & Variable	Right to invoice
Energy	Over time	Energy Capacity Steam	Units delivered Time elapsed Units delivered	Fixed & Variable	Right to invoice & Series (2)
Metals	Point in time	Sale of ferrous & non-ferrous metals	Units delivered	Variable	Less than 1 year
Other (Construction)	Over time	Construction services	Costs incurred	Fixed & Variable	N/A

(1) The amount of variable consideration that is included in the transaction price may be constrained, and is included only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur in a future period. We estimate our variable service fee using the expected value method.

(2) Service Fee and Energy contracts have been determined to have an annual and monthly series, respectively.

ASC 606 requires disclosure of the aggregate amount of transaction price that is allocated to performance obligations that have not yet been satisfied as of December 31, 2018 . The guidance provides certain conditions (identified as "practical expedients") that limit this disclosure requirement. We have contracts that meet the following practical expedients provided by ASC 606:

1. The performance obligation is part of a contract that has an original expected duration of one year or less.
2. Revenue is recognized from the satisfaction of the performance obligations in the amount billable to our customer that corresponds directly with the value to the customer of our performance completed to date (i.e. “right-to-invoice” practical expedient).
3. The variable consideration is allocated entirely to a wholly unsatisfied performance obligation or to a wholly unsatisfied promise to transfer a distinct service or a series of distinct services that are substantially the same and that have the same pattern of transfer to our customer (i.e. “series practical expedient”).

The following table shows our remaining performance obligations which primarily consists of the fixed consideration contained in our contracts as of December 31, 2018 (dollars in millions):

	Total
Total Remaining performance obligation	$ 6,147
Percentage expected to be recognized:	
2019	11%
2020	9%

Contract Balances

The following table reflects the balance in our contract assets, which we classify as “Accounts receivable unbilled” and present net in Accounts receivable, and our contract liabilities, which we classify as deferred revenue and present in “Accrued expenses and other current liabilities” in our consolidated balance sheet (in millions):

	December 31, 2018	December 31, 2017
Unbilled receivables	$ 16	$ 13
Deferred revenue	$ 15	$ 14

For the year ended December 31, 2018 , revenue recognized that was included in deferred revenue on our consolidated balance sheet at the beginning of the period totaled $7 million .

Accounts receivable are recorded when the right to consideration becomes unconditional and we typically receive payments from customers monthly. The timing of our receipt of cash from construction projects is generally based upon our reaching completion milestones as set forth in the applicable contracts, and the timing and size of these milestone payments can result in material working capital variability between periods. We had no asset impairment charges related to these assets in the period.

NOTE 8. STOCK-BASED AWARD PLANS

Stock-Based Award Plans

In May 2014, the stockholders of the Company approved the Covanta Holding Corporation 2014 Equity Award Plan (the "Plan") to provide incentive compensation to non-employee directors, officers and employees, and to consolidate the two previously existing equity compensation plans into a single plan: the Company's Equity Award Plan for Employees and Officers (the "Former Employee Plan") and the Company's Equity Award Plan for Directors (the "Former Director Plan," and together with the Former Employee Plan, the "Former Plans"). Shares that were available for issuance under the Former Plans will be available for issuance under the Plan.

The purpose of the Plan is to promote our interests (including our subsidiaries and affiliates) and our stockholders' interests by using equity interests to attract, retain and motivate our management, non-employee directors and other eligible persons and to encourage and reward their contributions to our performance and profitability. The Plan provides for awards to be made in the form of (a) shares of restricted stock, (b) restricted stock units, (c) incentive stock options, (d) non-qualified stock options, (e) stock appreciation rights, (f) performance awards, or (g) other stock-based awards which relate to or serve a similar function to the awards described above. Awards may be made on a standalone, combination or tandem basis.

Stock-Based Compensation

We recognize compensation costs using the graded vesting attribution method over the requisite service period of the award, which is generally three to five years. Forfeitures are accounted for as they occur. Stock-based compensation expense is as follows (in millions, except for weighted average years):

	Total Compensation Expense Year Ended December 31,			As of December 31, 2018	
	2018	2017	2016	Unrecognized stock-based compensation expense	Weighted-average years to be recognized
Restricted Stock Awards	$ 5	$ 11	$ 10	$ 2	0.9
Restricted Stock Units	$ 19	$ 7	$ 6	$ 12	1.7
Tax benefit related to compensation expense	$ 18	$ 10	$ 10		

Restricted Stock Awards

Restricted stock awards that have been issued to employees typically vest over a three-year period. Restricted stock awards are stock-based awards for which the employee or director does not have a vested right to the stock ("nonvested") until the requisite service period has been rendered.

Restricted stock awards to employees are subject to forfeiture if the employee is not employed on the vesting date. Restricted stock awards issued to directors are not subject to forfeiture in the event a director ceases to be a member of the Board of Directors, except in limited circumstances. Restricted stock awards will be expensed over the requisite service period. Prior to vesting, restricted stock awards have all of the rights of common stock (other than the right to sell or otherwise transfer, when issued). We calculate the fair value of share-based stock awards based on the closing price on the date the award was granted.

During the year ended December 31, 2018 , we awarded 13,158 shares of restricted stock for annual director compensation. We determined the service vesting condition of these restricted stock awards to be non-substantive and, in accordance with accounting principles for stock compensation, recorded the entire fair value of the awards as compensation expense on the grant date.

During the year ended December 31, 2018 , we withheld 375,673 shares of our common stock in connection with tax withholdings

for vested stock awards.

Changes in nonvested restricted stock awards as of December 31, 2018 were as follows (in thousands, except per share amounts):

	Number of Shares	Weighted-Average Grant Date Fair Value
Nonvested at the beginning of the year	1,389	$ 16.46
Granted	13	$ 15.20
Vested	(638)	$ 17.09
Forfeited	(37)	$ 16.01
Nonvested at the end of the year	727	$ 15.90

The weighted-average grant-date fair value of RSAs granted during the years ended December 31, 2018 , 2017 , and 2016 was $15.20 , $16.22 , and $15.14 respectively. The total fair value of shares vested during the years ended December 31, 2018 , 2017 , and 2016 , was $11 million , $10 million , and $9 million , respectively.

Restricted Stock Units

Annually we award units for which the employee does not have a vested right to the stock (“nonvested”) until the required financial performance metric has been reached for each pre-determined vesting date. Stock-based compensation expense for each financial performance metric is recognized beginning in the period when management has determined it is probable the financial performance metric will be achieved for the respective vesting period.

During the year ended December 31, 2018 we awarded certain employees grants of 1,208,711 RSUs. The RSUs will be expensed over the requisite service period. The terms of the RSUs include vesting provisions based solely on continued service. If the service criteria are satisfied the RSUs will generally vest during March of 2019 , 2020 , and 2021 .

During the year , ended December 31, 2018 , we awarded certain employees grants of 385,464 performance based RSUs of which 50% will vest based upon our cumulative Free Cash Flow per share target over a three year performance period and the other 50% will vest based on a total shareholder return ("TSR") against metrics consistent with market practices and our peers with vesting determined by our relative TSR percentile rank versus the companies in our peer group.

During the year ended December 31, 2018 we awarded 79,268 RSUs for annual director compensation and 31,531 RSUs, for quarterly director fees for certain of our directors who elected to receive RSUs in lieu of cash payments. We determined the service vesting condition of these restricted stock units to be non-substantive and, in accordance with accounting principles for stock compensation, recorded the entire fair value of the awards as compensation expense on the grant date.

Changes in nonvested restricted stock units as of December 31, 2018 were as follows (in thousands, except per share amounts):

	Number of Shares	Weighted-Average Grant Date Fair Value
Nonvested at the beginning of the year	1,815	$ 15.80
Granted	1,705	$ 15.01
Vested	(467)	$ 17.52
Forfeited	(55)	$ 14.79
Nonvested at the end of the year	2,998	$ 15.11

The weighted-average grant-date fair value of RSUs granted during the years ended December 31, 2018 , 2017 , and 2016 was $15.01 , $15.94 , and $14.65 , respectively. The total fair value of shares vested during the years ended December 31, 2018 , 2017 , and 2016 , was $8 million , $1 million , and $1 million , respectively.

Stock Options

We have also awarded stock options to certain employees and directors. Stock options awarded to directors vested immediately. Stock options awarded to employees have typically vested annually over three to five years and expire over ten years. We calculate the fair value of our share-based option awards using the Black-Scholes option pricing model which requires estimates of the expected life of the award and stock price volatility.

The following table summarizes activity and balance information of the options under the 2014 Stock Option Plan as of December 31, 2018 :

	Shares	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value [2]
2014 Stock Option Plan		(in thousands, except per share amounts)		
Outstanding at the beginning of the year	225	$ 24.30		
Granted	—	$ —		
Exercised	—	$ —		
Expired	(200)	$ 24.76		
Forfeited	—	$ —		
Outstanding at the end of the year [1]	25	$ 20.58	5.52	$ —
Options exercisable at year end	25	$ 20.58	5.52	$ —

(1) All options outstanding as of December 31, 2018 are fully vested.
(2) The aggregate intrinsic value represents the total pre-tax intrinsic value (the difference between the closing stock price on the last trading day of 2018 and the exercise price, multiplied by the number of in-the-money options) that would have been received by the option holders had all option holders exercised their options on the last trading day of 2018 . The intrinsic value changes based on the fair market value of our common stock.

NOTE 9. OPERATING LEASES

Leases are primarily operating leases for leaseholds on EfW facilities, as well as for trucks and automobiles, office space and machinery and equipment. Some of these operating leases have renewal options. Rental expense was $23 million , $22 million , and $19 million , for the years ended December 31, 2018, 2017 and 2016 , respectively.

The following is a schedule, by year, of future minimum rental payments required under operating leases that have initial or remaining non-cancelable lease terms in excess of one year as of December 31, 2018 (in millions):

	2019	2020	2021	2022	2023	Thereafter	Total
Future minimum rental payments	$ 11	$ 9	$ 8	$ 7	$ 7	$ 36	$ 78

NOTE 10. SUPPLEMENTARY INFORMATION

Other Operating Expense, net

Insurance Recoveries

Fairfax County Energy-from-Waste Facility

In February 2017, our Fairfax County energy-from-waste facility experienced a fire in the front-end receiving portion of the facility. During the first quarter of 2017, we completed our evaluation of the impact of this event and recorded an immaterial asset impairment, which we have since recovered from insurance proceeds. The facility resumed operations in December 2017. We expect to receive the remaining insurance recoveries for both property loss and business interruption during the first quarter of 2019.

Plymouth Energy-from-Waste Facility

In May 2016, our Plymouth energy-from-waste facility experienced a turbine generator failure. Damage to the turbine generator was extensive and operations at the facility were suspended promptly to assess the cause and extent of damage. The facility is capable of processing waste without utilizing the turbine generator to generate electricity, and we resumed waste processing

operations in early June of 2016. The facility resumed generating electricity early in the first quarter of 2017 after the generator and other damaged equipment were replaced.

The cost of repair or replacement of assets and business interruption losses for the above matters are insured under the terms of applicable insurance policies, subject to deductibles.

We recorded insurance gains, as a reduction to Other operating expense, net in our consolidated statement of operations as follows (in millions):

	Year Ended December 31,		
	2018	2017	2016
Insurance gains for property and clean-up costs, net of impairment charges	$ 18	$ 7	$ 1
Insurance gains for business interruption costs, net of costs incurred	$ 19	$ 23	$ 4

Hennepin County Legal Settlement

On September 25, 2017, we settled a dispute with Hennepin County, Minnesota regarding extension provisions in our service contract to operate the Hennepin Energy Recovery Center. We received $8 million in connection with the settlement. During the year ended December 31, 2017, we recorded a gain on settlement of $8 million as a reduction of Other operating expense, net in our consolidated statement of operations.

Impairment Charges

Impairment charges are as follows (in millions):

	Year Ended December 31,		
	2018	2017	2016
Impairment charges	$ 86	$ 2	$ 20

During the year ended December 31, 2018 , we identified an indicator of impairment associated with certain of our EfW facilities where the current expectation is that, more likely than not, the assets will not be operated through their previously estimated economic useful life. We performed recoverability tests to determine if these facilities were impaired as of the respective balance sheet date. As a result, based on expected cash flows utilizing Level 3 inputs, we recorded a non-cash impairment charge for the year ended December 31, 2018 of $86 million , to reduce the carrying value of the assets to their estimated fair value.

During the year ended December 31, 2016, we recorded a non-cash impairment charge of $13 million , pre-tax, related to the previously planned closure of our Pittsfield EfW facility which we now continue to operate. Such amount was calculated based on the estimated liquidation value of the tangible equipment utilizing Level 3 inputs.

We are party to a joint venture that was formed to recover and recycle metals from EfW ash monofills in North America. During the year ended December 31, 2016, due to operational difficulties and the decline in the scrap metal market, a valuation of the entity was conducted. As a result, we recorded a net impairment of our investment in this joint venture of $3 million , pre-tax, which represents our portion of the carrying value of the entity in excess of the fair value. Such amount was calculated based on the estimated liquidation value of the tangible equipment utilizing Level 3 inputs.

For more information regarding fair value measurements, see *Note 12. Financial Instruments* .

Selected Supplementary Balance Sheet Information

Selected supplementary balance sheet information is as follows (in millions):

	As of December 31,	
	2018	2017
Prepaid expenses	$ 22	$ 22
Spare parts	21	22
Renewable energy credits	7	6
Other	12	23
Total prepaid expenses and other current assets	$ 62	$ 73
Operating expenses, payroll and related expenses	$ 150	$ 145
Deferred revenue	10	14
Accrued liabilities to client communities	26	17
Interest payable	38	37
Dividends payable	36	36
Other	73	64
Total accrued expenses and other current liabilities	$ 333	$ 313

NOTE 11. INCOME TAXES

The Tax Cuts and Jobs Act (the "Act") was enacted on December 22, 2017. The Act reduces the US Federal corporate tax rate from 35% to 21%, requires companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and creates new taxes on certain foreign sourced earnings. As of December 2018, in accordance with Staff Accounting Bulletin 118, we completed our accounting for the tax effects of the enactment of the Act, any true up adjustments, as described below, are included in our income tax provision. We made an accounting policy election to account for the global intangible low-taxed income (“GILTI”) as current period expense.

Deferred tax assets and liabilities: We re-measured our US federal deferred tax assets and liabilities based on the rates at which they are expected to reverse in the future, which is generally 21% . The provisional amount recorded as of December 31, 2017 related to the re-measurement of the deferred tax balance was a tax benefit of $204 million , this amount was materially correct and no material adjustment was recorded to this amount for the year ended December 31, 2018.

Foreign tax effects: The one-time transition tax is based on our total post-1986 earnings and profits ("E&P") previously deferred from US income taxes. As of December 31, 2017, we recorded a provisional amount for our one-time transition tax liability, resulting in an increase in income tax expense of $21 million with a corresponding reduction of deferred tax asset related to the utilization of our gross NOL. During the year ended December 31, 2018, we completed our calculation of the total post 1986 E&P for the foreign subsidiaries and based on the final amounts held in cash we recorded a $1 million true up to the transition tax with a reduction to the deferred tax assets on the net operating loss carryforward, resulting in no additional tax liability.

We file a federal consolidated income tax return with our eligible subsidiaries. Our federal consolidated income tax return also includes the taxable results of certain grantor trusts described below. The components of income tax expense were as follows (in millions):

	Year Ended December 31,		
	2018	2017	2016
Current:			
Federal	$ —	$ 4	$ (2)
State	1	2	6
Foreign	1	(1)	(2)
Total current	2	5	2
Deferred:			
Federal	(1)	(204)	28
State	(25)	(2)	(9)
Foreign	(5)	10	1
Total deferred	(31)	(196)	20
Total income tax (benefit) expense	$ (29)	$ (191)	$ 22

Domestic and foreign pre-tax income (loss) was as follows (in millions):

	Year Ended December 31,		
	2018	2017	2016
Domestic	$ (43)	$ (43)	$ 26
Foreign	160	(92)	(12)
Total	$ 117	$ (135)	$ 14

The effective income tax rate was (25)% , 142% , and 150% for the years ended December 31, 2018, 2017 and 2016 , respectively.

The decrease in the effective tax rate for the year ended December 31, 2018, compared to the year ended December 31, 2017 is primarily due to the combined effects of (i) in 2017 there was a significant deferred tax revaluation due to tax reform which did not occur in 2018 (ii) no income tax associated with the gain from sale of our joint venture with GIG; (iii) the discrete tax benefits attributable to the New Jersey State Tax Law change and a state audit settlement.

The decrease in the effective tax rate for the year ended December 31, 2017, compared to the year ended December 31, 2016 is primarily due to the combined effects of (i) the recognition of tax benefit from the re-measurement of the deferred taxes and the estimated transition tax due to the enactment of the Act and (ii) the change from pre-tax income in 2016 to pre-tax loss in 2017.

A reconciliation of our income tax expense (benefit) at the federal statutory income tax rate of 21% to income tax expense (benefit) at the effective tax rate is as follows (in millions):

	Year Ended December 31,		
	2018	2017	2016
Income tax expense (benefit) at the federal statutory rate	$ 25	$ (47)	$ 5
State and other tax expense	(1)	(2)	1
Tax rate differential on foreign earnings	1	10	4
Income from grantor trust	—	(8)	—
Gain on sale of business	(44)	—	—
Permanent differences	3	4	4
Foreign currency exchange gain	2	—	—
Impact of state tax law change	(13)	—	—
State ITC credit	1	1	(4)
Change in valuation allowance	—	31	2
Liability for uncertain tax positions	(4)	—	15
Adjustment to deferred tax	—	(1)	(5)
Impact of deferred tax re-measurement for federal tax rate change	—	(204)	—
Tax reform transition tax	1	21	—
Expiration of non-qualified stock options	—	3	—
Other	—	1	—
Total income tax (benefit) expense	$ (29)	$ (191)	$ 22

We had consolidated federal NOLs estimated to be approximately $197 million for federal income tax purposes as of the end of 2018 . These consolidated federal NOLs will expire, if not used, in the following amounts in the following years (in millions):

	Amount of Carryforward Expiring
2033	$ 194
2035	1
2036	1
2037	1
	$ 197

In addition to the consolidated federal NOLs, as of December 31, 2018 , we had state NOL carryforwards of approximately $360 million , which expire between 2028 and 2037 , net foreign NOL carryforwards of approximately $173 million with some expiring between 2019 and 2038 . The federal tax credit carryforwards include production tax credits of $60 million expiring between 2024 and 2036 , and research and experimentation tax credits of $1 million expiring between 2027 and 2033 . Additionally, we had state income tax credits of $1 million .

The tax effects of temporary differences that give rise to the deferred tax assets and liabilities are presented as follows (in millions):

	As of December 31,	
	2018	2017
Deferred tax assets:		
Net operating loss carryforwards	$ 90	$ 119
Accrued expenses	13	15
Prepaid and other costs	48	48
Deferred tax assets attributable to pass-through entities	10	10
Retirement benefits	1	2
State adjustment	5	—
Hedging	4	—
Other	1	3
Unbilled accounts	1	—
Interest expense	12	—
AMT and other credit carryforwards	49	48
Total gross deferred tax asset	234	245
Less: valuation allowance	(73)	(77)
Total deferred tax asset	161	168
Deferred tax liabilities:		
Unbilled accounts receivable	—	3
Property, plant and equipment	521	538
Intangible assets	12	33
Deferred tax liabilities attributable to pass-through entities	5	8
Deferred gain on convertible debt	—	4
Other, net	1	1
Total gross deferred tax liability	539	587
Net deferred tax liability, including deferred tax liability held for sale	378	419
Less: Deferred tax liability held for sale [1]	—	7
Net deferred tax liability	$ 378	$ 412

(1) As of December 31, 2017, assets and liabilities related to our Dublin EfW facility met the criteria to be classified as held for sale on our consolidated balance sheet. For further information see *Note 4. Dispositions and Assets Held for Sale* .

Cumulative undistributed foreign earnings for which United States taxes were not provided were included in consolidated retained earnings in the amount of approximately zero as of December 31, 2018 and 2017 , respectively. For 2018, foreign undistributed earnings were considered permanently invested, therefore no provision for US income taxes was accrued. For 2017, after the application of the tax impact of the Act, no additional tax was included in the provision related to the cumulative undistributed foreign earnings as of December 31, 2017.

Deferred tax assets relating to employee stock based compensation deductions were reduced to reflect exercises of non-qualified stock option grants and vesting of restricted stock. Some exercises of non-qualified stock option grants and vesting of restricted stock resulted in tax deductions in excess of previously recorded benefits resulting in a "windfall".

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows (in millions):

Balance at December 31, 2015	$ 36
Additions based on tax positions related to the current year	16
Additions for tax positions of prior years	4
Reductions for lapse in applicable statute of limitations	(3)
Reductions for tax positions of prior years	(4)
Payment	(6)
Balance at December 31, 2016	43
Additions based on tax positions related to the current year	1
Additions for tax positions of prior years	6
Reductions for lapse in applicable statute of limitations	(1)
Reductions for tax positions of prior years	(2)
Additions due to acquisitions	1
Balance at December 31, 2017	48
Additions based on tax positions related to the current year	2
Additions for tax positions of prior years	1
Reductions for lapse in applicable statute of limitations	(2)
Reductions for tax positions of prior years	(8)
Balance at December 31, 2018	$ 41

The uncertain tax positions, exclusive of interest and penalties, were $41 million and $48 million as of December 31, 2018 and 2017 , respectively, which also represent potential tax benefits that if recognized, would impact the effective tax rate.

We record interest accrued on liabilities for uncertain tax positions and penalties as part of the tax provision. As of December 31, 2018 and 2017 , we had accrued interest and penalties associated with liabilities for uncertain tax positions of $5 million . We continue to reflect interest accrued and penalties on uncertain tax positions as part of the tax provision.

Audits for federal income tax returns are closed for the years through 2010. However, the Internal Revenue Service ("IRS") can audit the NOL's generated during those years in the years that the NOL's are utilized.

State income tax returns are generally subject to examination for a period of three to six years after the filing of the respective tax return. The state impact of any federal changes remains subject to examination by various states for a period of up to one year after formal notification to the states. We have various state income tax returns in the process of examination, administrative appeals or litigation.

Our NOLs predominantly arose from our predecessor insurance entities, formerly named Mission Insurance Group, Inc., (“Mission”). These Mission insurance entities have been in state insolvency proceedings in California and Missouri since the late 1980's. The amount of NOLs available to us will be reduced by any taxable income or increased by any taxable losses generated by current members of our consolidated tax group, which include grantor trusts associated with the Mission insurance entities.

While we cannot predict what amounts, if any, may be includable in taxable income as a result of the final administration of these grantor trusts, substantial actions toward such final administration have been taken and we believe that neither arrangements with the California Commissioner of Insurance nor the final administration by the Missouri Director will result in a material reduction in available NOLs.

NOTE 12. FINANCIAL INSTRUMENTS

Fair Value Measurements

Authoritative guidance associated with fair value measurements provides a framework for measuring fair value and establishes a fair value hierarchy that prioritizes the inputs used to measure fair value, giving the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1 inputs), then significant other observable inputs (Level 2 inputs) and the lowest priority to significant unobservable inputs (Level 3 inputs). The following methods and assumptions were used to

estimate the fair value of each class of financial instruments:

- For marketable securities, the carrying value of these amounts is a reasonable estimate of their fair value.
- Fair values for long-term debt and project debt are determined using quoted market prices (Level 1).
- The fair values of our energy hedges were determined using the spread between our fixed price and the forward curve information available within the market.

The estimated fair value amounts have been determined using available market information and appropriate valuation methodologies. However, considerable judgment is required in interpreting market data to develop estimates of fair value. Accordingly, the estimates presented herein are not necessarily indicative of the amounts that we would realize in a current market exchange and are based on pertinent information available to us as of December 31, 2018 . Such amounts have not been comprehensively revalued for purposes of these financial statements and current estimates of fair value may differ significantly from the amounts presented herein.

The following financial instruments are recorded at their estimated fair value. The following table presents information about the recurring fair value measurement of our assets and liabilities as of December 31, 2018 and 2017 :

Financial Instruments Recorded at Fair Value on a Recurring Basis:	Fair Value Measurement Level	As of December 31, 2018	As of December 31, 2017
		(In millions)	
Assets:			
Investments — mutual and bond funds [1]	1	$ 2	$ 2
Total assets:		$ 2	$ 2
Liabilities:			
Derivative liability — energy hedges [2]	2	$ 13	$ 5
Derivative liability — interest rate swaps included in liabilities held for sale [3]	2	—	7
Total liabilities:		$ 13	$ 12

(1) Included in other noncurrent assets in the consolidated balance sheets.
(2) The short-term balance is included in Accrued expenses and other current liabilities and the long-term balance is included in Other liabilities in the consolidated balance sheets.
(3) As of December 31, 2017, assets and liabilities related to our Dublin EfW facility met the criteria to be classified as held for sale on our consolidated balance sheet. For further information see *Note 4. Dispositions and Assets Held for Sale* .

The following financial instruments are recorded at their carrying amount (in millions):

Financial Instruments Recorded at Carrying Amount:	As of December 31, 2018 Carrying Amount	As of December 31, 2018 Estimated Fair Value	As of December 31, 2017 Carrying Amount	As of December 31, 2017 Estimated Fair Value
Liabilities:				
Long-term debt	$ 2,342	$ 2,245	$ 2,349	$ 2,371
Project debt	$ 152	$ 154	$ 174	$ 179
Project debt included in liabilities held for sale [1]	$ —	$ —	$ 510	$ 510

(1) As of December 31, 2017, assets and liabilities related to our Dublin EfW facility met the criteria to be classified as held for sale on our consolidated balance sheet. For further information see *Note 4. Dispositions and Assets Held for Sale* .

We are required to disclose the fair value of financial instruments for which it is practicable to estimate that value. The fair value of short-term financial instruments such as cash and cash equivalents, restricted cash, accounts receivables, prepaid expenses and other assets, accounts payable and accrued expenses approximates their carrying value on the consolidated balance sheets due to their short-term nature.

In addition to the recurring fair value measurements, certain assets are measured at fair value on a non-recurring basis when an indication of impairment is identified. Long-lived assets, such as property and equipment and identifiable intangibles with finite useful lives, are periodically evaluated for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Assets are grouped and evaluated for impairment at the lowest level of which there are identifiable cash flows, which is generally at the facility level. Assets are reviewed using factors including, but not limited to, our future operating plans and projected cash flows. The determination of whether impairment has occurred is based on the assets

fair value as compared to the carrying value. Fair value is generally determined using an income approach, which requires discounting the estimated future cash flows associated with the asset. If the asset carrying amount exceeds its fair value, an impairment charge is recognized in the amount by which the carrying amount exceeds the fair value of the asset.

NOTE 13. EQUITY METHOD INVESTMENTS

Investments in investees and joint ventures accounted for under the equity method of $160 million and $5 million are included as Other assets in our consolidated balance sheet of December 31, 2018 and 2017, respectively. A shareholder loan of $6 million related to the Earls Gate project is included in Other assets in our consolidated balance sheet of December 31, 2018 . For additional information on our equity investments in Ireland and the UK, see *Note 3. New Business and Asset Management - Green Investment Group Limited ("GIG") Joint Ventures.*

Our ownership percentages in our investments in investees and joint ventures are as follows:

	December 31,	
Ownership interest:	**2018**	**2017**
Dublin EfW (Ireland) [1]	50%	—%
Ambiente 2000 S.r.l. (Italy)	40%	40%
Earls Gate (UK) [2]	25%	—%
South Fork Plant (US)	50%	50%
Koma Kulshan Plant (US)	—%	50%
Tartech (US)	—%	50%

(1) We have a 50% indirect ownership of Dublin EfW, through our 50/50 joint venture with GIG, Covanta Europe Assets Ltd.

(2) We have a 25% indirect ownership of Earls Gate, through our 50/50 joint venture with GIG, Covanta Green Jersey Assets Ltd., which owns 50% of Earls Gate.

Summarized financial information of our equity method investments is presented as follows (in millions):

	December 31,	
	2018	**2017**
Balance Sheet:		
Current assets	$ 80	$ 7
Long-term assets	$ 834	$ 17
Current liabilities	$ 69	$ 9
Long-term liabilities	$ 521	$ 2

	For the Year Ended December 31,		
	2018	**2017**	**2016**
Statement of Operations:			
Operating revenue	$ 112	$ 17	$ 19
Operating income (loss)	$ 31	$ 1	$ (7)
Net income (loss)	$ 13	$ 1	$ (7)

We serve as the O&M service provider for the Dublin EfW facility which is owned by CEAL, our joint venture with GIG, under market competitive terms. For the period from February 12, 2018 through December 31, 2018 we recognized $27 million in revenues related to this agreement.

NOTE 14. DERIVATIVE INSTRUMENTS

Energy Price Risk

We have entered into a variety of contractual hedging arrangements, designated as cash flow hedges, in order to mitigate our exposure to energy market risk, and will continue to do so in the future. Our efforts in this regard involve only mitigation of price volatility for the energy we produce and do not involve taking positions (either long or short) on energy prices in excess of our physical generation. The amount of energy generation for which we have hedged on a forward basis under agreements with various financial institutions as of December 31, 2018 is indicated in the following table (in millions):

Calendar Year	Hedged MWh
2019	2.8
2020	0.2
Total	3.0

As of December 31, 2018 , the fair value of the energy derivative liability was $13 million . The effective portion of the change in fair value was recorded as a component of AOCI. As of December 31, 2018 , the amount of hedge ineffectiveness was not material .

As of December 31, 2017 , the fair value of the energy derivative liability was $5 million . The effective portion of the change in fair value was recorded as a component of AOCI. As of December 31, 2017 , the amount of hedge ineffectiveness was not material.

During the year ended December 31, 2018 , cash provided by and used in energy derivative settlements of $8 million and $24 million , respectively, was included in net cash provided by operating activities on our consolidated statement of cash flows.

During the year ended December 31, 2017 , cash provided by and used in energy derivative settlements of $17 million and zero , respectively, was included in the change in net cash provided by operating activities on our consolidated statement of cash flows.

Interest Rate Swaps

In 2017, in order to hedge the risk of adverse variable interest rate fluctuations associated with the senior secured term loan previously held by Dublin EfW, we entered into floating to fixed rate swap agreements with various financial institutions to hedge the variable interest rate fluctuations associated with the floating rate portion of the loan, expiring in 2032. The interest rate swap was designated as a cash flow hedge which was recorded at fair value with changes in fair value recorded as a component of AOCI. The unrealized loss was included within Gain (loss) on sale of assets upon deconsolidation.

As of December 31, 2017 , the fair value of the interest rate swap derivative of $7 million , pre-tax, was recorded within Liabilities held for sale in our consolidated balance sheet and was subsequently sold as part of the transaction with GIG. See *Note 4. Dispositions and Assets Held for Sale* .

NOTE 15. INTANGIBLE ASSETS AND GOODWILL

Our intangible assets and liabilities are recorded upon acquisition at their estimated fair market values based upon discounted cash flows. Intangible assets and liabilities are amortized using the straight line method over their useful lives. Waste and service contract liabilities, net, are included as a component of Other liabilities on our consolidated balance sheets.

Intangible assets consisted of the following (in millions):

	Remaining Weighted Average Useful Life	As of December 31, 2018			As of December 31, 2017		
		Gross Carrying Amount	Accumulated Amortization	Net	Gross Carrying Amount	Accumulated Amortization	Net
Waste, service and energy contracts	19 years	$ 522	$ 271	$ 251	$ 494	$ 243	$ 251
Customer relationships, permits and other	5 years	$ 52	$ 24	$ 28	$ 54	$ 18	36
Intangible assets, net		$ 574	$ 295	$ 279	$ 548	$ 261	$ 287
Waste and service contracts (liability)	13 years	$ (72)	$ (64)	$ (8)	$ (66)	$ (62)	$ (4)

The following table details the amount of amortization expense and contra-expense associated with our intangible assets and liabilities that was included in our consolidated statements of operations for each of the years indicated (in millions):

	Year Ended December 31,		
	2018	2017	2016
Intangible assets, net	$ 20	$ 20	$ 27
Waste and service contracts (contra-expense)	$ (2)	$ (2)	$ (6)

The following table details the amount of estimated amortization expense and contra-expense associated with our intangible assets and liabilities expected to be included in our consolidated statements of operations for each of the years indicated as of December 31, 2018 (in millions):

	Year Ended December 31,				
	2019	2020	2021	2022	2023
Intangible assets, net	26	30	28	16	13
Waste and service contracts (contra-expense)	(2)	$ (1)	$ (1)	$ —	$ —

The weighted average number of years prior to the next renewal period for contracts that we have an intangible recorded is 6 years.

Goodwill

The following table details the changes in carrying value of goodwill (in millions):

	Total
Balance at December 31, 2016	$ 302
Goodwill related to acquisitions	11
Balance at December 31, 2017	313
Goodwill related to acquisitions	8
Balance at December 31, 2018	$ 321

As of December 31, 2018 , goodwill of approximately $48 million was deductible for federal income tax purposes.

NOTE 16. CONSOLIDATED DEBT

Consolidated debt is as follows (in millions):

	Average Rate	December 31, 2018	December 31, 2017
LONG-TERM DEBT:			
Revolving credit facility	4.19%	$ 212	$ 445
Term loan, net due 2019	3.12%	—	191
Term loan, net due 2023	4.27%	394	—
Credit Facilities Sub-total		$ 606	$ 636
Senior Notes		1,200	1,200
Less: deferred financing costs related to senior notes		(16)	(15)
Senior Notes Sub-total		$ 1,184	$ 1,185
Tax-exempt bonds		$ 494	$ 464
Less: deferred financing costs related to tax-exempt bonds		(6)	(5)
Tax-Exempt Bonds Sub-total		$ 488	$ 459
Equipment financing capital leases due 2024 through 2028		64	69
Total long-term debt		$ 2,342	$ 2,349
Less: current portion		(15)	(10)
Noncurrent long-term debt		$ 2,327	$ 2,339
PROJECT DEBT:			
Project debt related to service fee structures		$ 58	$ 68
Union capital lease		89	94
Project debt related to tip fee structures		3	9
Unamortized debt premium, net		3	4
Less: deferred financing costs		(1)	(1)
Total project debt		$ 152	$ 174
Less: Current portion		(19)	(23)
Noncurrent project debt		$ 133	$ 151
TOTAL CONSOLIDATED DEBT		$ 2,494	$ 2,523
Less: Current debt		(34)	(33)
TOTAL NONCURRENT CONSOLIDATED DEBT		$ 2,460	$ 2,490

Credit Facility Refinancing

In 2018, our subsidiary, Covanta Energy, entered into an amended and restated $1.3 billion senior secured credit agreement, which provides for a $900 million revolving credit facility (the “Revolving Credit Facility”) and a $400 million term loan (the “Term Loan”) both expiring August 2023 (collectively referred to as the "Credit Facilities").

The refinancing transaction:

- reduced the aggregate commitment amount of the Revolving Credit Facility by $100 million to $900 million and adjusted the pricing grid such that the initial applicable margin was reduced by 25 basis points as compared to the previous Revolving Credit Facility;
- refinanced Covanta Energy's previous $200 million Term Loan with a new $400 million Term Loan; and
- extended the maturity date of both the Term Loan and Revolving Credit Facility from March 2020 to August 2023.

We incurred approximately $7 million in financing costs related to these amendments which will be deferred and amortized over the five year term of the Credit Facilities. In addition, the remaining unamortized deferred costs of $4 million on the previous Revolver and Term Loan collectively will also be deferred and amortized over the revised term of 5 years. A portion of the net proceeds of the new Term Loan were used to repay direct borrowings under the previous Revolving Credit Facility and pay transaction fees and expenses.

The Revolving Credit Facility is available for the issuance of letters of credit of up to $600 million , provides for a $50 million sub-limit for the issuance of swing line loans (a loan that can be requested in US Dollars on a same day basis for a short drawing period); and is available in US Dollars, Euros, Pounds Sterling, Canadian Dollars and certain other currencies to be agreed upon, in each case for either borrowings or for the issuance of letters of credit. The proceeds under the Revolving Credit Facility are available for working capital and general corporate purposes of Covanta Energy and its subsidiaries. We have the option to establish additional term loan commitments and/or increase the size of the Revolving Credit Facility (collectively, the "Incremental Facilities"), subject to the satisfaction of certain conditions and obtaining sufficient lender commitments, in an amount up to the greater of $500 million and the amount that, after giving effect to the incurrence of such Incremental Facilities, would not result in a leverage ratio, as defined in the credit agreement governing our Credit Facilities (the "Credit Agreement"), exceeding 2.75:1.00.

Unutilized Capacity under Revolving Credit Facility

As of December 31, 2018 , we had unutilized capacity under the Revolving Credit Facility as follows (in millions):

	Total Facility Commitment	Expiring	Direct Borrowings	Outstanding Letters of Credit	Unutilized Capacity
Revolving Credit Facility	$ 900	2023	$ 212	$ 239	$ 449

Repayment Terms

As of December 31, 2018 , the Term Loan has mandatory principal payments of approximately $10 million in each year through 2022 and $355 million in 2023. The Credit Facilities are pre-payable at our option at any time.

Interest and Fees

Borrowings under the Credit Facilities bear interest, at our option, at either a base rate or a Eurodollar rate plus an applicable margin determined by a pricing grid based on Covanta Energy's leverage ratio. Base rate is defined as the higher of (i) the Federal Funds Effective Rate plus 0.50% , (ii) the rate the administrative agent announces from time to time as its per annum "prime rate" or (iii) the London Interbank Offered Rate ("LIBOR"), or a comparable or successor rate, plus 1.00% . Base rate borrowings under the Revolving Credit Facility bear interest at the base rate plus an applicable margin ranging from 0.50% to 1.50% . Eurodollar borrowings under the Revolving Credit Facility bear interest at LIBOR plus an applicable margin ranging from 1.75% to 2.75% . Fees for issuances of letters of credit include fronting fees equal to 0.15% per annum and a participation fee for the lenders equal to the applicable interest margin for LIBOR rate borrowings. We will incur an unused commitment fee ranging from 0.30% to 0.50% on the unused amount of commitments under the Revolving Credit Facility.

Base rate borrowings under the Term Loan bear interest at the base rate plus an applicable margin ranging from 0.75% to 1.00% . Eurodollar borrowings under the Term Loan bear interest at LIBOR plus an applicable margin ranging from 1.75% to 2.00% .

Guarantees and Securitization

The Credit Facilities are guaranteed by us and by certain of our subsidiaries. The subsidiaries that are party to the Credit Facilities agreed to secure all of the obligations under the Credit Facilities by granting, for the benefit of secured parties, a first priority lien on substantially all of their assets, to the extent permitted by existing contractual obligations. The Credit Facilities are also secured by a pledge of substantially all of the capital stock of each of our domestic subsidiaries and 65% of substantially all the capital stock of each of our directly-owned foreign subsidiaries, in each case to the extent not otherwise pledged.

Credit Agreement Covenants

The loan documentation governing the Credit Facilities contains various affirmative and negative covenants, as well as financial maintenance covenants, that limit our ability to engage in certain types of transactions. We were in compliance with all of the affirmative and negative covenants under the Credit Facilities as of December 31, 2018 .

The negative covenants of the Credit Facilities limit our and our restricted subsidiaries' ability to, among other things:

- incur additional indebtedness (including guarantee obligations);
- create certain liens against or security interests over certain property;
- pay dividends on, redeem, or repurchase our capital stock or make other restricted junior payments;
- enter into agreements that restrict the ability of our subsidiaries to make distributions or other payments to us;
- make investments;
- consolidate, merge or transfer all or substantially all of our assets and the assets of our subsidiaries on a consolidated basis;
- dispose of certain assets; and
- make certain acquisitions.

The financial maintenance covenants of the Credit Facilities, which are measured on a trailing four quarter period basis, include the following:

- a maximum Leverage Ratio of 4.00 to 1.00 for the trailing four quarter period, which measures the principal amount of Covanta Energy's consolidated debt less certain restricted funds dedicated to repayment of project debt principal and construction costs ("Consolidated Adjusted Debt") to its adjusted earnings before interest, taxes, depreciation and amortization, as calculated in the Credit Agreement ("Credit Agreement Adjusted EBITDA"). The definition of Credit Agreement Adjusted EBITDA in the Credit Facilities excludes certain non-recurring and non-cash charges and may incorporate certain pro forma adjustments.
- a minimum Interest Coverage Ratio of 3.00 to 1.00, which measures Covanta Energy's Credit Agreement Adjusted EBITDA to its consolidated interest expense plus certain interest expense of ours, to the extent paid by Covanta Energy as calculated in the Credit Agreement.

Senior Notes

The table below summarizes our aggregate principal amount of senior unsecured notes:

Maturity	Rate	December 31, 2018	December 31, 2017
2027	6.000%	$ 400	$ —
2025	5.875%	400	400
2024	5.875%	400	400
2022	6.375%	—	400
		$ 1,200	$ 1,200

Senior Notes due 2027 (the "2027 Senior Notes")

In October 2018, we issued $400 million aggregate principal amount of Senior Notes due 2027. The 2027 Senior Note bear interest at 6.00% per annum, payable semi-annually on January 1 and July 1 of each year, commencing on July 1, 2019. Net proceeds from the sale of the 2027 Senior Notes were approximately $394 million and were used along with cash on hand and/or direct borrowings under our Revolving Credit Facility to fund the optional redemption of all of our 2022 Senior Notes.

During the year ended December 31, 2018, as a result of the redemption, we recorded a prepayment charge of $9 million and a write-off of the remaining deferred financing costs of $3 million recognized in our consolidated statements of operations as a Loss on extinguishment of debt. The 2027 Senior Notes are governed by and issued pursuant to the Indenture dated January 18, 2007 between us and Wells Fargo Bank, National Association, as trustee, (the "Base Indenture") and the Sixth Supplemental Indenture dated as of October 1, 2018.

Senior Notes due 2025 (the "2025 Senior Notes")

In March 2017, we issued $400 million aggregate principal amount of 5.875% Senior Notes due July 2025. The 2025 Notes bear interest at 5.875% per annum, payable semi-annually on January 1 and July 1 of each year, beginning on July 1, 2017. Net proceeds from the sale of the 2025 Senior Notes were approximately $394 million and were used to fund the redemption of our 2020 Senior Notes.

During the year ended December 31, 2017, as a result of the redemption, we recorded a prepayment charge of $9 million and a write-off of the remaining deferred financing costs of $4 million recognized in our consolidated statements of operations as a Loss on extinguishment of debt. The 2025 Senior Notes are governed by and issued pursuant to the Base Indenture and the Fifth Supplemental Indenture dated March 16, 2017.

Senior Notes due 2024 (the "2024 Senior Notes")

In March 2014, we issued $400 million aggregate principal amount of 5.875% Senior Notes due March 2024. The 2024 Senior Notes bear interest at 5.875% per annum, payable semi-annually on March 1 and September 1 of each year, commencing on September 1, 2014. The 2024 Senior Notes are governed by and issued pursuant to the Base Indenture and the Fourth Supplemental Indenture dated March 6, 2014.

Our Senior Notes are:

- general unsecured obligations of Covanta and are not guaranteed by any of our subsidiaries;
- rank equally in right of payment with all of our existing and future senior unsecured indebtedness that is not subordinated in right of payment to the Senior Notes;
- are effectively subordinated in right of payment to any of our existing and future secured indebtedness to the extent of the value of the assets securing such indebtedness;
- are structurally subordinated to any existing and future liabilities of any of our subsidiaries, including Covanta Energy, including their guarantees under certain of our Tax-Exempt Bonds;
- governed by the Base Indenture as supplemented by the supplemental indentures;
- are subject to redemption at our option, in whole or in part, subject to the terms of their respective supplemental indentures;
- are redeemable at our option using the proceeds of certain equity offerings subject to the terms of their respective supplemental indentures.

The indentures for our Senior Notes further may limit our ability and the ability of certain of our subsidiaries to:

- incur additional indebtedness;
- pay dividends or make other distributions or repurchase or redeem their capital stock;
- prepay, redeem or repurchase certain debt;
- make loans and investments;
- sell restricted assets;
- incur liens;
- enter into transactions with affiliates;
- alter the businesses they conduct;
- enter into agreements restricting our subsidiaries' ability to pay dividends; and
- consolidate, merge or sell all or substantially all of their assets.

Tax-Exempt Bonds

Our Tax-Exempt Bonds are summarized in the table below:

Series	Maturity	Coupon	December 31, 2018	December 31, 2017
New Hampshire Series 2018A	2027	4.000%	$ 20	$ —
New Hampshire Series 2018B	2042	4.625%	67	—
New Hampshire Series 2018C	2042	4.875%	82	—
New York Series 2018A	2042	4.750%	130	—
New York Series 2018B	2024	3.500%	35	—
Virginia Series	2038	5.000%	30	—
New Jersey Series 2015A	2045	5.250%	90	90
Pennsylvania Series 2015A	2043	5.000%	40	40
Massachusetts Series 2012A	2027	4.875%	—	20
Massachusetts Series 2012B	2042	4.875%	—	67
Massachusetts Series 2012C	2042	5.250%	—	82
Niagara Series 2012A	2042	5.250%	—	130
Niagara Series 2012B	2024	4.000%	—	35
			$ 494	$ 464

In September 2018, we completed a refinancing transaction involving the issuance by the National Finance Authority, a component unit of the Business Finance Authority of the State of New Hampshire, of $170 million aggregate principal amount of Resource Recovery Bonds Series 2018A, 2018B and 2018C (the "New Hampshire Series”) and the issuance by the Niagara Area Development Corporation of $165 million aggregate principal amount of Solid Waste Disposal Facility Refunding Revenue Bonds Series 2018A and 2018B (the “New York Series”).

The net proceeds of both issuances were loaned to us for the purpose of redeeming the outstanding principal balance of our previously outstanding Massachusetts Development Finance Agency 2012 Series bonds and Niagara Area Development Corporation Series 2012 bonds.

In connection with the 2018 refinancing transaction, we recorded deferred financing costs of $3 million , which will be amortized over the term of the New Hampshire and New York Series bonds. In addition, we recorded a $3 million write-off of unamortized issuance costs associated with the previously outstanding debt which was recognized as a Loss on extinguishment of debt in our condensed consolidated statement of operations for the year ended December 31, 2018. The New Hampshire Series and New York Series bonds are our senior unsecured obligations and are not guaranteed by any of our subsidiaries.

In June 2018, we completed a financing transaction involving the issuance by the Virginia Small Business Financing Authority (the “VSBFA”) of $30 million in aggregate principal amount of Solid Waste Disposal Bonds due 2038 (the “2018 Virginia Series”). The VSBFA has approved an aggregate principal amount of $50 million for issuance and $20 million remains reserved for potential future issuance at our option. The 2018 Virginia Series bonds are payable semi-annually on January 1 and July 1, of each year, beginning January 1, 2019. The Virginia Series bonds have a legal maturity of January 1, 2048 but, are subject to a mandatory tender for purchase on July 1, 2038. We utilized the net proceeds of the 2018 Virginia Series to fund certain capital expenditures at our facilities in Virginia and paying related costs of issuance. The Virginia Bonds are our senior unsecured obligations and are not guaranteed by any of our subsidiaries. Our New Jersey Series and Pennsylvania Series bonds are guaranteed by Covanta Energy.

Each of the respective loan agreements for our Tax-Exempt Bonds contain customary events of default, including failure to make any payments when due, failure to perform its covenants under the respective loan agreement, and our bankruptcy or insolvency. Additionally, each of the loan agreements contains cross-default provisions that relate to our other indebtedness. Upon the occurrence of an event of default, the unpaid balance of the loan under the applicable loan agreement will become due and payable immediately. Our Tax Exempt Bonds also contain certain terms including mandatory redemption requirements in the event that (i) the respective loan agreement is determined to be invalid, or (ii) the respective bonds are determined to be taxable. In the event of a mandatory redemption of the bonds, we will have an obligation under each respective loan agreement to prepay the respective loan in order to fund the redemption.

Union County EfW Facility Capital Lease Arrangement

In June 2016, we extended the lease term related to the Union County EfW facility through 2053, which resulted in capital lease treatment for the revised lease. We recorded a lease liability of $104 million , calculated utilizing an incremental borrowing rate of 5.0% which is included in long-term project debt on our consolidated balance sheet. The lease includes certain periods of contingent rentals based upon plant performance as either a share of revenue or a share of plant profits. These contingent payments have been excluded from the calculation of the lease liability and instead will be treated as a period expense when incurred. As of December 31, 2018 , the outstanding borrowings under the capital lease have mandatory payments remaining as follows (in millions):

	2019	2020	2021	2022	2023	Thereafter
Future minimum payments	$ 5	$ 6	$ 6	$ 6	$ 7	$ 59

Equipment Financing Capital Lease Arrangements

In 2014, we entered into equipment financing capital lease arrangements to finance the purchase of barges, railcars, containers and intermodal equipment related to our New York City contract. The lease terms range from 10 years to 12 years and the fixed interest rates range from 3.48% to 8.16% . The outstanding borrowings under the equipment financing capital lease arrangements were $64 million as of December 31, 2018 , and have mandatory payments remaining as follows (in millions):

	2019	2020	2021	2022	2023	Thereafter
Future minimum payments	$ 5	$ 6	$ 6	$ 6	$ 6	$ 35

Depreciation associated with these capital lease arrangements is included in Depreciation and amortization expense on our consolidated statement of operations. For additional information see *Note 1. Organization and Summary of Significant Accounting Policies - Property, Plant and Equipment* .

PROJECT DEBT

The maturities of project debt as of December 31, 2018 are as follows (in millions):

	2019	2020	2021	2022	2023	Thereafter	Total	Less: Current Portion	Total Noncurrent Project Debt
Debt	$ 19	$ 8	$ 8	$ 9	$ 9	$ 97	$ 150	$ (19)	$ 131
Premium and deferred financing costs	—	—	—	—	—	2	2	—	2
Total [1]	$ 19	$ 8	$ 8	$ 9	$ 9	$ 99	$ 152	$ (19)	$ 133

(1) Amounts include the Union Capital lease discussed above.

Project debt associated with the financing of energy-from-waste facilities is arranged by municipal entities through the issuance of tax-exempt and taxable revenue bonds or other borrowings. For those facilities we own, that project debt is recorded as a liability on our consolidated balance sheet. Generally, debt service for project debt related to Service Fee structures is the primary responsibility of municipal entities, whereas debt service for project debt related to Tip Fee structures is paid by our project subsidiary from project revenue expected to be sufficient to cover such expense.

Payment obligations for our project debt associated with energy-from-waste facilities are generally limited recourse to the operating subsidiary and non-recourse to us, subject to operating performance guarantees and commitments. These obligations are typically secured by the revenue pledged under the respective indentures and by a mortgage lien and a security interest in the respective energy-from-waste facility and related assets. As of December 31, 2018 , such revenue bonds were collateralized by property, plant and equipment with a net carrying value of $538 million and restricted funds held in trust of approximately $22 million .

Rates on our project debt as of December 31, 2018 were as follows:

	Minimum	Maximum
Project debt related to service fee structures due through 2035	4.00%	5.00%
Project debt related to tip fee structures due through 2020	5.25%	6.20%

Financing Costs

All deferred financing costs are amortized to interest expense over the life of the related debt using the effective interest method. For each of the years ended December 31, 2018, 2017 and 2016 amortization of deferred financing costs included as a component of interest expense totaled $5 million , $7 million and $6 million , respectively.

Capitalized Interest

Interest expense paid and costs amortized to interest expense related to project financing are capitalized during the construction and start-up phase of the project. Total interest expense capitalized was as follows (in millions):

	Year Ended December 31,		
	2018	2017	2016
Capitalized interest	$ —	$ 17	$ 26

Project Debt Included in Liabilities Held for Sale

In December 2017, as part of the joint venture transaction with GIG, we announced a plan to sell a 50% indirect interest in our Dublin project. Accordingly, during the fourth quarter of 2017, we determined that the assets and liabilities associated with our Dublin EfW facility met the criteria for classification as assets held for sale. The transaction was completed in February 2018 and resulted in our loss of a controlling interest in Dublin EfW, which required the entity to be deconsolidated from our financial statements as of the sale date. For additional information see *Note 3. New Business and Asset Management - Green Investment Group Limited ("GIG") Joint Ventures.*

Project debt included in Liabilities held for sale on our consolidated balance sheet of December 31, 2017 is as follows:

Dublin Senior Loan due 2032 (2.77% - 3.57%) [1]	$ 474
Less: debt discount related to Dublin Senior Loan	(10)
Less: deferred financing costs related to Dublin Senior Loan	(13)
Dublin Senior Loan, net	451
Dublin Junior Loan due 2032 (4.23%-5.36%)	$ 60
Less: deferred financing costs related to Dublin Junior Loan	(1)
Dublin Junior Loan, net	59
Total project debt included in Liabilities held for sale, net	$ 510

[1] Reflects hedged fixed rates.

Dublin Project Refinancing

During 2014, we executed agreements for project financing totaling €375 million to fund a majority of the construction costs of the Dublin EfW facility. The project financing package included: (i) €300 million of project debt under a credit facility agreement with various lenders which consisted of a €250 million senior secured term loan (the "Dublin Senior Term Loan due 2021") and a €50 million second lien term loan (the "Dublin Junior Term Loan due 2022"), and (ii) a €75 million convertible preferred investment (the "Dublin Convertible Preferred"), which was committed by a leading global energy infrastructure investor.

On December 14, 2017, we executed agreements for project financing totaling €446 million ($534 million) to refinance the existing project debt and the Dublin Convertible Preferred. The new financing package included: (i) €396 million ($474 million) of senior secured project debt under a credit facility agreement between Dublin Waste to Energy Limited and various lenders (the "Dublin Senior Loan") and (ii) a €50 million ($60 million) second lien term loan between Dublin Waste to Energy Group (Holdings) Limited and various lenders (the "Dublin Junior Loan"). The proceeds of the loans, along with other sources of funds, were utilized to repay (i) Dublin Senior Term Loan due 2021, (ii) the Dublin Junior Term Loan due 2022, (iii) the Dublin Convertible Preferred and (iv) transaction related fees and expenses.

During the year ended December 31, 2017, as a result of the Dublin project refinancing, we recorded the following charges to Loss on extinguishment of debt on our consolidated statement of operations: (i) a "make whole" payment on the Dublin Convertible Preferred of $41 million , (ii) $19 million of third party fees incurred in connection with the refinance and a write-off of part of the remaining deferred financing costs and (iii) unamortized debt discount and deferred financing costs of $11 million .

Unamortized debt discount and deferred financing costs of $13 million related to the remaining portion of the previous debt that was considered a debt modification will continue to be amortized over the term of the refinanced debt. Debt discount and fees incurred in connection with the refinance totaling $11 million were deferred and will be amortized over the life of the refinanced debt as a debt discount.

As of December 31, 2017 the Dublin project debt was classified as Liabilities held for sale on our consolidated balance sheet. For further information see *Note 4. Dispositions and Assets Held for Sale* .

Dublin Senior Loan due 2032

As of December 31, 2017, the €396 million ($474 million) Dublin Senior Loan was fully drawn and is included in Liabilities held for sale on our consolidated balance sheet. The Dublin Senior Loan is comprised of three tranches as follows: i) a €94 million ($113 million) fixed rate Tranche A, (ii) a €167 million ($199 million) fixed rate Tranche B and (iii) a €135 million ($162 million) floating rate Tranche C.

Key commercial terms of the Dublin Senior Term Loan include:

- Final maturity on November 24, 2032 (approximately 15 years after the operational commencement date of the facility).
- Scheduled repayments will be made semi-annually according to a 15-year amortization profile, beginning in 2018. The Dublin Senior Loan is pre-payable at our option, subject to potential prepayment costs under Tranche A and B.
- Borrowings will bear interest as follows:
- Tranche A: At a fixed rate equal to 3.00%
- Tranche B: At a fixed rate equal to 2.77%
- Tranche C: At the 6-month Euro Interbank Offered Rate ("EURIBOR") plus 2.15% . We entered into interest rate swap agreements in order to hedge our exposure to adverse variable interest rate fluctuations under Tranche C.
- The Dublin Senior Loan is a senior obligation of the project company and certain other related subsidiaries, all of which are wholly-owned by us, and is secured by a first priority lien on substantially all of the project-related assets. The Dublin Senior Term Loan is non-recourse to us and our subsidiary Covanta Energy.
- The Dublin Senior Loan credit agreement contains positive, negative and financial maintenance covenants that are customary for a project financing of this type. Our ability to service the Dublin Junior Loan and to make cash distributions to common equity is subject to ongoing compliance with these covenants, including maintaining a minimum debt service coverage ratio and loan life coverage ratio on the Dublin Senior Loan.

Dublin Junior Loan due 2032

As of December 31, 2017, the €50 million Dublin Junior Loan ($60 million) was fully drawn and is included in Liabilities held for sale on our consolidated balance sheet. The Dublin Junior Loan is comprised of two tranches: (i) a €21 million ($25 million) floating rate Tranche A and (ii) a €29 million ($35 million) fixed rate Tranche B.

Key commercial terms of the Dublin Junior Loan include:

- Final maturity on December 24, 2032 (one month after the maturity of the Dublin Senior Loan).
- Scheduled repayments will be made semi-annually according to a 15-year amortization profile, beginning in 2018. The loan is pre-payable at our option subject to potential prepayment costs under Tranche B. The loan shall also be reduced by an incremental amount equal to 10% of Excess Cashflow, as defined in the credit agreement, on each of the Repayment Dates occurring between October 31, 2026 through April 30, 2029 and 20% of Excess Cashflow thereafter.
- Tranche A borrowings will bear interest at the 6-month Euro Interbank Offered Rate ("EURIBOR") plus 4.50%
- Tranche B borrowings will bear interest at a fixed rate equal to 5.358% .
- The Dublin Junior Loan is a junior obligation of the project company and certain other related subsidiaries, all of which are wholly-owned by us, and is secured by a second priority lien on substantially all of the project-related assets and a first priority lien on the assets of the top tier project holding company. The Dublin Junior Loan is non-recourse to us and our subsidiary Covanta Energy.
- Under the Dublin Junior Loan credit agreement, our ability to make cash distributions to common equity is subject to ongoing compliance with the covenants under the agreement, including maintaining a minimum debt service coverage ratio on the Dublin Junior Loan.

NOTE 17. COMMITMENTS AND CONTINGENCIES

We and/or our subsidiaries are party to a number of claims, lawsuits and pending actions, most of which are routine and all of which are incidental to our business. We assess the likelihood of potential losses on an ongoing basis to determine whether losses are considered probable and reasonably estimable prior to recording an estimate of the outcome. If we can only estimate the range of a possible loss, an amount representing the low end of the range of possible outcomes is recorded. The final consequences of these proceedings are not presently determinable with certainty. As of December 31, 2018 and 2017 , accruals for our loss contingencies approximated $16 million and $18 million , respectively.

Environmental Matters

Our operations are subject to environmental regulatory laws and environmental remediation laws. Although our operations are occasionally subject to proceedings and orders pertaining to emissions into the environment and other environmental violations, which may result in fines, penalties, damages or other sanctions, we believe that we are in substantial compliance with existing environmental laws and regulations.

We may be identified, along with other entities, as being among parties potentially responsible for contribution to costs associated with the correction and remediation of environmental conditions at disposal sites subject to federal and/or analogous state laws. In certain instances, we may be exposed to joint and several liabilities for remedial action or damages. Our liability in connection with such environmental claims will depend on many factors, including our volumetric share of waste, the total cost of remediation, and the financial viability of other companies that also sent waste to a given site and, in the case of divested operations, the contractual arrangement with the purchaser of such operations.

The potential costs related to the matters described below and the possible impact on future operations are uncertain due in part to the complexity of governmental laws and regulations and their interpretations, the varying costs and effectiveness of cleanup technologies, the uncertain level of insurance or other types of recovery and the questionable level of our responsibility. Although the ultimate outcome and expense of any litigation, including environmental remediation, is uncertain, we believe that the following proceedings will not have a material adverse effect on our consolidated results of operations, financial position or cash flows.

Lower Passaic River Matter. In August 2004, the United States Environmental Protection Agency (the "EPA") notified our subsidiary, Covanta Essex Company ("Essex"), that it was a potentially responsible party ("PRP") for Superfund response actions in the Lower Passaic River Study Area ("LPRSA"), a 17 mile stretch of river in northern New Jersey. Essex's LPRSA costs to date are not material to its financial position and results of operations; however, to date the EPA has not sought any LPRSA remedial costs or natural resource damages against PRPs. In March 2016, the EPA released the Record of Decision ("ROD") for its Focused Feasibility Study of the lower 8 miles of the LPRSA; the EPA's selected remedy includes capping/dredging of sediment, institutional controls and long-term monitoring. In June 2018, PRP Occidental Chemical Corporation ("OCC") filed a federal Superfund lawsuit against 120 PRPs including Essex with respect to past and future response costs expended by OCC with respect to the LPRSA. The Essex facility started operating in 1990 and Essex does not believe there have been any releases to the LPRSA, but in any event believes any releases would have been de minimis considering the history of the LPRSA; however, it is not possible at this time to predict that outcome or to estimate the range of possible loss relating to Essex's liability in the matter, including for LPRSA remedial costs and/or natural resource damages.

Tulsa Matter. In January 2016, we were informed by the United States Attorney's Office for the Northern District of Oklahoma ("US Attorney's Office") that our subsidiary, Covanta Tulsa Renewable Energy LLC ("Covanta Tulsa"), was the target of a criminal investigation being conducted by the EPA. The investigation related to alleged improprieties in the recording and reporting of emissions data during an October 2013 incident involving one of the three municipal waste combustion units at our Tulsa, Oklahoma facility. In October 2018, Covanta Tulsa entered into a Non-Prosecution Agreement ("NPA") with the US Attorney's Office, pursuant to which no charges will be filed if, for a period of one year, Covanta Tulsa satisfies the requirements of the NPA, including that it comply with applicable laws and regulations. As part of the NPA, Covanta Tulsa also made a $200,000 community service payment to the Oklahoma Department of Environmental Quality to fund air quality and environmental efforts in Oklahoma.

Other Matters

China Indemnification Claims

Subsequent to completing the exchange of our project ownership interests in China for a 15% ownership interest in Sanfeng Environment, Sanfeng Environment made certain claims for indemnification under the agreement related to the condition of the facility in Taixing. In February 2018, we made a settlement payment of $7 million related to this claim.

Durham-York Contractor Arbitration

In January 2019, the arbitrator issued a decision regarding outstanding disputes with our primary contractor for the Durham-York construction project, which related to: (i) claims by the contractor for the balance of the contract price withheld, change orders, delay damages and other expense reimbursement and (ii) claims by us for charges and liquidated damages for project completion delays. Our results as of and for the year ended December 31, 2018 reflected an adjustment to our previous estimate for this settlement, including interest and fees which was not material to our results of operations.

Other Commitments

Other commitments as of December 31, 2018 were as follows (in millions):

Letters of credit issued under the Revolving Credit Facility	$	239
Surety bonds		180
Total other commitments — net	$	419

The letters of credit were issued to secure our performance under various contractual undertakings related to our domestic and international projects or to secure obligations under our insurance program. Each letter of credit relating to a project is required to be maintained in effect for the period specified in related project contracts, and generally may be drawn if it is not renewed prior to expiration of that period.

We believe that we will be able to fully perform under our contracts to which these existing letters of credit relate, and that it is unlikely that letters of credit would be drawn because of a default of our performance obligations. If any of these letters of credit were to be drawn by the beneficiary, the amount drawn would be immediately repayable by us to the issuing bank. If we do not immediately repay such amounts drawn under letters of credit issued under the Revolving Credit Facility, unreimbursed amounts would be treated under the Credit Facilities as either additional term loans or as revolving loans.

The surety bonds listed in the table above relate primarily to construction and performance obligations and support for other obligations, including closure requirements of various energy projects when such projects cease operating. Were these bonds to be drawn upon, we would have a contractual obligation to indemnify the surety company.

We have certain contingent obligations related to our Senior Notes and Tax-Exempt Bonds. Holders may require us to repurchase their Senior Notes and Tax-Exempt Bonds if a fundamental change occurs. For specific criteria related to the redemption features of the Senior Notes and Tax-Exempt Bonds, see *Note 16. Consolidated Debt* .

We have issued or are party to guarantees and related contractual support obligations undertaken pursuant to agreements to construct and operate waste and energy facilities. For some projects, such performance guarantees include obligations to repay certain financial obligations if the project revenue is insufficient to do so, or to obtain or guarantee financing for a project. With respect to our businesses, we have issued guarantees to public sector clients and other parties that our subsidiaries will perform in accordance with contractual terms, including, where required, the payment of damages or other obligations. Additionally, damages payable under such guarantees for our energy-from-waste facilities could expose us to recourse liability on project debt. If we must perform under one or more of such guarantees, our liability for damages upon contract termination would be reduced by funds held in trust and proceeds from sales of the facilities securing the project debt and is presently not estimable. Depending upon the circumstances giving rise to such damages, the contractual terms of the applicable contracts, and the contract counterparty's choice of remedy at the time a claim against a guarantee is made, the amounts owed pursuant to one or more of such guarantees could be greater than our then-available sources of funds. To date, we have not incurred material liabilities under such guarantees.

New York City Contract Investments

We expect to incur a total of approximately $35 million of capital expenditures, primarily for transportation equipment related to our New York City waste transport and disposal contract, for additional information see *Note 3. New Business and Asset Management* . As of December 31, 2018 , we have incurred $13 million of these expenditures which is included in Purchase of property, plant and equipment on our consolidated statement of cash flows for the year ended December 31, 2018 .

NOTE 18. QUARTERLY DATA (UNAUDITED)

The following table presents quarterly unaudited financial data for the periods presented on the consolidated statements of operations (in millions, except per share amounts):

	Quarter Ended							
	March 31,		June 30,		September 30,		December 31,	
	2018	2017	2018	2017	2018	2017	2018	2017
Operating revenue	$ 458	$ 404	$ 454	$ 424	$ 456	$ 429	$ 500	$ 495
Operating income (loss)	$ 20	$ (23)	$ (18)	$ 20	$ 2	$ 46	$ 59	$ 58
Net income (loss)	$ 201	$ (52)	$ (31)	$ (37)	$ (27)	$ 15	$ 9	$ 131
Earnings (loss) per share:								
Basic	$ 1.55	$ (0.41)	$ (0.24)	$ (0.28)	$ (0.21)	$ 0.11	$ 0.07	$ 1.02
Diluted	$ 1.53	$ (0.41)	$ (0.24)	$ (0.28)	$ (0.21)	$ 0.11	$ 0.07	$ 1.01

Net income for the quarter ended March 31, 2018 includes a $204 million gain on the loss of our controlling interest in Dublin EfW. See *Note 3. New Business and Asset Management* and *Note 4. Dispositions and Assets Held for Sale* for further information.

Net income for the quarter ended December 31, 2017 includes a net benefit of $183 million or $1.39 per diluted share associated with the enactment of the Tax Cuts and Jobs Act discussed further in *Note 11. Income Taxes* .

Schedule II — Valuation and Qualifying Accounts
Receivables Valuation and Qualifying Accounts

		Additions			
Description	Balance Beginning of Year	Charged to Costs and Expense	Charged to Other Accounts	Deductions	Balance at End of Period
			(In millions)		
Reserves for doubtful accounts:					
Year ended December 31, 2018	$ 14	$ 2	$ —	$ 8	$ 8
Year ended December 31, 2017	$ 9	$ 9	$ —	$ 4	$ 14
Year ended December 31, 2016	$ 7	$ 3	$ —	$ 1	$ 9
Deferred tax valuation allowance:					
Year ended December 31, 2018	$ 77	$ 6	$ (4)	$ (6)	$ 73
Year ended December 31, 2017	$ 71	$ 16	$ (2)	$ (8)	$ 77
Year ended December 31, 2016	$ 73	$ 9	$ (4)	$ (7)	$ 71

Item 9. ***CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE***

There were no disagreements with accountants on accounting and financial disclosure.

Item 9A. ***CONTROLS AND PROCEDURES***

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, has evaluated the effectiveness of Covanta's disclosure controls and procedures, as required by Rule 13a-15(b) and 15d-15(b) under the Securities Exchange Act of 1934 (the "Exchange Act") as of December 31, 2018 . Our disclosure controls and procedures are designed to reasonably assure that information required to be disclosed by us in reports we file or submit under the Exchange Act is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding disclosure and is recorded, processed, summarized and reported within the time periods specified in the Securities and Exchange Commission's rules and forms.

Our Chief Executive Officer and Chief Financial Officer have concluded that, based on their reviews, our disclosure controls and procedures are effective to provide such reasonable assurance.

Our management, including our Chief Executive Officer and Chief Financial Officer, believes that any disclosure controls and procedures or internal controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must consider the benefits of controls relative to their costs. Inherent limitations within a control system include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people, or by unauthorized override of the control. While the design of any system of controls is to provide reasonable assurance of the effectiveness of disclosure controls, such design is also based in part upon certain assumptions about the likelihood of future events, and such assumptions, while reasonable, may not take into account all potential future conditions. Accordingly, because of the inherent limitations in a cost effective control system, misstatements due to error or fraud may occur and may not be prevented or detected.

Our management has conducted an assessment of its internal control over financial reporting as of December 31, 2018 as required by Section 404 of the Sarbanes-Oxley Act. Management's report on our internal control over financial reporting is included on page 104 . The Independent Registered Public Accounting Firm's report with respect to the effectiveness of our internal control over financial reporting is included on page 105 . Management has concluded that internal control over financial reporting is effective as of December 31, 2018 .

Changes in Internal Control over Financial Reporting

There has not been any change in our system of internal control over financial reporting during the quarter ended December 31, 2018 that has materially affected, or is reasonably likely to materially affect, internal control over financial reporting.

Management's Report on Internal Control over Financial Reporting

The management of Covanta Holding Corporation ("Covanta") is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rule 13a-15(f).

All internal control systems, no matter how well designed, have inherent limitations including the possibility of human error and the circumvention or overriding of controls. Further, because of changes in conditions, the effectiveness of internal controls may vary over time. 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. Accordingly, even those systems determined to be effective can provide us only with reasonable assurance with respect to financial statement preparation and presentation.

Covanta's management has assessed the effectiveness of internal control over financial reporting as of December 31, 2018 , following the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in Internal Control - Integrated Framework (2013 Framework). Based on our assessment under the framework in Internal Control - Integrated Framework (2013 Framework), Covanta's management has concluded that our internal control over financial reporting was effective as of December 31, 2018 .

Our independent auditors, Ernst & Young LLP, have issued an attestation report on our internal control over financial reporting. This report appears on page 105 of this report on Form 10-K for the year ended December 31, 2018 .

/s/ Stephen J. Jones

Stephen J. Jones

President and Chief Executive Officer

/s/ Bradford J. Helgeson

Bradford J. Helgeson

Executive Vice President and Chief Financial Officer

February 19, 2019

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Covanta Holding Corporation

Opinion on Internal Control over Financial Reporting

We have audited Covanta Holding Corporation and subsidiaries' internal control over financial reporting as of December 31, 2018 , based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Covanta Holding Corporation and subsidiaries (the Company) maintained, in all material aspects, effective internal control over financial reporting as of December 31, 2018 , based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), consolidated balance sheets of the Company as of December 31, 2018 and 2017 , and the related consolidated statements of operations, comprehensive income (loss), equity and cash flows for each of the three years in the period ended December 31, 2018 , and the related notes and financial statement schedule listed in the Index at Item 15a of the Company and our report dated February 19, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

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

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

/s/ Ernst & Young LLP

Iselin, New Jersey
February 19, 2019

Item 9B. ***OTHER INFORMATION***

None.

PART III

Item 10. ***DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE***

Information regarding our executive officers is incorporated by reference herein from the discussion under *Item 1. Business — Executive Officers* of this Annual Report on Form 10-K. We have a Code of Conduct and Ethics for Senior Financial Officers and a Policy of Business Conduct. The Code of Conduct and Ethics applies to our Chief Executive Officer, Chief Financial Officer, Chief Accounting Officer, Controller or persons performing similar functions. The Policy of Business Conduct applies to all of our directors, officers and employees and those of our subsidiaries. Both the Code of Conduct and Ethics and the Policy of Business Conduct are posted on our website at www.covanta.com on the Corporate Governance page. We will post on our website any amendments to or waivers of the Code of Conduct and Ethics or Policy of Business Conduct for executive officers or directors, in accordance with applicable laws and regulations. The remaining information called for by this Item 10 is incorporated by reference herein from the discussions under the headings "Election of Directors," "Board Structure and Composition — Committees of the Board," and "Security Ownership of Certain Beneficial Owners and Management — Section 16(a) Beneficial Ownership Reporting Compliance" in our definitive Proxy Statement for the 2019 Annual Meeting of Stockholders.

Item 11. ***EXECUTIVE COMPENSATION***

The information required by Item 11 of Form 10-K is incorporated by reference herein from the discussions under the headings "Compensation Committee Report," "Board Structure and Composition — Compensation of the Board," and "Executive Compensation" in our definitive Proxy Statement for the 2019 Annual Meeting of Stockholders.

Item 12. ***SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS***

The information required by Item 12 of Form 10-K is incorporated by reference herein from the discussion under the headings "Security Ownership of Certain Beneficial Owners and Management" and "Equity Compensation Plan Information" in our definitive Proxy Statement for the 2019 Annual Meeting of Stockholders.

Item 13. ***CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE***

The information required by Item 13 of Form 10-K is incorporated by reference herein from the discussions under the headings "Board Structure and Composition" and "Certain Relationships and Related Person Transactions" in the definitive Proxy Statement for the 2019 Annual Meeting of Stockholders.

Item 14. ***PRINCIPAL ACCOUNTANT FEES AND SERVICES***

The information required by Item 14 of Form 10-K is incorporated by reference herein from the discussion under the heading "Independent Registered Public Accountant Fees" in the definitive Proxy Statement for the 2019 Annual Meeting of Stockholders.

PART IV

Item 15. ***EXHIBITS, FINANCIAL STATEMENT SCHEDULES***

(a) Documents filed as part of this report:

(1) Consolidated Financial Statements of Covanta Holding Corporation:

Included in Part II of this Report:

Consolidated Statements of Operations for the years ended December 31, 2018, 2017 and 2016
Consolidated Statements of Comprehensive Income (Loss) for the years ended December 31, 2018, 2017 and 2016
Consolidated Balance Sheets as of December 31, 2017 and 2016
Consolidated Statements of Cash Flows for the years ended December 31, 2018, 2017 and 2016
Consolidated Statements of Equity for the years ended December 31, 2018, 2017 and 2016
Notes to Consolidated Financial Statements, for the years ended December 31, 2018, 2017 and 2016
Report of Ernst & Young LLP, Independent Registered Public Accounting Firm, on the consolidated financial statements of Covanta Holding Corporation for the years ended December 31, 2018, 2017 and 2016

(2) Financial Statement Schedules of Covanta Holding Corporation:

Included in Part II of this report: Schedule II — Valuation and Qualifying Accounts

All other schedules are omitted because they are not applicable, not significant or not required, or because the required information is included in the financial statement notes thereto.

(3) Exhibits:

EXHIBIT INDEX

Exhibit No.	Description
Articles of Incorporation and By-Laws.	
3.1†	Restated Certificate of Incorporation of Covanta Holding Corporation (incorporated herein by reference to Exhibit 3.1 of Covanta Holding Corporation's Current Report on Form 8-K dated January 19, 2007 and filed with the SEC on January 19, 2007).
3.2†	Amended and Restated Bylaws of Covanta Holding Corporation, effective September 19, 2013 (incorporated herein by reference to Exhibit 3.1(ii) of Covanta Holding Corporation's Current Report on Form 8-K dated September 19, 2013 filed with the SEC on September 20, 2013).
Instruments Defining Rights of Security Holders, Including Indentures.	
4.1†	Registration Rights Agreement dated November 8, 2002 among Covanta Holding Corporation and SZ Investments, L.L.C. (incorporated herein by reference to Exhibit 10.6 of Covanta Holding Corporation's Annual Report on Form 10-K for the year ended December 27, 2002 and filed with the SEC on March 27, 2003).
4.2†	Registration Rights Agreement between Covanta Holding Corporation, D.E. Shaw Laminar Portfolios, L.L.C., SZ Investments, L.L.C., and Third Avenue Trust, on behalf of The Third Avenue Value Fund Series, dated December 2, 2003 (incorporated herein by reference to Exhibit 4.1 of Covanta Holding Corporation's Current Report on Form 8-K dated December 2, 2003 and filed with the SEC on December 5, 2003).
4.3†	Indenture dated as of January 18, 2007 between Covanta Holding Corporation and Wells Fargo Bank, National Association, as trustee (incorporated herein by reference to Exhibit 4.1 of Covanta Holding Corporation's Registration Statement on Form S-3 (Reg. No. 333-140082) filed with the SEC on January 19, 2007).
4.4†	Third Supplemental Indenture dated as of March 19, 2012 between Covanta Holding Corporation and Wells Fargo Bank, National Association, as trustee (incorporated herein by reference to Exhibit 4.2 of Covanta Holding Corporation's Current Report on Form 8-K dated March 19, 2012 and filed with the SEC on March 19, 2012).
4.5†	Fourth Supplemental Indenture dated as of March 6, 2014 between Covanta Holding Corporation and Wells Fargo Bank, National Association, as trustee (incorporated herein by reference to Exhibit 4.2 of Covanta Holding Corporation's Current Report on Form 8-K dated March 6, 2014 and filled with the SEC on March 6, 2014).
4.6†	Fifth Supplemental Indenture dated as of March 16, 2017 between Covanta Holding Corporation and Wells Fargo Bank, National Association, as trustee (incorporated herein by reference to Exhibit 4.2 of Covanta Holding Corporation's Current Report on Form 8-K dated March 16, 2017 and filled with the SEC on March 16, 2017).
4.7†	Sixth Supplemental Indenture dated as of October 18, 2018 between Covanta Holding Corporation and Wells Fargo Bank, National Association, as trustee (incorporated herein by reference to Exhibit 4.2 of Covanta Holding Corporation's Current Report on Form 8-K dated October 18, 2018 and filed with the SEC on October 18, 2018).
Material Contracts.	
10.1†*	Covanta Energy Savings Plan, as amended by December 2003 amendment (incorporated herein by reference to Exhibit 10.25 of Covanta Holding Corporation's Annual Report on Form 10-K for the year ended December 31, 2004 and filed with the SEC on March 16, 2005).
10.2†	Rehabilitation Plan Implementation Agreement, dated January 11, 2006, by and between John Garamendi, Insurance Commissioner of the State of California, in his capacity as Trustee of the Mission Insurance Company Trust, the Mission National Insurance Company Trust and the Enterprise Insurance Company Trust, on the one hand, and Covanta Holding Corporation, on the other hand (incorporated herein by reference to Exhibit 10.1 of Covanta Holding Corporation's Current Report on Form 8-K dated March 2, 2006 and filed with the SEC on March 6, 2006).
10.3†	Amendment to Rehabilitation Plan Implementation Agreement, accepted and agreed to on March 17, 2006 (incorporated herein by reference to Exhibit 10.1 of Covanta Holding Corporation's Current Report on Form 8-K dated March 17, 2006 and filed with the SEC on March 20, 2006).

10.4†	Amendment to Agreement Regarding Closing (Exhibit A to the Rehabilitation Plan Implementation Agreement), dated January 10, 2006, by and between John Garamendi, Insurance Commissioner of the State of California, in his capacity as Trustee of the Mission Insurance Company Trust, the Mission National Insurance Company Trust, and the Enterprise Insurance Company Trust, on the one hand, and Covanta Holding Corporation, on the other hand (incorporated herein by reference to Exhibit 10.2 of Covanta Holding Corporation's Current Report on Form 8-K dated March 2, 2006 and filed with the SEC on March 6, 2006).
10.5	Pledge and Security Agreement, dated as of August 21, 2018, between each of Covanta Energy Corporation and the other grantors party thereto, and Bank of America, N.A., as Collateral Agent.
10.6	Intercompany Subordination Agreement, dated as of August 21, 2018, among Covanta Energy Corporation, Covanta Holding Corporation, certain subsidiaries of Covanta Energy Corporation, as Guarantor Subsidiaries, certain other subsidiaries of Covanta Energy Company, as non-guarantor subsidiaries, and Bank of America, N.A., as Administrative Agent.
10.7†	Form of Covanta Holding Corporation Indemnification Agreement, entered into with each Director and Officer (incorporated herein by reference to Exhibit 10.1 of Covanta Holding Corporation's Current Report on Form 8-K dated December 6, 2007 and filed with the SEC on December 12, 2007.
10.8†	Equity Commitment for Rights Offering between Covanta Holding Corporation and SZ Investments L.L.C. dated February 1, 2005 (incorporated herein by reference to Exhibit 10.2 of Covanta Holding Corporation's Current Report on Form 8-K dated January 31, 2005 and filed with the SEC on February 2, 2005).
10.9†	Equity Commitment for Rights Offering between Covanta Holding Corporation and EGI-Fund (05-07) Investors, L.L.C. dated February 1, 2005 (incorporated herein by reference to Exhibit 10.3 of Covanta Holding Corporation's Current Report on Form 8-K dated January 31, 2005 and filed with the SEC on February 2, 2005).
10.10†	Loan Agreement, dated as of August 29, 2018, by and between Covanta Holding Corporation and the Niagara Development Corporation (incorporated by reference to Exhibit 1.2 of Covanta Holding Corporation's Current Report on Form 8-K dated August 30, 2018 and filed with the SEC on August 30, 2018).
10.11†	Loan Agreement, dated as of August 29, 2018, by and between Covanta Holding Corporation and the New Hampshire National Finance Authority (incorporated herein by reference to Exhibit 1.1 of Covanta Holding Corporation's Current Report on Form 8-K dated August 30, 2018 and filed with the SEC on August 30, 2018).
10.12†	Agreement, dated as of August 22, 2013, by and among Covanta Holding Corporation and John M. Huff, as Director of the Missouri Department of Insurance, Financial Institutions and Professional Registration (the "Trustee") solely in his capacity as trustee and statutory receiver of the Mission Reinsurance Corporation Trust and the Holland-America Insurance Company Trust (incorporated herein by reference to Exhibit 10.1 of Covanta Holding Corporation's Quarterly Report on Form 10-Q dated October 24, 2013 and filed with the SEC on October 24, 2013).
10.13†*	Covanta Holding Corporation 2014 Equity Award Plan (incorporated herein by reference to Exhibit 4.1 of Covanta Holding Corporation's Registration Statement on Form S-8 filed with the SEC on May 8, 2014).
10.14†*	Form of Covanta Holding Corporation Stock Option Agreement for Employees and Officers (incorporated herein by reference to Exhibit 4.3 of Covanta Holding Corporation's Registration Statement on Form S-8 filed with the SEC on May 7, 2008).
10.15†*	Form of Growth Equity Award Agreement (incorporated herein by reference to Exhibit 10.1 of Covanta Holding Corporation's Current Report on Form 8-K dated February 24, 2010 and filed with the SEC on March 2, 2010).
10.16†*	Covanta Energy Corporation Senior Officers Severance Plan (incorporated herein by reference to Exhibit 10.2 of Covanta Holding Corporation's Current Report on Form 8-K dated February 24, 2010 and filed with the SEC on March 2, 2010).
10.17†*	Form of Covanta Holding Corporation Restricted Stock Award Agreement for Directors (incorporated by reference to Exhibit 10.25 of Covanta Holding Corporation's Annual Report on Form 10-K filed with the SEC on February 16, 2018).
10.18†*	Form of Covanta Holding Corporation TSR Award Agreement for Employees and Officers (incorporated herein by reference to Exhibit 10.4 of Covanta Holding Corporation's Quarterly Report on Form 10-QA dated August 11, 2014 and filed with the SEC on August 11, 2014).
10.19†*	Form of Covanta Holding Corporation Stock Option Award Agreement for Directors (incorporated herein by reference to Exhibit 10.5 of Covanta Holding Corporation's Quarterly Report on Form 10-QA dated August 11, 2014 and filed with the SEC on August 11, 2014).
10.20†*	Form of Covanta Holding Corporation Restricted Stock Unit Agreement for Directors (incorporated herein by reference to Exhibit 10.35 of Covanta Holding Corporation's Annual Report on Form 10-K for the year ended December 31, 2016 and filed with the SEC on February 28, 2017).

10.21†	Second Amended and Restated Credit and Guaranty Agreement, dated as of August 21, 2018, among Covanta Energy, LLC, Covanta Holding Corporation, certain subsidiaries of Covanta Energy, LLC, as guarantors, the lenders party thereto, Bank of America, N.A., as Administrative Agent, Collateral Agent and Issuing Bank, Credit Agricole Corporate and Investment Bank, JPMorgan Chase Bank, Citizens Bank, N.A. MUFG Union Bank, N.A and Sumitomo Mitsui Banking Corporation as Syndication Agents, and TD Bank, N.A., Capital One, National Association, Cobank, ACB and Compass Bank , as Co-Documentation Agents (incorporated herein by reference to Exhibit 10.1 of Covanta Holding Corporation's Current Report on Form 8-K dated August 21, 2018 and filed with the SEC on August 21, 2018).
10.22†*	Offer Letter from Covanta Holding Corporation to Stephen J. Jones dated January 5, 2015 (incorporated herein by reference to Exhibit 10.1 of Covanta Holding Corporation's Current Report on Form 8-K dated January 5, 2015 and filed with the SEC on January 5, 2015).
10.23†*	Offer Letter from Covanta Holding Corporation to Michael J. de Castro dated May 12, 2015 (incorporated herein by reference to Exhibit 10.1 of Covanta Holding Corporation's Current Report on Form 8-K dated June 2, 2015 and filed with the SEC on June 2, 2015).
10.24†*	Form of Covanta Holding Corporation 2014 Equity Award Plan Performance Share Award Agreement for Employees and Officers (incorporated herein by reference to Exhibit 10.1 of Covanta Holding Corporation's Current Report on Form 8-K dated March 2, 2016 and filed with the SEC on March 3, 2016).
10.25†*	Form of Covanta Holding Corporation Restricted Stock Award Agreement for Senior Officers (incorporated herein by reference to Exhibit 10.34 of Covanta Holding Corporation's Annual Report on Form 10-K for the year ended December 31, 2016 and filed with the SEC on February 28, 2017).
10.26†*	Form of Covanta Holding Corporation Restricted Stock Unit Agreement for Senior Officers (incorporated herein by reference to Exhibit 10.35 of Covanta Holding Corporation's Annual Report on Form 10-K for the year ended December 31, 2016 and filed with the SEC on February 28, 2017).

Other.

21.1	Subsidiaries of the Registrant
23.1	Consent of Independent Registered Public Accounting Firm
31.1	Certification pursuant to Section 302 of Sarbanes-Oxley Act of 2002 by the Chief Executive Officer.
31.2	Certification pursuant to Section 302 of Sarbanes-Oxley Act of 2002 by the Chief Financial Officer.
32	Certification of periodic financial report pursuant to Section 906 of Sarbanes-Oxley Act of 2002 by the Chief Executive Officer and Chief Financial Officer.
101.INS	XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH	XBRL Taxonomy Extension Schema
101.CAL	XBRL Taxonomy Calculation Linkbase
101.LAB	XBRL Taxonomy Extension Labels Linkbase
101.PRE	XBRL Taxonomy Extension Presentation Linkbase
101.DEF	XBRL Taxonomy Extension Definition Document

† Not filed herewith, but incorporated herein by reference.

* Management contract or compensatory plan or arrangement.

Pursuant to paragraph 601(b)(4)(iii)(A) of Regulation S-K, the registrant has omitted from the foregoing list of exhibits, and hereby agrees to furnish to the Securities and Exchange Commission, upon its request, copies of certain instruments, each relating to long-term debt not exceeding 10% of the total assets of the registrant and its subsidiaries on a consolidated basis.

(b) Exhibits: See list of Exhibits in this Part IV, Item 15(a)(3) above.

(c) Financial Statement Schedules: See Part IV, Item 15(a)(2) above.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) 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.

COVANTA HOLDING CORPORATION
(Registrant)

By: /S/ STEPHEN J. JONES
Stephen J. Jones
President and Chief Executive Officer

Date: February 19, 2019

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Name	Title	Date
/S/ STEPHEN J. JONES Stephen J. Jones	President and Chief Executive Officer and Director (Principal Executive Officer)	February 19, 2019
/S/ BRADFORD J. HELGESON Bradford J. Helgeson	Executive Vice President, Chief Financial Officer (Principal Financial Officer)	February 19, 2019
/S/ MANPREET S. GREWAL Manpreet S. Grewal	Vice President and Chief Accounting Officer (Principal Accounting Officer)	February 19, 2019
/S/ SAMUEL ZELL Samuel Zell	Chairman of the Board	February 19, 2019
/S/ DAVID M. BARSE David M. Barse	Director	February 19, 2019
/S/ RONALD J. BROGLIO Ronald J. Broglio	Director	February 19, 2019
/S/ PETER C. B. BYNOE Peter C. B. Bynoe	Director	February 19, 2019
/S/ LINDA J. FISHER Linda J. Fisher	Director	February 19, 2019
/S/ JOSEPH M. HOLSTEN Joseph M. Holsten	Director	February 19, 2019
/S/ OWEN MICHAELSON Owen Michaelson	Director	February 19, 2019
/S/ DANIELLE PLETKA Danielle Pletka	Director	February 19, 2019
/S/ MICHAEL W. RANGER Michael W. Ranger	Director	February 19, 2019
/S/ ROBERT S. SILBERMAN Robert S. Silberman	Director	February 19, 2019
/S/ JEAN SMITH Jean Smith	Director	February 19, 2019

AMENDED AND RESTATED

PLEDGE AND SECURITY AGREEMENT

dated as of August 21, 2018

between

EACH OF COVANTA ENERGY, LLC

AND THE OTHER GRANTORS PARTY HERETO

And

BANK OF AMERICA, N.A., as Collateral Agent

TABLE OF CONTENTS

SCHEDULES AND EXHIBITS

This **AMENDED AND RESTATED PLEDGE AND SECURITY AGREEMENT** , dated as of August 21, 2018 (this " **Agreement** "), between **EACH OF THE UNDERSIGNED** , whether as an original signatory hereto or as an Additional Grantor (as herein defined) (each, a " **Grantor** "), and **BANK OF AMERICA, N.A.** , as collateral agent for the Secured Parties (as herein defined) (in such capacity as collateral agent, the " **Collateral Agent** ").

RECITALS:

WHEREAS , reference is made to that certain Second Amended and Restated Credit and Guaranty Agreement, dated as of the date hereof (as it may be amended, restated, supplemented or otherwise modified from time to time, the " **Credit Agreement** "), by and among **COVANTA ENERGY LLC** , a Delaware limited liability company (" **Company** "), **COVANTA HOLDING CORPORATION** , a Delaware corporation, **CERTAIN SUBSIDIARIES OF COMPANY** , as guarantors, the Lenders party thereto from time to time (the " **Lenders** "), **BANK OF AMERICA, N.A.** , as Administrative Agent, Collateral Agent and Issuing Bank;

WHEREAS , subject to the terms and conditions of the Credit Agreement, certain Grantors may enter into one or more Permitted Hedge Agreements, Permitted Letters of Credit and/or Permitted Cash Management Agreements with one or more Lender Counterparties;

WHEREAS , in consideration of the extensions of credit and other accommodations of Lenders and Lender Counterparties as set forth in the Credit Agreement, the Permitted Hedge Agreements, Permitted Letters of Credit and the Permitted Cash Management Agreements, respectively, each Grantor has agreed to secure such Grantor's obligations under the Credit Documents, the Permitted Hedge Agreements, the Permitted Letters of Credit and the Permitted Cash Management Agreements as set forth herein;

NOW, THEREFORE , in consideration of the premises and the agreements, provisions and covenants herein contained, each Grantor and the Collateral Agent agree as follows:

SECTION 1. DEFINITIONS; GRANT OF SECURITY.

1.1 General Definitions . In this Agreement, the following terms shall have the following meanings:

" **Account Debtor** " shall mean each Person who is obligated on a Receivable or any Supporting Obligation related thereto.

" **Accounts** " shall mean all "accounts" as defined in Article 9 of the UCC.

" **Additional Grantors** " shall have the meaning assigned in Section 5.2 .

" **Agreement** " shall have the meaning set forth in the preamble.

" **Cash Proceeds** " shall have the meaning assigned in Section 7.6 .

" **CFC** " means a "controlled foreign corporation" within the meaning of Section 957 of the Tax Code

" **CFC Holding Company** " means (i) any direct or indirect Domestic Subsidiary

that has no material assets other than the Capital Stock of one or more CFCs and (ii) any direct or indirect Domestic Subsidiary that has no material assets other than the Capital Stock or Indebtedness of one or more other Domestic Subsidiaries of the type referred to in the immediately preceding clause (i).

" **Chattel Paper** " shall mean all "chattel paper" as defined in Article 9 of the UCC,

including, without limitation, "electronic chattel paper" or "tangible chattel paper", as each term is defined in Article 9 of the UCC.

" **Collateral** " shall have the meaning assigned in Section 2.1 .

" **Collateral Account** " shall mean any account established by the Collateral Agent. " **Collateral Agent** " shall have the meaning set forth in the preamble.

" **Collateral Records** " shall mean books, records, ledger cards, files,

correspondence, customer lists, blueprints, technical specifications, manuals, computer software, computer printouts, tapes, disks and related data processing software and similar items that at any time evidence or contain information relating to any of the Collateral or are otherwise necessary or helpful in the collection thereof or realization thereupon.

" **Collateral Support** " shall mean all property (real or personal) assigned,

hypothecated or otherwise securing any Collateral and shall include any security agreement or other agreement granting a lien or security interest in such real or personal property.

" **Company** " shall have the meaning set forth in the recitals.

" **Copyright Licenses** " shall mean any and all agreements providing for the

granting of any right in or to Copyrights (whether such Grantor is licensee or licensor thereunder) including, without limitation, each agreement referred to in Schedule 4.5(B) (as such schedule may be amended or supplemented from time to time).

" **Copyrights** " shall mean all United States copyrights, whether registered or

unregistered and: (i) all registrations and applications therefor including, without limitation, the registrations and applications referred to in Schedule 4.5(A) (as such schedule may be amended or supplemented from time to time), (ii) all extensions and renewals thereof, (iii) all rights to sue for past, present and future infringements thereof, and (iv) all Proceeds of the foregoing, and, if not otherwise included in the definition of "Proceeds" herein, licenses, royalties, income, payments, claims, damages and proceeds of suit.

" **Credit Agreement** " shall have the meaning set forth in the recitals.

" **Deposit Accounts** " shall mean all "deposit accounts" as defined in Article 9 of

the UCC.

" **Documents** " shall mean all "documents" as defined in Article 9 of the UCC.

" **Equipment** " shall mean all "equipment" as defined in Article 9 of the UCC

including, without limitation, all machinery, manufacturing equipment, data processing equipment, computers, office equipment, furnishings, furniture, appliances, fixtures and tools, all accessions or

additions thereto, all parts thereof, whether or not at any time of determination incorporated or installed therein or attached thereto, and all replacements therefor, wherever located, now or hereafter existing, including any fixtures.

" **Excluded Property** " shall have the meaning set forth in Section 2.2 .

" **General Intangibles** " shall mean all "general intangibles" as defined in Article 9

of the UCC, including, without limitation, all "payment intangibles" as defined in Article 9 of the UCC, all interest rate or currency protection or hedging arrangements, all tax refunds, all licenses, permits, concessions and authorizations.

" **Goods** " shall mean all "goods" as defined in Article 9 of the UCC including,

without limitation, all Inventory and Equipment.

" **Grantors** " shall have the meaning set forth in the preamble.

" **Instruments** " shall mean all "instruments" as defined in Article 9 of the UCC.

" **Insurance** " shall mean (i) all insurance policies covering any or all of the Collateral (regardless of whether the Collateral Agent is the loss payee thereof) and (ii) any key man life insurance policies.

" **Intellectual Property** " shall mean, collectively, the Copyrights, the Copyright Licenses, the Patents, the Patent Licenses, the Trademarks, the Trademark Licenses, the Trade Secrets, and the Trade Secret Licenses.

" **Inventory** " shall mean all "inventory" as defined in Article 9 of the UCC

including, without limitation, all goods held for sale or lease or to be furnished under contracts of service or so leased or furnished, all raw materials, work in process, finished goods, and materials used or consumed in the manufacture, packing, shipping, advertising, selling, leasing, furnishing or production of such inventory or otherwise used or consumed in any Grantor's business; all goods in which any Grantor has an interest in mass or a joint or other interest or right of any kind; and all goods which are returned to or repossessed by any Grantor, all computer programs embedded in any goods and all accessions thereto and products thereof.

" **Investment Property** " shall mean (i) all "investment property" (as such term is

defined in Article 9 of the UCC) and (ii) all of the following (regardless of whether classified as investment property under the UCC): all Pledged Equity Interests and Pledged Debt; provided , however , that Investment Property shall not include any Securities Accounts, Deposit Accounts or Commodities Accounts.

" **Lender** " shall have the meaning set forth in the recitals.

" **Letter of Credit Right** " shall mean "letter of credit right" as defined in Article 9

of the UCC.

" **Non-Assignable Contract** " shall mean any agreement, contract or license to

which any Grantor is a party for which the assignment or granting of a security interest therein by such Grantor is restricted or purported to be restricted (either by its terms or by any federal or state statutory

prohibition or otherwise irrespective of whether such prohibition or restriction is enforceable under Section 9-406 through 409 of the UCC).

" **Patent Licenses** " shall mean all agreements providing for the granting of any right

in or to Patents (whether such Grantor is licensee or licensor thereunder) including, without limitation, each agreement referred to in Schedule 4.5(D) (as such schedule may be amended or supplemented from time to time).

" **Patents** " shall mean all United States patents and applications for any of the

foregoing, including, but not limited to: (i) each patent and patent application referred to in Schedule 4.5(C) hereto (as such schedule may be amended or supplemented from time to time), (ii) all reissues, divisions, continuations, continuations-in-part, extensions, renewals, and reexaminations thereof, (iii) all rights to sue for past, present and future infringements thereof, (iv) all licenses, claims, damages, and proceeds of suit arising therefrom, and (v) all Proceeds of the foregoing, and, if not otherwise included in the definition of "Proceeds" herein, licenses, royalties, income, payments, claims, damages, and proceeds of suit.

" **Pledge Supplement** " shall mean any supplement to this Agreement in

substantially the form of Exhibit A .

" **Pledged Debt** " shall mean, with respect to any Grantor, all indebtedness owed to

such Grantor, including, without limitation, all indebtedness described on Schedule 4.4(A) under the heading "Pledged Debt" (as such schedule may be amended or supplemented from time to time), issued by the obligors named therein, the instruments evidencing such indebtedness, and all interest, cash, instruments and other property or proceeds from time to time received, receivable or otherwise distributed in respect of or in exchange for any or all of such indebtedness.

" **Pledged Equity Interests** " shall mean all Pledged Stock, Pledged LLC Interests, Pledged Partnership Interests and Pledged Trust Interests.

" **Pledged LLC Interests** " shall mean, with respect to any Grantor, all interests in

any limited liability company directly owned by such Grantor including, without limitation, all limited liability company interests listed on Schedule 4.4(A) under the heading "Pledged LLC Interests" (as such schedule may be amended or supplemented from time to time) and the certificates, if any, representing such limited liability company interests and any interest of such Grantor on the books and records of such limited liability company and all dividends, distributions, cash, warrants, rights, options, instruments, securities and other property or proceeds from time to time received, receivable or otherwise distributed in respect of or in exchange for any or all of such limited liability company interests.

" **Pledged Partnership Interests** " shall mean, with respect to any Grantor, all

interests in any general partnership, limited partnership, limited liability partnership or other partnership directly owned by such Grantor including, without limitation, all partnership interests listed on Schedule 4.4(A) under the heading "Pledged Partnership Interests" (as such schedule may be amended or supplemented from time to time) and the certificates, if any, representing such partnership interests and any interest of such Grantor on the books and records of such partnership and all dividends, distributions, cash, warrants, rights, options, instruments, securities and other property or proceeds

from time to time received, receivable or otherwise distributed in respect of or in exchange for any or all of such partnership interests.

" **Pledged Stock** " shall mean, with respect to any Grantor, all shares of capital stock

directly owned by such Grantor, including, without limitation, all shares of capital stock described on Schedule 4.4(A) under the heading "Pledged Stock" (as such schedule may be amended or supplemented from time to time), and the certificates, if any, representing such shares and any interest of such Grantor in the entries on the books of the issuer of such shares, and all dividends, distributions, cash, warrants, rights, options, instruments, securities and other property or proceeds from time to time received, receivable or otherwise distributed in respect of or in exchange for any or all of such shares.

" **Pledged Trust Interests** " shall mean, with respect to any Grantor, all interests in

a Delaware business trust or other trust directly owned by such Grantor including, without limitation, all trust interests listed on Schedule 4.4(A) under the heading "Pledged Trust Interests" (as such schedule may be amended or supplemented from time to time) and the certificates, if any, representing such trust interests and any interest of such Grantor on the books and records of such trust and all dividends, distributions, cash, warrants, rights, options, instruments, securities and other property or proceeds from time to time received, receivable or otherwise distributed in respect of or in exchange for any or all of such trust interests.

" **Proceeds** " shall mean: (i) all "proceeds" as defined in Article 9 of the UCC, (ii)

payments or distributions made with respect to any Investment Property and (iii) whatever is receivable or received when Collateral or proceeds are sold, exchanged, collected or otherwise disposed of, whether such disposition is voluntary or involuntary.

" **Receivables** " shall mean all rights to payment, whether or not earned by

performance, for goods or other property sold, leased, licensed, assigned or otherwise disposed of, or services rendered or to be rendered, including, without limitation all such rights constituting or evidenced by any Account, Chattel Paper, Instrument, General Intangible or Investment Property, together with all of Grantor's rights, if any, in any goods or other property giving rise to such right to payment and all Collateral Support and Supporting Obligations related thereto.

" **Receivables Records** " shall mean (i) all original copies of all documents,

instruments or other writings or electronic records or other Records evidencing the Receivables, (ii) all books, correspondence, credit or other files, Records, ledger sheets or cards, invoices, and other papers relating to Receivables, including, without limitation, all tapes, cards, computer tapes, computer discs, computer runs, record keeping systems and other papers and documents relating to the Receivables, whether in the possession or under the control of Grantor or any computer bureau or agent from time to time acting for Grantor or otherwise, (iii) all evidences of the filing of financing statements and the registration of other instruments in connection therewith, and amendments, supplements or other modifications thereto, notices to other creditors or secured parties, and certificates, acknowledgments, or other writings, including, without limitation, lien search reports, from filing or other registration officers, (iv) all credit information, reports and memoranda relating thereto and (v) all other written or nonwritten forms of information related in any way to the foregoing or any Receivable.

" **Record** " shall have the meaning specified in Article 9 of the UCC.

“ **Secured Obligations** ” shall have the meaning assigned in Section 3.1 .

“ **Secured Parties** ” shall mean the Agents, Issuing Banks, Lenders and the Lender Counterparties and shall include, without limitation, all former Agents, Issuing Banks, Lenders and Lender Counterparties to the extent that any Obligations owing to such Persons were incurred while such Persons were Agents, Issuing Banks, Lenders or Lender Counterparties and such Obligations have not been paid or satisfied in full.

“ **Supporting Obligation** ” shall mean all “supporting obligations” as defined in Article 9 of the UCC.

“ **Tax Code** ” shall mean the United States Internal Revenue Code of 1986, as

amended from time to time.

“ **Trademark Licenses** ” shall mean any and all agreements providing for the

granting of any right in or to Trademarks (whether such Grantor is licensee or licensor thereunder) including, without limitation, each agreement referred to in Schedule 4.5(F) (as such schedule may be amended or supplemented from time to time).

“ **Trademarks** ” shall mean all United States trademarks, trade names, corporate

names, company names, business names, fictitious business names, Internet domain names, service marks, certification marks, collective marks, logos, other source or business identifiers, all registrations and applications for any of the foregoing including, but not limited to: (i) the registrations and applications referred to in Schedule 4.5(E) (as such schedule may be amended or supplemented from time to time), (ii) all extensions or renewals of any of the foregoing, (iii) the goodwill of the business connected with the use of and symbolized by the foregoing, (iv) the right to sue for past, present and future infringement or dilution of any of the foregoing or for any injury to goodwill, and (v) all Proceeds of the foregoing, and, if not otherwise included in the definition of “Proceeds” herein, licenses, royalties, income, payments, claims, damages, and proceeds of suit.

“ **Trade Secret Licenses** ” shall mean any and all agreements providing for the

granting of any right in or to Trade Secrets (whether such Grantor is licensee or licensor thereunder) including, without limitation, each agreement referred to in Schedule 4.5(G) (as such schedule may be amended or supplemented from time to time).

“ **Trade Secrets** ” shall mean all trade secrets and all other confidential or

proprietary information and know how, including but not limited to: (i) the right to sue for past, present and future misappropriation or other violation of any Trade Secret, and (ii) all Proceeds of the foregoing, and, if not otherwise included in the definition of “Proceeds” herein, licenses, royalties, income, payments, claims, damages, and proceeds of suit.

“ **UCC** ” shall mean the Uniform Commercial Code as in effect from time to time in

the State of New York or, when the context relates to perfection or priority of a security interest, the Uniform Commercial Code as in effect from time to time in any other applicable jurisdiction. “ **United States** ” shall mean the United States of America.

1.2 Definitions; Interpretation . All capitalized terms used herein (including the preamble and recitals hereto) and not otherwise defined herein shall have the meanings ascribed thereto in the

Credit Agreement or, if not defined therein, in the UCC. References to "Sections," "Exhibits" and "Schedules" shall be to Sections, Exhibits and Schedules, as the case may be, of this Agreement unless otherwise specifically provided. Section headings in this Agreement are included herein for convenience of reference only and shall not constitute a part of this Agreement for any other purpose or be given any substantive effect. Any of the terms defined herein may, unless the context otherwise requires, be used in the singular or the plural, depending on the reference. The use herein of the word "include" or "including", when following any general statement, term or matter, shall not be construed to limit such statement, term or matter to the specific items or matters set forth immediately following such word or to similar items or matters, whether or not nonlimiting language (such as "without limitation" or "but not limited to" or words of similar import) is used with reference thereto, but rather shall be deemed to refer to all other items or matters that fall within the broadest possible scope of such general statement, term or matter. If any conflict or inconsistency exists between this Agreement and the Credit Agreement, the Credit Agreement shall govern. All references herein to provisions of the UCC shall include all successor provisions under any subsequent version or amendment to any Article of the UCC.

At the request of Company, the Collateral Agent in its sole discretion may elect to

modify any of the time periods referenced in this Agreement.

SECTION 2. GRANT OF SECURITY.

2.1 Grant of Security . Each Grantor hereby grants to the Collateral Agent a security interest in and continuing lien on all of such Grantor's right, title and interest in, to and under the following property of such Grantor, in each case whether now owned or existing or hereafter acquired or arising and wherever located (all of which being hereinafter collectively referred to as the " **Collateral** "):

(a) Accounts;

(b) Chattel Paper;

(c) Documents;

(d) General Intangibles;

(e) Goods;

(f) Instruments;

(g) Insurance;

(h) Intellectual Property;

(i) Investment Property;

(j) to the extent not otherwise included above, all Collateral Records, Collateral Support and Supporting Obligations relating to any of the foregoing; and

(k) to the extent not otherwise included above, all Proceeds, products,

accessions, rents and profits of or in respect of any of the foregoing.

2.2 Certain Limited Exclusions . Notwithstanding anything herein to the contrary, in no event shall the Collateral include or the security interest granted under Section 2.1 hereof attach to Excluded Assets (all such property excluded from the definition of "Collateral" shall be referred to as " **Excluded Property** "). Notwithstanding anything contained herein to the contrary, Grantors shall not be required to take any action intended to cause Excluded Property to constitute Collateral and none of the covenants

or representations and warranties shall be deemed to apply to any property constituting Excluded Property.

In addition, (i) no action shall be required in any jurisdiction other than the jurisdiction of organization of the relevant Grantor to create or perfect a security interest in assets of such Grantor governed by the UCC (and with respect to intellectual property, filings in the United States Patent and Trademark Office and/or United States Copyright Office, as applicable), (ii) no action shall be required to be taken in order to perfect assets requiring perfection through control agreements or by "control" (including deposit accounts, other bank accounts or securities accounts or letter of credit rights) (other than (x) the delivery of Certificated Securities required to be pledged under the Credit Documents and (y) to perfect security interests in Grantors organized as limited liability companies or partnerships); provided, that no other party (including but not limited to the Senior Representative) has taken such action to perfect such assets through control agreements or by "control", (iii) the Grantors shall not be required to obtain any landlord waivers, estoppels or collateral access letters, (iv) no security agreements or pledge agreements governed by any foreign law shall be required and (v) no action shall require the creation or perfection of pledges of or security interests in, or the obtaining of legal opinions or other deliverables with respect to, particular assets of a Grantor, if, and for so long as and to the extent that the Administrative Agent and the Company reasonably agree in writing that the cost of creating or perfecting such pledges or security interests in such assets, or obtaining such legal opinions or other deliverables in respect of such assets, (taking into account any adverse tax consequences to Holding and its Affiliates (including the imposition of material withholding or other taxes)), shall be excessive in view of the benefits to be obtained by the Secured Parties therefrom.

SECTION 3. SECURITY FOR OBLIGATIONS; GRANTORS REMAIN LIABLE.

3.1 Security for Obligations . This Agreement secures, and the Collateral is collateral security for, the prompt and complete payment or performance in full when due, whether at stated maturity, by required prepayment, declaration, acceleration, demand or otherwise (including the payment of amounts that would become due but for the operation of the automatic stay under Section 362(a) of the Bankruptcy Code, 11 U.S.C. §362(a) (and any successor provision thereof)), of all Obligations of every Grantor (the " **Secured Obligations** ").

3.2 Continuing Liability Under Collateral . Notwithstanding anything herein to the contrary, (i) each Grantor shall remain liable for all obligations under the Collateral the same as if this Agreement had not been executed and nothing contained herein is intended or shall be a delegation of duties to the Collateral Agent or any Secured Party, (ii) each Grantor shall remain liable under each of the agreements included in the Collateral the same as if this Agreement had not been executed, including, without limitation, any agreements relating to Pledged Partnership Interests or Pledged LLC Interests, to perform all of the obligations undertaken by it thereunder all in accordance with and pursuant to the terms and provisions thereof and neither the Collateral Agent nor any Secured Party shall have any obligation or liability under any of such agreements by reason of or arising out of this Agreement or any other document related thereto nor shall the Collateral Agent nor any Secured Party have any obligation to make any inquiry as to the nature or sufficiency of any payment received by it or have any obligation to take any action to collect or enforce any rights under any agreement included in the Collateral, including, without limitation, any agreements relating to Pledged Partnership Interests or Pledged LLC Interests, and (iii) the exercise by the Collateral Agent

of any of its rights hereunder shall not release any Grantor from any of its duties or obligations under the contracts and agreements included in the Collateral.

SECTION 4. REPRESENTATIONS AND WARRANTIES AND COVENANTS.

4.1 Generally .

(a) Representations and Warranties . Each Grantor hereby represents and warrants with respect to itself that:

(i) it owns the Collateral purported to be owned by it or otherwise has the rights it purports to have in each item of Collateral reflected in the Historical Financial Statements referred in Section 4.7 of the Credit Agreement and in the most recent financial statements delivered pursuant to Section 5.1 of the Credit Agreement, and, as to all such Collateral whether now existing or hereafter acquired, will continue to own or have such rights in each such item of the Collateral, subject to its rights to dispose of or abandon such rights to the extent permitted hereunder or under the Credit Agreement, in each case free and clear of any and all Liens of all other Persons, including, without limitation, liens arising as a result of such Grantor becoming bound (as a result of merger or otherwise) as debtor under a security agreement entered into by another Person other than Permitted Liens;

(ii) it has indicated on Schedule 4.1(A) as of the Amendment and Restatement Effective Date: (w) the type of organization of such Grantor, (x) the jurisdiction of organization of such Grantor, (y) its organizational identification number and (z) the jurisdiction where the chief executive office or its sole place of business is, located;

(iii) as of the Amendment and Restatement Effective Date, the full legal name of such Grantor is as set forth on Schedule 4.1(A) ;

(iv) except as provided on Schedule 4.1(B) , as of the Amendment and Restatement Effective Date it has not changed its legal name, jurisdiction of organization, chief executive office or sole place of business or its corporate structure in any way (e.g., by merger, consolidation, change in corporate form or otherwise) within the past one (1) year;

(v) (x) to the extent required under this Agreement, upon the filing of all UCC financing statements naming each Grantor as "debtor" and the Collateral Agent as "secured party" and describing the Collateral in the filing offices set forth opposite such Grantor's name on Schedule 4.1(C) hereof and other filings delivered by each Grantor and (y) to the extent not subject to Article 9 of the UCC and to the extent that a perfected first priority security interest may be obtained by the recordation of the security interest in the applicable United States Intellectual Property registries, upon recordation of the security interests granted hereunder in United States Patents, Trademarks and Copyrights in the United States Patent and Trademark Office and the United States Copyright Office, the security interests granted to the Collateral Agent hereunder constitute valid and perfected first priority Liens (subject in the case of priority only to Permitted Liens and to the rights of the United States government (including any agency or department) thereof with respect to United States government Receivables) on all of the Collateral to the extent that a security interest may be perfected by the filing of a UCC financing statement or by the recordation of the security interest in the United States Patent and Trademark Office or the United States Copyright Office;

(vi) except as set forth on Schedule 4.1(D), as such schedule may be amended or supplemented from time to time, all actions and consents (other than actions and consents required by the UCC or any other applicable law), including all filings, notices, registrations and recordings,

necessary for the exercise by the Collateral Agent of the voting or other rights provided for in this Agreement or the exercise of remedies in respect of the Collateral have been made or obtained; provided that filing of assignments in the applicable Intellectual Property registries may be necessary to the exercise of certain remedies in respect of Intellectual Property and the exercise of remedies in respect of Non-Assignable Contracts (other than those provided under 9-406, 9-407 and 9-408 of the UCC, to the extent that they apply) may require the consent of the other party thereto;

(vii) no authorization, approval or other action by, and no notice to or filing with, any Governmental Authority or regulatory body is required for either (i) the pledge or grant by any Grantor of the security interest purported to be created in favor of the Collateral Agent hereunder or (ii) the exercise by Collateral Agent of any rights or remedies in respect of any Collateral (whether specifically granted or created hereunder or created or provided for by applicable law), except (A) for actions required with respect to accounts where the United States government or subdivision thereof is an Account Debtor, (B) for the filings contemplated by clauses (v) and (vi) above, (C) as may be required, in connection with the disposition of any Investment Property, by laws generally affecting the offering and sale of Securities and (D) for the exercise of right and remedies in respect of any Pledged Equity Interests issued by a CFC or CFC Holding Company;

(viii) none of the Collateral constitutes, or is the Proceeds of, "farm products" (as defined in the UCC);

(ix) it does not own any "as extracted collateral" (as defined in the UCC) or any timber to be cut; and

(x) as of the Amendment and Restatement Effective Date, such Grantor has been duly organized as an entity of the type as set forth opposite such Grantor's name on Schedule 4.1(A) solely under the laws of the jurisdiction as set forth opposite such Grantor's name on Schedule 4.1(A) and remains duly existing as such. Such Grantor has not filed any certificates of domestication, transfer or continuance in any other jurisdiction as of the Amendment and Restatement Effective Date.

(b) Covenants and Agreements . Each Grantor hereby covenants and agrees with respect to itself that:

(i) except for the security interest created by this Agreement, it shall not create or suffer to exist any Lien upon or with respect to any of the Collateral, except Permitted Liens, and upon obtaining knowledge thereof, it shall defend the Collateral against all Persons (other than the Secured Parties) that have instituted, or made a non-frivolous threat in writing of, any Adverse Proceeding claiming an interest therein adverse to the Collateral Agent;

(ii) it shall not produce, use or permit any Collateral to be used unlawfully or in violation of any provision of this Agreement or any applicable statute, regulation or ordinance or any policy of insurance covering the Collateral if such violation or noncompliance could reasonably be expected to have, individually or in the aggregate, a Material Adverse Effect;

(iii) it shall not change such Grantor's legal name, identity, corporate structure (e.g., by merger, consolidation, change in corporate form or otherwise), type of organization or jurisdiction of organization unless it shall have

(a) notified the Collateral Agent in writing, by executing and delivering to the Collateral Agent a completed Pledge Supplement, substantially in the form of Exhibit A attached hereto, together with all Supplements to applicable Schedules showing such change thereto, no more than thirty (30) days (or such longer period as may be agreed by the Collateral Agent) after any such change or establishment, identifying such new proposed name, identity, corporate structure, jurisdiction of organization and providing such other information in connection therewith as the Collateral Agent may reasonably request and;

(b) taken all actions reasonably determined to be necessary by the Collateral Agent to maintain the continuous validity, perfection and at least the same priority of the Collateral Agent's security interest in the Collateral intended to be granted and agreed to hereby; provided that with respect to any Grantor that is an Immaterial Restricted Subsidiary, non-compliance with the foregoing covenant shall not result in a Default pursuant to Section 8.1 of the Credit Agreement for a period of ten (10) Business Days after the receipt of the notice pursuant to Section 8.1(e) of the Credit Agreement, so long as such Grantor is diligently pursuing in good faith the cure or correction of such non-compliance continuously during such period;

(iv) except as otherwise permitted under the Credit Agreement or as consented to by the Collateral Agent (such consent not to be unreasonably withheld or delayed), it shall not file any certificates of domestication, transfer or continuance in any jurisdiction other than the jurisdiction set forth opposite such Grantor's name on Schedule 4.1(A) ; provided that with respect to any Grantor that is an Immaterial Restricted Subsidiary, non-compliance with the foregoing covenant shall not result in a Default pursuant to Section 8.1 of the Credit Agreement for a period of ten (10) Business Days after the receipt of the notice pursuant to Section 8.1(e) of the Credit Agreement, so long as such Grantor is diligently pursuing in good faith the cure or correction of such non-compliance continuously during such period; and

(v) it shall not take or permit any action which could materially impair the Collateral Agent's rights in the Collateral, subject to Grantors' rights to dispose of or abandon rights in the Collateral to the extent permitted hereunder or under the Credit Agreement and the right to grant Permitted Liens.

4.2 Equipment and Inventory .

(a) Representations and Warranties . Each Grantor represents and warrants with respect to itself that:

(i) all of its Equipment and Inventory included in the Collateral (other than Equipment out for repair or Equipment and Inventory in transit) is kept on the Amendment and Restatement Effective Date and during the past 12 months has been kept only at one of the locations specified in Schedule 4.2 ; and

(ii) any Goods now or hereafter produced by such Grantor constituting a substantial portion of the Collateral have been and will be produced in material compliance with the requirements of the Fair Labor Standards Act, as amended.

(b) Covenants and Agreements . Each Grantor covenants and agrees with

respect to itself that:

(i) it shall keep the Equipment, Inventory and any Documents evidencing any of its Equipment and Inventory (other than Equipment out for repair or Equipment and Inventory in transit) in one of the locations specified on Schedule 4.2 (as such schedule may be amended or supplemented from time to time) unless it shall have notified the Collateral Agent in writing, no later than forty-five (45) days (or such longer period as may be agreed by the Collateral Agent) after any change in locations, identifying such new locations and providing such other information in connection therewith as the Collateral Agent may reasonably request; and

(ii) it shall not deliver any Document evidencing any of its Equipment and Inventory to any Person other than the issuer of such Document to claim the Goods evidenced therefor or the Collateral Agent.

4.3 Receivables .

(a) Covenants and Agreements : Each Grantor hereby covenants and agrees with respect to itself that:

(i) at the request of the Collateral Agent after the occurrence and during the continuation of an Event of Default, it shall mark conspicuously, in form and manner reasonably satisfactory to the Collateral Agent, all of its Chattel Paper and Instruments (other than any delivered to the Collateral Agent as provided herein and Instruments deposited in a Deposit Account for collection in the ordinary course of business), as well as its Receivables Records with an appropriate reference to the fact that the Collateral Agent has a security interest therein;

(ii) other than in the ordinary course of business as generally conducted by it, and except as otherwise provided in subsection (iii) below or the Credit Agreement, following the occurrence and during the continuation of an Event of Default, such Grantor shall not (w) grant any extension or renewal of the time of payment of any of its Receivables, (x) compromise or settle any dispute, claim or legal proceeding with respect to any of its Receivables for less than the total unpaid balance thereof, (y) release, wholly or partially, any Person liable for the payment thereof, or (z) allow any credit or discount thereon;

(iii) except as otherwise provided in this subsection or the Credit Agreement, each Grantor shall continue to collect in accordance with its past business practice, all amounts due or to become due to such Grantor under its Receivables and any Supporting Obligation and diligently exercise in accordance with its past business practice each material right it may have under any of its Receivables, or any Supporting Obligation or Collateral Support therefor, in each case, at its own expense, and in connection with such collections and exercise, such Grantor shall take such action as such Grantor may deem necessary. Notwithstanding the foregoing, the Collateral Agent shall have the right at any time following the occurrence and during the continuation of an Event of Default to notify, or require any Grantor to notify, any Account Debtor of the Collateral Agent's security interest in the Receivables and any Supporting Obligation and, in addition, at any time following the occurrence and during the continuation of an Event of Default, the Collateral Agent may: (1) direct the Account Debtors under any Receivables to make payment of all amounts due or to become due to such Grantor thereunder directly to the Collateral Agent; (2) notify, or require any Grantor to notify, each Person maintaining

a lockbox or similar arrangement to which Account Debtors under any Receivables have been directed to make payment to remit all amounts representing collections on checks and other payment items from time to time sent to or deposited in such lockbox or other arrangement directly to the Collateral Agent; and (3) enforce, at the expense of such Grantor, collection of any such Receivables and to adjust, settle or compromise the amount or payment thereof, in the same manner and to the same extent as such Grantor might have done. If the Collateral Agent notifies any Grantor that it has elected to collect the Receivables in accordance with the preceding sentence, any payments of Receivables received by such Grantor shall be forthwith (and in any event within two (2) Business Days) deposited by such Grantor in the exact form received, duly indorsed by such Grantor to the Collateral Agent if required, in a Deposit Account designated by the Collateral Agent, and until so turned over, all amounts and proceeds (including checks and other instruments) received by such Grantor in respect of the Receivables, any Supporting Obligation or Collateral Support shall be received in trust for the benefit of the Collateral Agent hereunder and shall be segregated from other funds of such Grantor and such Grantor shall not adjust, settle or compromise the amount or payment of any Receivable, or release wholly or partly any Account Debtor or obligor thereof, or allow any credit or discount thereon; and

(iv) subject to any underlying contractual requirements or provisions, it shall use its commercially reasonable efforts to keep in full force and effect any material Supporting Obligation or Collateral Support relating to any of its material Receivables.

(b) Delivery of Receivables . With respect to any of its Receivables in excess of $5,000,000 individually that is evidenced by, or constitutes, Chattel Paper or Instruments (other than Instruments deposited or to be deposited for collection in the ordinary course of business), each Grantor shall, at the reasonable request of the Collateral Agent, cause each originally executed copy thereof to be delivered to the Collateral Agent (or its agent or designee) appropriately indorsed to the Collateral Agent or indorsed in blank: (i) with respect to any such Receivables in existence on the date hereof, on or prior to the date hereof and (ii) with respect to any such Receivables hereafter arising, promptly after such Grantor acquiring rights therein.

4.4 Investment Property

4.4.1 Investment Property Generally.

(a) Covenants and Agreements . Each Grantor hereby covenants and agrees with respect to itself that:

(i) in the event it acquires rights in any Investment Property in excess of $5,000,000 individually after the date hereof, it shall promptly deliver to the Collateral Agent a completed Pledge Supplement, substantially in the form of Exhibit A attached hereto, together with Supplements to Schedules thereto, reflecting such new Investment Property; provided that no Grantor shall be required to deliver any such Pledge Supplement with respect to any Investment Property in excess of $5,000,000 individually that has been acquired during any Fiscal Quarter earlier than the date of delivery of the Compliance Certificate delivered pursuant to Section 5.1(c) of the Credit Agreement with respect to such Fiscal Quarter (or such longer period as may be agreed by the Collateral Agent); provided , further that delivery of a Pledge Supplement with respect to any Investment Property required to be delivered pursuant to Sections 5.9 or 5.11 of the Credit Agreement shall be delivered in accordance with such Sections. Notwithstanding the foregoing, it is understood and agreed that the security interest of the Collateral Agent shall attach to all Investment Property immediately upon any Grantor's acquisition

of rights therein and shall not be affected by the failure of any Grantor to deliver a supplement to Schedule 4.4 as required hereby;

(ii) except as provided in the next sentence, in the event such Grantor receives any dividends, interest or distributions on any Investment Property, or any securities or other property upon the merger, consolidation, liquidation or dissolution of any issuer of any Investment Property, then (a) such dividends, interest or distributions and securities or other property shall be included in the definition of Collateral without further action and (b) such Grantor shall immediately take all steps, if any, necessary to ensure the validity, perfection, priority and, if applicable, control of the Collateral Agent over such Investment Property (including, without limitation, delivery thereof to the Collateral Agent if required by this Agreement) and pending any such action such Grantor shall be deemed to hold such dividends, interest, distributions, Securities or other property interest for the benefit of the Collateral Agent and shall segregate such dividends, distributions, Securities or other property from all other property of such Grantor. Notwithstanding the foregoing, so long as no Event of Default shall have occurred and be continuing, the Collateral Agent authorizes each Grantor to retain all ordinary cash dividends and distributions paid to it; and

(iii) each Grantor consents to the grant by each other Grantor of a Security Interest in all Investment Property to the Collateral Agent and waives any applicable restrictions on transfer that may otherwise apply thereto in the event of any exercise of remedies hereunder.

(b) Delivery .

(i) Each Grantor agrees that with respect to any Investment Property evidencing ownership interests in a Subsidiary of such Grantor or any other Investment Property in excess of $5,000,000 individually in which it currently has rights it shall comply with the provisions of this Section 4.4.1(b) on or before the Amendment and Restatement Effective Date and with respect to any Investment Property required to be delivered pursuant to Sections 5.9 or 5.11 of the Credit Agreement or any other Investment Property in excess of $5,000,000 individually after the date hereof hereafter acquired by such Grantor it shall comply with the provisions of this Section 4.4.1(b) promptly after acquiring rights therein, in each case in form and substance reasonably satisfactory to the Collateral Agent. With respect to any Investment Property that is represented by a certificate or that is an “instrument” (other than (A) any Investment Property credited to a Securities Account, (B) Investment Property but only so long as such Investment Property is not yet required to be delivered pursuant to Sections 5.9 or 5.11 of the Credit Agreement, (C) instruments in a principal amount not in excess of $5,000,000 individually and (D) instruments deposited or to be deposited for collection in the ordinary course of business), it shall cause such certificate or instrument to be promptly delivered to the Collateral Agent, indorsed in blank by an “effective indorsement” (as defined in Section 8-107 of the UCC), regardless of whether such certificate constitutes a “certificated security” for purposes of the UCC; provided that no Grantor shall be required to deliver any such Investment Property in excess of $5,000,000 individually that is not required to be delivered pursuant to Sections 5.9 or 5.11 of the Credit Agreement that has been acquired during any Fiscal Quarter earlier than the date of delivery of the Compliance Certificate delivered pursuant to Section 5.1(c) of the Credit Agreement with respect to such Fiscal Quarter (or such longer period as may be permitted by the Credit Agreement or agreed by the Collateral Agent). For the avoidance of doubt, any Investment

Property required to be delivered pursuant to Sections 5.9 or 5.11 of the Credit Agreement shall be delivered in accordance with such Sections.

(c) Voting and Distributions .

(i) So long as no Event of Default shall have occurred and be continuing and the Collateral Agent has not given the applicable Grantor five (5) Business Days' prior written notice to the contrary:

(1) except as otherwise provided under the covenants and agreements relating to investment property in this Agreement or elsewhere herein or in the Credit Agreement, each Grantor shall be entitled to exercise or refrain from exercising any and all voting and other consensual rights pertaining to the Investment Property or any part thereof for any purpose not inconsistent with the terms of this Agreement or the Credit Agreement;

(2) the Collateral Agent shall promptly execute and deliver (or cause to be executed and delivered) to each Grantor all proxies, and other instruments as such Grantor may from time to time reasonably request for the purpose of enabling such Grantor to exercise the voting and other consensual rights when and to the extent which it is entitled to exercise pursuant to clause (1) above; and

(3) upon the occurrence and during the continuation of an Event of Default and upon two (2) Business Days' prior written notice from the Collateral Agent to such Grantor of the Collateral Agent's intention to exercise such rights:

(A) all rights of each Grantor to exercise the voting and other consensual rights which it would otherwise be entitled to exercise pursuant hereto shall cease and all such rights shall thereupon become vested in the Collateral Agent who shall thereupon have the sole right to exercise such voting and other consensual rights; and

(B) in order to permit the Collateral Agent to exercise the voting and other consensual rights which it may be entitled to exercise pursuant hereto and to receive all dividends and other distributions which it may be entitled to receive hereunder: (1) each Grantor shall promptly execute and deliver (or cause the applicable issuer to execute and deliver) to the Collateral Agent all proxies, dividend payment orders and other instruments as the Collateral Agent may from time to time reasonably request and (2) each Grantor acknowledges that the Collateral Agent may utilize the power of attorney set forth in Section 6.1 .

4.4.2 Pledged Equity Interests

(a) Representations and Warranties . Each Grantor hereby represents and warrants with respect to itself, that:

(i) as of the Amendment and Restatement Effective Date, Schedule 4.4(A) sets forth under the headings "Pledged Stock," "Pledged LLC Interests," "Pledged Partnership Interests" and "Pledged Trust Interests," respectively, all of the Pledged Stock, Pledged LLC Interests, Pledged

Partnership Interests and Pledged Trust Interests owned by such Grantor and such Pledged Equity Interests constitute the percentage of issued and outstanding shares of stock, percentage of membership interests, percentage of partnership interests or percentage of beneficial interest of the respective issuers thereof indicated on such Schedule;

(ii) it is the record and beneficial owner of such Pledged Equity Interests free of all Liens of other Persons other than Permitted Liens and (in the case of Pledged Equity Interests not issued by a Subsidiary or an Affiliate of such Grantor, to such Grantor's best knowledge) there are no outstanding warrants, options or other rights to purchase, or shareholder, voting trust or similar agreements outstanding with respect to, or property that is convertible into, or that requires the issuance or sale of, any such Pledged Equity Interests;

(iii) (in the case of Pledged Equity Interests not issued by a Subsidiary or an Affiliate of such Grantor, to such Grantor's best knowledge) no consent of any Person including any other general or limited partner, any other member of a limited liability company, any other shareholder or any other trust beneficiary is necessary or desirable in connection with the creation, perfection or first priority status of the security interest of the Collateral Agent in any such Pledged Equity Interests or the exercise by the Collateral Agent of the voting or other rights provided for in this Agreement or the exercise of remedies in respect thereof;

(iv) none of such Pledged LLC Interests nor Pledged Partnership Interests are or represent interests in issuers that: (a) are registered as investment companies or (b) are dealt in or traded on securities exchanges or markets; and

(v) except as otherwise set forth on Schedule 4.4(B) (as such schedule may be amended or supplemented from time to time), all of the Pledged LLC Interests and Pledged Partnership Interests, in each case issued by a Domestic Subsidiary of such Grantor, are or represent interests in issuers that have opted to be treated as securities under the uniform commercial code of any jurisdiction.

(b) Covenants and Agreements . Each Grantor hereby covenants and agrees that:

(i) unless otherwise permitted under the Credit Agreement, without the prior written consent of the Collateral Agent, it shall not vote to enable or take any other action to: cause any issuer of any Pledged Partnership Interests or Pledged LLC Interests owned by such Grantor which are not securities (for purposes of the UCC) on the date hereof to elect or otherwise take any action to cause such Pledged Partnership Interests or Pledged LLC Interests to be treated as securities for purposes of the UCC unless prior to taking such actions, such Grantor shall promptly notify the Collateral Agent in writing of any such election or action and, in such event, shall take all steps necessary to establish the Collateral Agent's "control" thereof;

(ii) except as expressly permitted by the Credit Agreement, without the prior written consent of the Collateral Agent, it shall not permit any issuer of any Pledged Equity Interest which is a Subsidiary of such Grantor to merge or consolidate unless (i) if such issuer is required to be a Grantor under this Agreement, such issuer creates a security interest that is perfected by a filed

financing statement (that is not effective solely under section 9-508 of the UCC) in collateral in which such new debtor has or acquires rights, and (ii) all the outstanding capital stock or other equity interests of the surviving or resulting corporation, limited liability company, partnership or other entity which is a Subsidiary of such Grantor and which is owned by such Grantor is, upon such merger or consolidation, pledged hereunder; provided that if the surviving or resulting Grantors upon any such merger or consolidation involves an issuer which is a CFC or CFC Holding Company, then such Grantor shall only be required to pledge equity interests in accordance with Section 2.2 ; and

(iii) each Grantor consents to the grant by each other Grantor of a security interest in all Investment Property to the Collateral Agent and, without limiting the foregoing, consents to the transfer of any Pledged Partnership Interest and any Pledged LLC Interest to the Collateral Agent or its nominee following the occurrence and during the continuation of an Event of Default and to the substitution of the Collateral Agent or its nominee as a partner in any partnership or as a member in any limited liability company with all the rights and powers related thereto.

4.4.3 Pledged Debt

(i) Representations and Warranties . Each Grantor hereby represents and warrants with respect to itself that Schedule 4.4 sets forth as of the Amendment and Restatement Effective Date under the heading "Pledged Debt" all of the Pledged Debt owned by such Grantor in excess of $5,000,000 individually owned by any Grantor and to the knowledge of such Grantor, all of such Pledged Debt has been duly authorized, authenticated or issued, and delivered and is the legal, valid and binding obligation of the issuers thereof and is not in default.

4.5 Intellectual Property .

(a) Representations and Warranties . Except as disclosed in Schedule 4.5(H) , (as such schedule may be amended or supplemented from time to time), each Grantor hereby represents and warrants with respect to itself that:

(i) Schedule 4.5 (as such schedule may be amended or supplemented from time to time) sets forth a true and complete list of (a) all United States and state registrations of and applications for Patents, Trademarks, and Copyrights owned by each Grantor; and (b) all Patent Licenses, Trademark Licenses, Trade Secret Licenses and Copyright Licenses material to the business of such Grantor except for non-exclusive licenses to commercially available software;

(ii) except as could not reasonably be expected to have, individually or in the aggregate, a Material Adverse Effect, (a) it is the sole and exclusive owner of the entire right, title, and interest in and to all United States Intellectual Property of such Grantor listed on Schedule 4.5 (as such schedule may be amended or supplemented from time to time), and owns or has the valid right to use, all other United States Intellectual Property that is material to the conduct of its business, free and clear of all Liens, except for Permitted Liens; and (b) all United States Intellectual Property owned by such Grantor and material to the conduct of its business is subsisting and has not been adjudged invalid or unenforceable;

(iii) to such Grantor's knowledge, (A) all United States Intellectual Property material to the conduct of such Grantor's business is subsisting and unexpired, (B) no holding, decision, or judgment has been rendered in any action or proceeding before any court or administrative authority

challenging the validity of such Grantor's right to register, or such Grantor's rights to own or use, any United States Intellectual Property that could reasonably be expected to have a Material Adverse Effect and (C) no such action or proceeding is pending or threatened (except for routine office actions issued in the course of prosecution) that could reasonably be expected to have a Material Adverse Effect;

(iv) to such Grantor's knowledge, (a) the conduct of such Grantor's business does not infringe upon any Intellectual Property right owned or controlled by a third party; and (b) no third party is infringing upon in any material respect any rights in any United States Intellectual Property owned by such Grantor; and

(v) to such Grantor's knowledge, (a) none of the Trade Secrets owned by such Grantor that are material to its business have been used, divulged, disclosed or appropriated to the detriment of such Grantor for the benefit of any other person; and (b) no employee, independent contractor or agent of such Grantor is in default or breach of any term of any employment agreement, non-disclosure agreement, assignment of inventions agreement or similar agreement or contract relating in any way to the protection, ownership, and use of such Grantor's Intellectual Property.

(b) Covenants and Agreements . Each Grantor hereby covenants and agrees with respect to itself as follows:

(i) other than in a manner consistent with an exercise of such Grantor's reasonable business judgment, it shall not do any act or knowingly omit to do any act whereby any of the United States Intellectual Property which is material to the business of such Grantor may lapse, or become abandoned, dedicated to the public, or unenforceable;

(ii) it shall promptly notify the Collateral Agent if it knows that any item of the United States Intellectual Property that is material to the business of such Grantor is reasonably likely to become (a) abandoned or dedicated to the public or placed in the public domain, (b) invalid or unenforceable (other than as a result of the expiration of its non renewable, or natural term), or (c) subject to any adverse determination or development (including the institution of proceedings) in any action or proceeding in the United States Patent and Trademark Office or the United States Copyright Office, or any court (other than office actions in the course of prosecution that do not materially affect such Grantor's right to use such Intellectual Property);

(iii) it shall take all commercially reasonable steps in the United States Patent and Trademark Office and the United States Copyright Office to pursue any application and maintain any registration of each United States Trademark, Patent, and Copyright owned by such Grantor that is material to its business which is now or shall become included in the Intellectual Property including, but not limited to, those items on Schedule 4.5 (as it may be amended or supplemented from time to time), but only to the extent that such items remain material to such Grantor's business;

(iv) it shall promptly (but in no event more than once in any calendar year) report to the Collateral Agent the occurrence of any of the following which occurred since the last report to the Collateral Agent, but only to the extent that such items remain material to such Grantor's business: (i) the filing of any application to register any Patent, Trademark or Copyright with the United States Patent and Trademark Office or the United States Copyright Office (whether such application is filed by such Grantor or through any agent, employee, licensee, or designee thereof) and (ii) the registration of any Intellectual Property by any such office, or the acquisition of any such Intellectual Property in

each case by executing and delivering to the Collateral Agent a completed Pledge Supplement, substantially in the form of Exhibit A attached hereto, together with all Supplements to Schedules thereto; and

(v) it shall take steps that are, in such Grantor's reasonable business judgment, commercially reasonable to protect the secrecy of all Trade Secrets that are material to the business of such Grantor.

SECTION 5. FURTHER ASSURANCES; ADDITIONAL GRANTORS.

5.1 Further Assurances .

(a) Subject to specific limitations contained herein, each Grantor agrees that from time to time, at the expense of such Grantor, it shall promptly execute and deliver all further instruments and documents, and take all further action, that may be necessary or that the Collateral Agent may reasonably request, in order to create and/or maintain the validity, perfection or priority of and protect any security interest granted hereby or to enable the Collateral Agent to exercise and enforce its rights and remedies hereunder with respect to any Collateral. Without limiting the generality of the foregoing, each Grantor shall:

(i) file such financing or continuation statements, or amendment thereto, and execute and deliver such other agreements, instruments, endorsements, powers of attorney or notices, as may be necessary or as the Collateral Agent may reasonably request, in order to perfect and preserve the security interests granted hereby;

(ii) take all actions necessary to ensure the recordation of appropriate evidence of the liens and security interest granted hereunder in the United States Intellectual Property with any intellectual property registry in which said Intellectual Property is registered or in which an application for registration is pending including, without limitation, the United States Patent and Trademark Office, the United States Copyright Office and the various Secretaries of State;

(iii) at any reasonable time following the occurrence and during the continuation of an Event of Default, upon request by the Collateral Agent, assemble the Collateral and allow inspection of the Collateral by the Collateral Agent, or persons designated by the Collateral Agent; and

(iv) at the Collateral Agent's reasonable request, appear in and defend any action or proceeding that may affect such Grantor's title to or the Collateral Agent's security interest in all or any part of the Collateral.

(b) Each Grantor hereby authorizes the Collateral Agent to file a Record or Records, including, without limitation, financing or continuation statements, and amendments thereto, in any jurisdictions and with any filing offices as the Collateral Agent may determine, in its reasonable

discretion, are necessary to perfect the security interest granted to the Collateral Agent herein. Such financing statements may describe the Collateral in the same manner as described herein. Each Grantor shall furnish to the Collateral Agent from time to time statements and schedules further identifying and describing the Collateral and such other reports in connection with the Collateral as the Collateral Agent may reasonably request, all in reasonable detail.

5.2 Additional Grantors . From time to time subsequent to the date hereof, additional Persons may become parties hereto as additional Grantors (each, an " **Additional Grantor** "), by executing a Counterpart Agreement. Upon delivery of any such Counterpart Agreement to the Collateral Agent, notice of which is hereby waived by Grantors, each Additional Grantor shall be a Grantor and shall be as fully a party hereto as if Additional Grantor were an original signatory hereto. Each Grantor expressly agrees that its obligations arising hereunder shall not be affected or diminished by the addition or release of any other Grantor hereunder, nor by any election of Collateral Agent not to cause any Subsidiary of Company to become an Additional Grantor hereunder. This Agreement shall be fully effective as to any Grantor that is or becomes a party hereto regardless of whether any other Person becomes or fails to become or ceases to be a Grantor hereunder.

SECTION 6. COLLATERAL AGENT APPOINTED ATTORNEY-IN-FACT.

6.1 Power of Attorney . Until the Termination Date, each Grantor hereby irrevocably appoints the Collateral Agent (such appointment being coupled with an interest) as such Grantor's attorney-in-fact, with full authority in the place and stead of such Grantor and in the name of such Grantor, the Collateral Agent or otherwise, from time to time in the Collateral Agent's discretion to take any action and to execute any instrument that the Collateral Agent may deem reasonably necessary or advisable to accomplish the purposes of this Agreement, including, without limitation, the following:

(a) upon the occurrence and during the continuance of any Event of Default, to obtain and adjust insurance required to be maintained by such Grantor or paid to the Collateral Agent pursuant to the Credit Agreement;

(b) upon the occurrence and during the continuance of any Event of Default, to ask for, demand, collect, sue for, recover, compound, receive and give acquittance and receipts for moneys due and to become due under or in respect of any of the Collateral;

(c) upon the occurrence and during the continuance of any Event of Default, to receive, endorse and collect any drafts or other instruments, documents and chattel paper in connection with clause (b) above;

(d) upon the occurrence and during the continuance of any Event of Default, to file any claims or take any action or institute any proceedings that the Collateral Agent may deem necessary or desirable for the collection of any of the Collateral or otherwise to enforce the rights of the Collateral Agent with respect to any of the Collateral;

(e) to prepare and file any UCC financing statements against such Grantor as debtor;

(f) to prepare, sign, and file for recordation in any intellectual property registry,

appropriate evidence of the lien and security interest granted herein in the Intellectual Property in the name of such Grantor as debtor;

(g) upon the occurrence and during the continuance of any Event of Default, to take or cause to be taken all actions necessary to perform or comply or cause performance or compliance with the terms of this Agreement, including, without limitation, access to pay or discharge taxes or Liens (other than Permitted Liens) levied or placed upon or threatened against the Collateral, the legality or validity thereof and the amounts necessary to discharge the same to be determined by the Collateral Agent in its sole discretion, any such payments made by the Collateral Agent to become obligations of such Grantor to the Collateral Agent, due and payable immediately without demand; and

(h) upon the occurrence and during the continuance of any Event of Default, generally to sell, transfer, pledge, make any agreement with respect to or otherwise deal with any of the Collateral as fully and completely as though the Collateral Agent were the absolute owner thereof for all purposes, and to do, at the Collateral Agent's option and such Grantor's expense, at any time or from time to time, all acts and things that the Collateral Agent deems reasonably necessary to protect, preserve or realize upon the Collateral and the Collateral Agent's security interest therein in order to effect the intent of this Agreement, all as fully and effectively as such Grantor might do.

6.2 No Duty on the Part of Collateral Agent or Secured Parties . The powers conferred on the Collateral Agent hereunder are solely to protect the interests of the Collateral Agent in the Collateral and shall not impose any duty upon the Collateral Agent or any Secured Party to exercise any such powers. The Collateral Agent and the Secured Parties shall be accountable only for amounts that they actually receive as a result of the exercise of such powers; and neither they nor any of their officers, directors, employees or agents shall be responsible to any Grantor for any act or failure to act hereunder, except for their own gross negligence or willful misconduct.

SECTION 7. REMEDIES.

7.1 Generally .

(a) If any Event of Default shall have occurred and be continuing, the Collateral Agent may exercise in respect of the Collateral, in addition to all other rights and remedies provided for herein or otherwise available to it at law or in equity, all the rights and remedies of the Collateral Agent on default under the UCC (whether or not the UCC applies to the affected Collateral) to collect, enforce or satisfy any Secured Obligations then owing, whether by acceleration or otherwise, and also may pursue any of the following separately, successively or simultaneously:

(i) require any Grantor to, and each Grantor hereby agrees that it shall at its expense and promptly upon request of the Collateral Agent forthwith, assemble all or part of the Collateral as directed by the Collateral Agent and make it available to the Collateral Agent at a place to be designated by the Collateral Agent that is reasonably convenient to both parties;

(ii) enter onto the property where any Collateral is located and take possession thereof with or without judicial process;

(iii) prior to the disposition of the Collateral, store, process, repair or recondition

the Collateral or otherwise prepare the Collateral for disposition in any manner to the extent the Collateral Agent deems appropriate; and

(iv) without notice except as specified below or under the UCC, sell, assign, lease, license (on an exclusive or nonexclusive basis) or otherwise dispose of the Collateral or any part thereof in one or more parcels at public or private sale, at any of the Collateral Agent's offices or elsewhere, for cash, on credit or for future delivery, at such time or times and at such price or prices and upon such other terms as the Collateral Agent may deem commercially reasonable.

(b) The Collateral Agent or any Secured Party may be the purchaser of any or all of the Collateral at any public or private (to the extent that the portion of the Collateral being privately sold is of a kind that is customarily sold on a recognized market or the subject of widely distributed standard price quotations) sale in accordance with the UCC and the Collateral Agent, as collateral agent for and representative of the Secured Parties, shall be entitled, for the purpose of bidding and making settlement or payment of the purchase price for all or any portion of the Collateral sold at any such sale made in accordance with the UCC, to use and apply any of the Secured Obligations as a credit on account of the purchase price for any Collateral payable by the Collateral Agent at such sale. Each purchaser at any such sale shall hold the property sold absolutely free from any claim or right on the part of any Grantor, and each Grantor hereby waives (to the extent permitted by applicable law) all rights of redemption, stay and/or appraisal which it now has or may at any time in the future have under any rule of law or statute now existing or hereafter enacted. Each Grantor agrees that, to the extent notice of sale shall be required by law, at least ten (10) days notice to such Grantor of the time and place of any public sale or the time after which any private sale is to be made shall constitute reasonable notification. The Collateral Agent shall not be obligated to make any sale of Collateral regardless of notice of sale having been given. The Collateral Agent may adjourn any public or private sale from time to time by announcement at the time and place fixed therefor, and such sale may, without further notice, be made at the time and place to which it was so adjourned. Each Grantor hereby waives any claims against the Collateral Agent arising by reason of the fact that the price at which any Collateral may have been sold at such a private sale was less than the price which might have been obtained at a public sale, even if the Collateral Agent accepts the first offer received and does not offer such Collateral to more than one offeree. If the proceeds of any sale or other disposition of the Collateral are insufficient to pay all the Secured Obligations, Grantors shall be liable for the deficiency and the fees of any attorneys employed by the Collateral Agent to collect such deficiency. Nothing in this Section shall in any way alter the rights of the Collateral Agent hereunder.

(c) The Collateral Agent may sell the Collateral without giving any warranties as to the Collateral. The Collateral Agent may specifically disclaim or modify any warranties of title or the like. This procedure will not be considered to adversely affect the commercial reasonableness of any sale of the Collateral.

(d) The Collateral Agent shall have no obligation to marshal any of the Collateral.

7.2 Application of Proceeds . Except as expressly provided elsewhere in this Agreement or in the Credit Agreement, all proceeds received by the Collateral Agent in respect of any sale, any collection from, or other realization upon all or any part of the Collateral shall

be applied in full or in part by the Collateral Agent in payment of the Secured Obligations in the following order:

First , to pay incurred and unpaid fees and expenses of the Agents under the Credit Documents;

Second , to the Administrative Agent, for application by it towards payment of amounts then due and owing and remaining unpaid in respect of the Secured Obligations, pro rata among the Secured Parties according to the amounts of the Secured Obligations then due and owing and remaining unpaid to the Secured Parties; and

Third , any balance remaining after the Secured Obligations shall have been paid in full, the Commitments shall have terminated or been cancelled and the Letters of Credit shall have been cancelled, Cash Collateralized or have expired shall be paid over to the Company or to whomsoever may be lawfully entitled to receive the same.

7.3 Sales on Credit . If Collateral Agent sells any of the Collateral upon credit, Grantor will be credited only with payments actually made by purchaser and received by Collateral Agent and applied to indebtedness of the purchaser. In the event the purchaser fails to pay for the Collateral, Collateral Agent may resell the Collateral and Grantor shall be credited with proceeds of the sale.

7.4 Investment Property . Each Grantor recognizes that, by reason of certain prohibitions contained in the Securities Act and applicable state securities laws, the Collateral Agent may be compelled, with respect to any sale of all or any part of the Investment Property conducted without prior registration or qualification of such Investment Property under the Securities Act and/or such state securities laws, to limit purchasers to those who will agree, among other things, to acquire the Investment Property for their own account, for investment and not with a view to the distribution or resale thereof. Each Grantor acknowledges that any such private sale may be at prices and on terms less favorable than those obtainable through a public sale without such restrictions (including a public offering made pursuant to a registration statement under the Securities Act) and, notwithstanding such circumstances, each Grantor agrees that the fact that any such sale is conducted as a private sale shall not, in and of itself, cause such sale to not be deemed to have been made in a commercially reasonable manner and that the Collateral Agent shall have no obligation to engage in public sales and no obligation to delay the sale of any Investment Property for the period of time necessary to permit the issuer thereof to register it for a form of public sale requiring registration under the Securities Act or under applicable state securities laws, even if such issuer would, or should, agree to so register it. If the Collateral Agent determines to exercise its right to sell any or all of the Investment Property, upon written request, each Grantor shall and shall cause each issuer of any Pledged Stock to be sold hereunder, each partnership and each limited liability company, in each case, which is a Subsidiary of such Grantor, from time to time to furnish to the Collateral Agent all such information as the Collateral Agent may request in order to determine the number and nature of interest, shares or other instruments included in the Investment Property which may be sold by the Collateral Agent in exempt transactions under the Securities Act and the rules and regulations of the Securities and Exchange Commission thereunder, as the same are from time to time in effect.

7.5 Intellectual Property .

(a) Anything contained herein to the contrary notwithstanding, upon the occurrence and during the continuation of an Event of Default:

(i) the Collateral Agent shall have the right (but not the obligation) to bring suit or otherwise commence any action or proceeding in the name of any Grantor, the Collateral Agent or otherwise, in the Collateral Agent's sole discretion, to enforce any Intellectual Property, in which event such Grantor shall, at the request of the Collateral Agent, do any and all lawful acts and execute any and all documents required by the Collateral Agent in aid of such enforcement and such Grantor shall promptly, upon demand, reimburse and indemnify the Collateral Agent as provided in Section 10 hereof in connection with the exercise of its rights under this Section;

(ii) in the event of a sale or other disposition of the Intellectual Property pursuant to Section 7.1 , such Grantor shall, upon written demand from the Collateral Agent, assign, convey or otherwise transfer to the Collateral Agent or the third-party acquirer, as the case may be, all of such Grantor's right, title and interest in and to the Intellectual Property and shall execute and deliver to the Collateral Agent or the third-party acquirer, as the case may be, such documents as are necessary or appropriate to carry out the intent and purposes of this Agreement;

(iii) within five (5) Business Days' after written notice from the Collateral Agent, each Grantor shall identify to the Collateral Agent, by name, title and job responsibility, such key personnel in such Grantor's employ on the date such notice was received that are reasonably essential to permit such Grantor to continue, directly or indirectly, to produce, advertise and sell the products and services sold or delivered by such Grantor under or in connection with material Trademarks, and such Granter shall use commercially reasonable efforts, to maintain such essential personnel in such Grantor's employ and available to perform their then-current functions at such Grantor's expense consistent with the salary and benefit structure applicable to each as of the date such notice was received by Grantor; and

(iv) for the avoidance of doubt, the Collateral Agent shall have all of the rights specified in Sections 4.3 and 7.6 of this Agreement with respect to amounts due or to become due to such Grantor in respect of the Intellectual Property in the same manner and to the same extent as such Grantor has with respect to other Receivables.

(b) If (i) an Event of Default shall have occurred and, by reason of cure, waiver, modification, amendment or otherwise, no longer be continuing, (ii) no other Event of Default shall have occurred and be continuing, (iii) an assignment or other transfer to the Collateral Agent of any rights, title and interests in and to the Intellectual Property shall have been previously made, and (iv) the Secured Obligations shall not have become immediately due and payable, upon the written request of any Grantor, the Collateral Agent shall promptly execute and deliver to such Grantor, at such Grantor's sole cost and expense, such assignments or other transfer as may be necessary to reassign

to such Grantor any such rights, title and interests as may have been assigned to the Collateral Agent as aforesaid, subject to any disposition thereof that may have been made by the Collateral Agent; provided , after giving effect to such reassignment, the Collateral Agent's security interest granted pursuant hereto, as well as all other rights and remedies of the Collateral Agent granted hereunder, shall continue to be in full force and effect; and provided , further , the rights, title and interests so reassigned shall be free and clear of any other Liens granted by or on behalf of the Collateral Agent and the Secured Parties.

(c) Solely for the purpose of enabling the Collateral Agent to exercise rights and remedies under this Section 7 and at such time as the Collateral Agent shall be lawfully entitled to exercise such rights and remedies, each Grantor hereby grants to the Collateral Agent, to the extent it has the right to do so, an irrevocable, nonexclusive license (exercisable without payment of royalty or other compensation to such Grantor), subject, in the case of Trademarks, to sufficient rights to quality control and inspection in favor of such Grantor to avoid the risk of invalidation of said Trademarks and subject to exclusive licenses validly granted by Grantor in accordance with the terms this Agreement and the other Credit Documents prior to the date that the Collateral Agent exercises its rights under this Section, to use, operate under, license, or sublicense any Intellectual Property now owned or hereafter acquired by such Grantor, and wherever the same may be located.

7.6 Cash Proceeds . In addition to the rights of the Collateral Agent specified in Section 4.3 with respect to payments of Receivables, all proceeds of any Collateral received by any Grantor consisting of cash, checks and other non-cash items (collectively, " **Cash Proceeds** ") shall, if an Event of Default shall have occurred and is continuing be held by such Grantor in trust for the Collateral Agent, segregated from other funds of such Grantor, and shall, forthwith upon receipt by such Grantor, unless otherwise provided pursuant to Section 4.4.1(a)(ii) , be turned over to the Collateral Agent in the exact form received by such Grantor (duly indorsed by such Grantor to the Collateral Agent, if required) and held by the Collateral Agent in the Collateral Account. Any Cash Proceeds received by the Collateral Agent (whether from a Grantor or otherwise): (i) if no Event of Default shall have occurred and be continuing, shall be handled as required by this Agreement or the Credit Agreement, or otherwise be turned over to the applicable Grantor and (ii) if an Event of Default shall have occurred and be continuing, may, in the sole discretion of the Collateral Agent, (A) be held by the Collateral Agent for the ratable benefit of the Secured Parties, as collateral security for the Secured Obligations (whether matured or unmatured) and/or (B) then or at any time thereafter may be applied by the Collateral Agent against the Secured Obligations then due and owing in accordance with the Credit Agreement.

SECTION 8. COLLATERAL AGENT.

The Collateral Agent has been appointed to act as Collateral Agent hereunder by Lenders and, by their acceptance of the benefits hereof, the other Secured Parties. The Collateral Agent shall be obligated, and shall have the right hereunder, to make demands, to give notices, to exercise or refrain from exercising any rights, and to take or refrain from taking any action (including, without limitation, the release or substitution of Collateral), solely in accordance with this Agreement and the Credit Agreement; provided , the Collateral Agent shall, after (x) payment in full of all Obligations under the Credit Agreement and the other Credit Documents (other than contingent indemnification and reimbursement obligations for which no claim has been made) and (y) all Letters of Credit have been cancelled or have expired or have been Cash Collateralized or otherwise secured to the satisfaction of the Issuing Bank thereof, exercise, or refrain from exercising, any remedies provided for herein in accordance with the instructions of the holders of a majority of the aggregate notional amount (or, with

respect to any Permitted Hedge Agreement that has been terminated in accordance with its terms, the amount then due and payable (exclusive of expenses and similar payments but including any early termination payments then due) under such Permitted Hedge Agreement) under all Permitted Hedge Agreements, all Permitted Letters of Credit and all Permitted Cash Management Agreements. In furtherance of the foregoing provisions of this Section, each Secured Party, by its acceptance of the benefits hereof, agrees that it shall have no right individually to realize upon any of the Collateral hereunder, it being understood and agreed by such Secured Party that all rights and remedies hereunder may be exercised solely by the Collateral Agent for the benefit of Secured Parties in accordance with the terms of this Section. Collateral Agent may at any time give notice of its resignation to the Secured Parties and Company in accordance with Section 9.5 of the Credit Agreement.

SECTION 9. CONTINUING SECURITY INTEREST; TRANSFER OF LOANS.

This Agreement shall create a continuing security interest in the Collateral and shall remain in full force and effect until the Termination Date, be binding upon each Grantor, its successors and assigns, and inure, together with the rights and remedies of the Collateral Agent hereunder, to the benefit of the Collateral Agent and its successors, transferees and assigns. Without limiting the generality of the foregoing, but subject to the terms of the Credit Agreement, any Lender may assign or otherwise transfer any Loans held by it to any other Person, and such other Person shall thereupon become vested with all the benefits in respect thereof granted to Lenders herein or otherwise. Upon the Termination Date, the security interest granted hereby shall automatically terminate hereunder and of record and all rights to the Collateral shall automatically revert to Grantors. Upon any such termination the Collateral Agent shall, at Grantors' expense, execute and deliver to Grantors or otherwise authorize the filing of such documents as Grantors shall reasonably request, including financing statement amendments to evidence such termination. Upon any disposition of property permitted by the Credit Agreement or the designation of any issuer of Pledged Equity Interest as an Unrestricted Subsidiary in accordance with Section 5.14 of the Credit Agreement, the Liens granted herein shall be deemed to be automatically released and such property or Pledged Equity Interest of such Unrestricted Subsidiary shall automatically revert to the applicable Grantor with no further action on the part of any Person. The Collateral Agent shall, at Grantor's expense, execute and deliver or otherwise authorize the filing of such documents as Grantors shall reasonably request, in form and substance reasonably satisfactory to the Collateral Agent, including financing statement amendments to evidence such release.

SECTION 10. STANDARD OF CARE; COLLATERAL AGENT MAY PERFORM.

The powers conferred on the Collateral Agent hereunder are solely to protect its interest in the Collateral and shall not impose any duty upon it to exercise any such powers. Except for the exercise of reasonable care in the custody of any Collateral in its possession and the accounting for moneys actually received by it hereunder, the Collateral Agent shall have no duty as to any Collateral or as to the taking of any necessary steps to preserve rights against prior parties or any other rights pertaining to any Collateral. The Collateral Agent shall be deemed to have exercised reasonable care in the custody and preservation of Collateral in its possession if such Collateral is accorded treatment substantially equal to that which the Collateral Agent accords its own property. Neither the Collateral Agent nor any of its directors, officers, employees or agents shall be liable for failure to demand, collect or realize upon all or any part of the Collateral or for any delay in doing so or shall be under any obligation to sell or otherwise dispose of any Collateral upon the request of any Grantor or otherwise. If any Grantor fails to perform any agreement contained herein, the Collateral Agent may itself perform, or cause

performance of, such agreement, and the expenses of the Collateral Agent incurred in connection therewith shall be payable by each Grantor under Section 10.2 of the Credit Agreement.

SECTION 11. AMENDMENT AND RESTATEMENT

This Agreement amends and restates, and supersedes and replaces, in each case in its entirety, the Pledge and Security Agreement dated as of March 28, 2012 (as such may have been amended, restated, supplemented or further modified and in effect immediately prior to the effectiveness of the Agreement, the "Original Agreement"), executed by the Grantors party thereto in favor of the Collateral Agent for the benefit of the Secured Parties party thereto, but no novation of the Secured Obligations outstanding under the Original Agreement or any amendment or supplement thereto shall be deemed to have occurred by virtue of the amendment and restatement of the Original Agreement, and none is intended or implied. By execution hereof, each Grantor hereby confirms and reaffirms its continuing liability with respect to such Secured Obligations.

SECTION 12. MISCELLANEOUS.

Any notice required or permitted to be given under this Agreement shall be given in accordance with Section 10.1 of the Credit Agreement. No failure or delay on the part of the Collateral Agent in the exercise of any power, right or privilege hereunder or under any other Credit Document shall impair such power, right or privilege or be construed to be a waiver of any default or acquiescence therein, nor shall any single or partial exercise of any such power, right or privilege preclude other or further exercise thereof or of any other power, right or privilege. All rights and remedies existing under this Agreement and the other Credit Documents are cumulative to, and not exclusive of, any rights or remedies otherwise available. In case any provision in or obligation under this Agreement shall be invalid, illegal or unenforceable in any jurisdiction, the validity, legality and enforceability of the remaining provisions or obligations, or of such provision or obligation in any other jurisdiction, shall not in any way be affected or impaired thereby. All covenants hereunder shall be given independent effect so that if a particular action or condition is not permitted by any of such covenants, the fact that it would be permitted by an exception to, or would otherwise be within the limitations of, another covenant shall not avoid the occurrence of a Default or an Event of Default if such action is taken or condition exists. This Agreement shall be binding upon and inure to the benefit of the Collateral Agent and Grantors and their respective successors and assigns. No Grantor shall, without the prior written consent of the Collateral Agent given in accordance with the Credit Agreement, assign any right, duty or obligation hereunder. This Agreement and the other Credit Documents embody the entire agreement and understanding between Grantors and the Collateral Agent and supersede all prior agreements and understandings between such parties relating to the subject matter hereof and thereof. Accordingly, the Credit Documents may not be contradicted by evidence of prior, contemporaneous or subsequent oral agreements of the parties. There are no unwritten oral agreements between the parties. This Agreement may be executed in one or more counterparts and by different parties hereto in separate counterparts, each of which when so executed and delivered shall be deemed an original, but all such counterparts together shall constitute but one and the same instrument; signature pages may be detached from multiple separate counterparts and attached to a single counterpart so that all signature pages are physically attached to the same document.

THIS AGREEMENT AND THE RIGHTS AND OBLIGATIONS OF THE PARTIES HEREUNDER SHALL BE GOVERNED BY, AND SHALL BE CONSTRUED AND ENFORCED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK.

[Signature pages follow]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed and delivered by their respective officers thereunto duly authorized as of the date fully written above.

COVANTA ENERGY, LLC, A DELAWARE LIMITED LIABILITY COMPANY, AND EACH OF ITS SUBSIDIARIES LISTED ON ANNEX A HERETO

By: /S/ Bradford J. Helgeson

Name: Bradford J. Helgeson

Title: Authorized Officer

[Signature Page to Amended and Restated Pledge Agreement]

BANK OF AMERICA, N.A.

as Administrative Agent

By: /S/ Ronaldo Naval

Name: Ronaldo Naval

Title: Vice President

[Signature Page to Amended and Restated Pledge Agreement]

ANNEX A
TO PLEDGE AND SECURITY AGREEMENT

Grantor Subsidiaries

1.	Camden County Energy Recovery Associates, L.P., a New Jersey limited partnership By its General Partner Covanta Camden GP, LLC and Limited Partner Covanta Energy, LLC
2.	Covanta 4Recovery Transfer Systems LLC (f/k/a TransRiver Transfer Systems LLC), a Delaware limited liability company By its Sole Member Covanta Sustainable Solutions, LLC
3.	Covanta Abington Transfer Solutions LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
4.	Covanta Alexandria/Arlington, Inc., a Virginia corporation
5.	Covanta ARC LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
6.	Covanta Bristol, Inc., a Connecticut corporation
7.	Covanta Camden GP, LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
8.	Covanta Company of SEMASS, LLC (f/k/a Covanta Company of SEMASS, L.P.), a Delaware limited liability company By its Sole Member Covanta ARC LLC
9.	Covanta Dade Metals Recovery LLC, a Florida limited liability company By its Sole Member Covanta Pasco, Inc.
10.	Covanta Delaware Valley OP, LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
11.	Covanta Energy Americas, Inc., a Delaware corporation
12.	Covanta Energy Group, LLC (f/k/a Covanta Energy Group, Inc.), a Delaware limited liability company By its Sole Member Covanta Energy, LLC
13.	Covanta Energy Marketing LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
14.	Covanta Fairfax, Inc., a Virginia corporation
15.	Covanta Harrisburg, Inc., a Delaware corporation
16.	Covanta Haverhill, Inc., a Massachusetts corporation
17.	Covanta Haverhill Associates, LLC (f/k/a Covanta Haverhill Associates), a Massachusetts limited liability company By its Sole Member Covanta Haverhill, Inc.
18.	Covanta Hempstead Company, a New York general partnership By its General Partners Covanta Hempstead II, LLC and Covanta ARC LLC
19.	Covanta Hempstead II, LLC, a Delaware limited liability company By its Sole Member Covanta ARC LLC
20.	Covanta Hillsborough, Inc., a Florida corporation
21.	Covanta Honolulu Resource Recovery Venture, LLC (f/k/a Covanta Honolulu Resource Recovery Venture), a Hawaii limited liability company By its Sole Member Covanta Projects, LLC
22.	Covanta Huntsville, Inc., an Alabama corporation
23.	Covanta Indianapolis, Inc., an Indiana corporation

24.	Covanta Kent, Inc., a Michigan corporation
25.	Covanta Lake II, Inc., a Florida corporation
26.	Covanta Lancaster, Inc., a Pennsylvania corporation
27.	Covanta Lee, Inc., a Florida corporation
28.	Covanta Long Beach Renewable Energy Corp., a Delaware corporation
29.	Covanta MacArthur Renewable Energy, Inc., a New York corporation
30.	Covanta Marion Land Corp., an Oregon corporation
31.	Covanta Marion, Inc., an Oregon corporation
32.	Covanta Metals Marketing LLC, a Delaware limited liability company By its Sole Member Covanta Lancaster, Inc.
33.	Covanta Montgomery, Inc., Maryland corporation
34.	Covanta Niagara I, LLC (f/k/a Covanta Niagara, L.P.), a Delaware limited liability company By its Sole Member Covanta ARC LLC
35.	Covanta Operations of Union, LLC, a New Jersey limited liability company By its Sole Member Covanta Projects, LLC
36.	Covanta Pasco, Inc., a Florida corporation
37.	Covanta Pittsfield, LLC, a New York limited liability company By its Sole Member and Manager Covanta Projects, LLC
38.	Covanta Plymouth Renewable Energy, LLC (f/k/a Covanta Plymouth Renewable Energy Limited Partnership), a Delaware limited liability company By its Sole Member Covanta Energy, LLC
39.	Covanta Power International Holdings, Inc., a Delaware corporation
40.	Covanta Projects, LLC (f/k/a Covanta Projects, Inc.), a Delaware limited liability company By its Sole Member Covanta Energy Group, LLC
41.	Covanta SECONN, LLC, a Delaware limited liability company By its sole Member Covanta ARC LLC
42.	Covanta Springfield, LLC, a New York limited liability company By its Sole Member Covanta Projects, LLC
43.	Covanta Stanislaus, Inc., a California corporation
44.	Covanta Sustainable Solutions, LLC (f/k/a Covanta 4Recovery, L.P.), a Delaware limited liability company By its Sole Member Covanta ARC LLC
45.	Covanta Tulsa Renewable Energy, LLC (f/k/a Covanta WBH, LLC), a Delaware limited liability company By its Sole Member Covanta Lancaster, Inc.
46.	Covanta Warren Energy Resources Co., LLC (f/k/a Covanta Warren Energy Resources Co., Limited Partnership), a Delaware limited liability company By its Sole Member Covanta Projects, LLC
47.	Covanta York Renewable Energy LLC, a Delaware limited liability company By its Sole Member and Manager Covanta Energy, LLC
48.	ECOvanta, LLC, a Delaware limited liability company By its Sole Member Covanta ARC LLC
49.	MSW Energy Finance Co. II, Inc., a Delaware corporation

50.	Peabody Monofill Associates, Inc., a Massachusetts corporation
51.	SEMASS Partnership, a Massachusetts limited partnership By its General Partner and Limited Partner Covanta Company of SEMASS, L.P. and Limited Partner MSW Energy Finance Co. II, Inc.
52.	Chesapeake Waste Solutions LLC, a Delaware limited liability company
53.	Covanta Environmental Solutions Carriers II, LLC, a Wisconsin limited liability company
54.	Advanced Waste Services of Indiana, LLC, a Wisconsin limited liability company
55.	Waste Recovery Solutions, LLC, a Florida limited liability company
56.	Environmental Pharmaceuticals, LLC, an Arizona limited liability company
57.	Industrial Oil Tank Service Corporation, a New York corporation
58.	GARCO, Inc., a North Carolina corporation
59.	Covanta Environmental Solutions, LLC, a Delaware limited liability company

SCHEDULE 4.1
TO PLEDGE AND SECURITY AGREEMENT

GENERAL INFORMATION

(A) Full Legal Name, Type of Organization, Jurisdiction of Organization, Chief Executive Office/Sole Place of Business and Organizational Identification Number of each Grantor:

Full Legal Name	**Type of Organization**	**Jurisdiction of Organization**	**Chief Executive Office**	**Principal Place of Business**	**Organization I.D.#**
Camden County Energy Recovery Associates, L.P.	Limited Partnership	New Jersey	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	600013339
Covanta 4Recovery Transfer Systems LLC (f/k/a TransRiver Transfer Systems LLC)	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	3430267
Covanta Abington Transfer Solutions LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	995 Fitzwatertown Road Abington PA USA 19001	2897347
Covanta Alexandria/Arlington, Inc.	Corporation	Virginia	445 South Street, Morristown, NJ 07960	5301 Eisenhower Ave. Alexandria VA USA 22304	2610640
Covanta ARC LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	3244018
Covanta Bristol, Inc.	Corporation	Connecticut	445 South Street, Morristown, NJ 07960	170 Enterprise Drive Bristol CT USA 06010	164349
Covanta Camden GP, LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	5373195
Covanta Company of SEMASS, LLC (f/k/a Covanta Company of SEMASS, L.P.)	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	2572164
Covanta Dade Metals Recovery LLC	Limited Liability Company	Florida	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	L11000047148
Covanta Delaware Valley OP, LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	2204834

Full Legal Name	Type of Organization	Jurisdiction of Organization	Chief Executive Office	Principal Place of Business	Organization I.D.#
Covanta Energy Americas, Inc.	Corporation	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	2418229
Covanta Energy Group, LLC (f/k/a Covanta Energy Group, Inc.)	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	2708045
Covanta Energy Marketing LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	4762354
Covanta Environmental Solutions, LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	5687719
Covanta Fairfax, Inc.	Corporation	Virginia	445 South Street, Morristown, NJ 07960	9898 Furnace Rd. Lorton VA USA 22079	0304530-9
Covanta Harrisburg, Inc.	Corporation	Delaware	445 South Street, Morristown, NJ 07960	1670 South 19th St. Harrisburg PA USA 17104	4332326
Covanta Haverhill Associates, LLC (f/k/a Covanta Haverhill Associates)	Limited Liability Company	Massachusetts	445 South Street, Morristown, NJ 07960	100 Recovery Way Haverhill MA USA 01835	1154738
Covanta Haverhill, Inc.	Corporation	Massachusetts	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	133375647
Covanta Hempstead II, LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	3312863
Covanta Hempstead Company	Corporation	New York	445 South Street, Morristown, NJ 07960	600 Merchants Concourse Westbury NY USA 11590	None as nothing is filed in the state
Covanta Hillsborough, Inc.	Corporation	Florida	445 South Street, Morristown, NJ 07960	350 Falkenburg Rd. Falkenburg FL USA 33619	H16487

SCHEDULE 4.1-2

Full Legal Name	Type of Organization	Jurisdiction of Organization	Chief Executive Office	Principal Place of Business	Organization I.D.#
Covanta Honolulu Resource Recovery Venture, LLC (f/k/a Covanta Honolulu Resource Recovery Venture)	Limited Liability Company	Hawaii	445 South Street, Morristown, NJ 07960	91-174 Hanua St. Kapolei HI USA 96707	10303 G5
Covanta Huntsville, Inc.	Corporation	Alabama	445 South Street, Morristown, NJ 07960	5251 Triana Blvd. Huntsville AL USA 35805	123-860
Covanta Indianapolis, Inc.	Corporation	Indiana	445 South Street, Morristown, NJ 07960	2320 South Harding St. Indianapolis IN USA 46221	198412-379
Covanta Kent, Inc.	Corporation	Michigan	445 South Street, Morristown, NJ 07960	950 Market Ave. SW Grand Rapids MI USA 49503	800205927
Covanta Lake II, Inc.	Corporation	Florida	445 South Street, Morristown, NJ 07960	3830 Rogers Industrial Park Rd. Okahumpka FL USA 34762	P04000028902
Covanta Lancaster, Inc.	Corporation	Pennsylvania	445 South Street, Morristown, NJ 07960	1911 River Rd. Bainbridge PA USA 17502	978004
Covanta Lee, Inc.	Corporation	Florida	445 South Street, Morristown, NJ 07960	10500 Buckingham Rd. Suite 400 Fort Myers FL USA 33905	L53388
Covanta Long Beach Renewable Energy Corp.	Corporation	Delaware	445 South Street, Morristown, NJ 07960	118 Pier S Avenue Long Beach CA USA 90802	2176606
Covanta MacArthur Renewable Energy, Inc.	Corporation	New York	445 South Street, Morristown, NJ 07960	4001 Veterans Memorial Hwy Ronkonkoma NY USA 11779	1218696
Covanta Marion Land Corp.	Corporation	Oregon	445 South Street, Morristown, NJ 07960	4850 Brooklake Road, NE P.O. Box 9126 Brooks OR USA 97305	046416-84
Covanta Marion, Inc.	Corporation	Oregon	445 South Street,	4850 Brooklake Road, NE P.O.	164271-14

SCHEDULE 4.1-3

Full Legal Name	Type of Organization	Jurisdiction of Organization	Chief Executive Office	Principal Place of Business	Organization I.D.#
			Morristown, NJ 07960	Box 9126 Brooks OR USA 97305	
Covanta Metals Marketing LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	5267219
Covanta Montgomery, Inc.	Corporation	Maryland	445 South Street, Morristown, NJ 07960	21204 Martinburg Rd. Dickerson MD USA 20842	D02905776
Covanta Niagara I, LLC (f/k/a Covanta Niagara, L.P.)	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	100 Energy Blvd. @ 56th Street Niagara Falls NY USA 14304	2325262
Covanta Operations of Union, LLC	Limited Liability Company	New Jersey	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	600052953
Covanta Pasco, Inc.	Corporation	Florida	445 South Street, Morristown, NJ 07960	14230 Hays Road Spring Hill FL USA 34610	M67467
Covanta Pittsfield, LLC (f/k/a eco/Pittsfield, LLC)	Limited Liability Company	New York	445 South Street, Morristown, NJ 07960	500 Hubbard Ave. Pittsfield MA USA 01201	2850552
Covanta Plymouth Renewable Energy, LLC (f/k/a Covanta Plymouth Renewable Energy Limited Partnership)	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	1155 Conshohocken Road Conshohocken PA USA 19428	2267862
Covanta Power International Holdings, Inc.	Corporation	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	2460596
Covanta Projects, LLC (f/k/a Covanta Projects, Inc.)	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	2034649
Covanta SECONN LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	2820277

SCHEDULE 4.1-4

Full Legal Name	Type of Organization	Jurisdiction of Organization	Chief Executive Office	Principal Place of Business	Organization I.D.#
Covanta Springfield, LLC	Limited Liability Company	New York	445 South Street, Morristown, NJ 07960	188 M Street Agawam MA USA 01001	2223906
Covanta Stanislaus, Inc.	Corporation	California	445 South Street, Morristown, NJ 07960	4040 Fink Rd. P.O. Box 278 Crows Landing CA USA 95313	C1292200
Covanta Sustainable Solutions, LLC (f/k/a Covanta 4Recovery, L.P.)	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	2544885
Covanta Tulsa Renewable Energy, LLC (f/k/a Covanta WBH, LLC)	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	2122 South Yukon Ave. Tulsa OK USA 74107	3710121
Covanta Warren Energy Resources Co., LLC (f/k/a Covanta Warren Energy Resources Co., Limited Partnership)	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	218 Mt. Pisgah Avenue & Quarry Road P.O. Box 147 Oxford NJ USA 07863	2063265
Covanta York Renewable Energy LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	2651 Blackbridge Road York PA USA 17406	2941502
ECOvanta, LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	2209 South 58th St. Philadelphia PA USA 19143	4805053
GARCO, Inc.	Corporation	North Carolina	445 South Street, Morristown, NJ 07960	2242 Carl Dr. Ashebro North Carolina USA 27203	C0384105
MSW Energy Finance Co. II, Inc.	Corporation	Delaware	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	3724574
Peabody Monofill Associates, Inc.	Corporation	Massachusetts	445 South Street, Morristown, NJ 07960	2 Daventry Court Lynnfield MA USA 01940	1036462
SEMASS Partnership	Limited Partnership	Massachusetts	445 South Street, Morristown, NJ 07960	141 Cranberry Hwy. West Wareham MA USA 20576	L87036038

SCHEDULE 4.1-5

Full Legal Name	Type of Organization	Jurisdiction of Organization	Chief Executive Office	Principal Place of Business	Organization I.D.#
Chesapeake Waste Solutions LLC	Limited Liability Company	Delaware	445 South Street, Morristown, NJ 07960	190 Shellyland road Manheim Pennsylvania USA 17545	2954038
Covanta Environmental Solutions Carriers II, LLC	Limited Liability Company	Wisconsin	445 South Street, Morristown, NJ 07960	3801 West McKinley Ave Milwaukee Wisconsin USA 53208	A030838
Advanced Waste Services of Indiana, LLC	Limited Liability Company	Wisconsin	445 South Street, Morristown, NJ 07960	445 South Street, Morristown, NJ 07960	A038749
Waste Recovery Solutions, LLC	Limited Liability Company	Florida	445 South Street, Morristown, NJ 07960	343 King Street Myerstown PA USA 17067	L15000209300
Environmental Pharmaceuticals, LLC	Limited Liability Company	Arizona	445 South Street, Morristown, NJ 07960	7326 East Evans Road Suite B Scottsdale Arizona USA 85260	L-15489436
Industrial Oil Tank Service Corporation	Corporation	New York	445 South Street, Morristown, NJ 07960	120 Dry Rd. Oriskany New York USA 13424	833546

(B) Changes in Name, Jurisdiction of Organization, Chief Executive Office or Sole Place of Business (or Principal Residence if Grantor is a Natural Person) and Corporate Structure within past one (1) year:

None

(C) Financing Statements:

None.

(D) Financing Statements:

None.

SCHEDULE 4.1-6

LOCATION OF EQUIPMENT AND INVENTORY

Location of Equipment and Inventory

247 A Commercial St.
Lynn, MA 01905

115 Washington St.
Holliston MA 01746

5301 Eisenhower Ave.
Alexandria, VA 22304

9898 Furnace Road
Lorton, VA 22079

1670 South 19th St.
Harrisburg, PA 17104

100 Recovery Way
Haverhill, MA 01835

600 Merchants Concourse
Westbury, NY 11590

417 North 5th Street
Minneapolis, MN 55401

505 6th Avenue North
Minneapolis, MN 55405

350 Falkenberg Rd.
Tampa, FL 33619

91-174 Hanua St.
Kapolei, HI 96707

5251 Triana Blvd.
Huntsville, AL 35805

2320 South Harding Street
Indianapolis, IN 46221

950 Market Ave. SW
Grand Rapids, MI 49503

1911 River Rd.
Bainbridge, PA 17502

10500 Buckingham Rd. Suite 400
Fort Myers, FL 33905

118 Pier S. Ave
Long Beach, CA 90802

4850 Brookdale Road, NE
P.O Box 9126
Brooks, OR 97305

4001 Veterans Memorial Highway
Ronkonkoma, NY 11779

Reserve Rd. Gate 20-40
Hartford, CT 06114

16101 Frederick Rd.
Derwood, MD 20855

14230 Hays Road
Spring Hill, FL 34610

500 Hubbard Ave.
Pittsfield, MA 01201

1155 Conshohocken Rd.
Conshohocken, PA

530 South Cherry St.
Wallingford, CT 06492

4040 Fink Road
Crows Landing, CA 95313

2122 South Yukon Avenue
Tulsa, OK 74107

218 Mt. Pisgah Avenue
Oxford, NJ 07863

2651 Blackbridge Rd. York, PA 17406

SCHEDULE 4.2-2

209 South 58th Street Philadelphia, PA 19143

SCHEDULE 4.2-3

INVESTMENT PROPERTY

(A) Pledged Stock, Pledged LLC. Interests and Pledged Partnership Interests

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
1.	Camden County Energy Recovery Associates, L.P.	New Jersey	Limited Partnership	1% GP interest owned by Covanta Camden GP, LLC and 99% LP interest owned by Covanta Energy, LLC
2.	Covanta 4Recovery Philadelphia LLC (f/k/a TransRiver Philadelphia LLC)	Delaware	Limited Liability Company	100% owned by Covanta Sustainable Solutions, LLC
3.	Covanta 4Recovery Transfer Systems LLC (f/k/a TransRiver Transfer Systems LLC)	Delaware	Limited Liability Company	100% owned by Covanta Sustainable Solutions, LLC
4.	Covanta Abington Transfer Solutions LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
5.	Covanta Alexandria/Arlington, Inc.	Virginia	Issued: 1,000 shares	100% owned by Covanta Projects, LLC
6.	Covanta ARC LLC	Delaware	Limited Liability Company	100% by Covanta Energy, LLC
7.	Covanta B-3, LLC (f/k/a eco/B-3, LLC)	New York	Limited Liability Company	100% owned by Covanta Projects, LLC
8.	Covanta Babylon, Inc.	New York	Issued: 100 shares	100% owned by Covanta Projects, LLC
9.	Covanta Bristol, Inc.	Connecticut	Issued: 100 shares	100% owned by Covanta Projects, LLC
10.	Covanta Camden GP, LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
11.	Covanta Company of SEMASS, LLC (f/k/a Covanta Company of SEMASS, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
12.	Covanta Connecticut (S.E.), LLC	Delaware	Limited Liability Company	100% owned by Covanta SECONN LLC
13.	Covanta Dade Metals Recovery LLC	Florida	Limited Liability Company	100% owned by Covanta Pasco, Inc.
14.	Covanta Dade Renewable Energy, LLC (f/k/a Covanta Dade Renewable Energy Ltd.)	Florida	Limited Liability Company	100% owned by Covanta Pasco, Inc.
15.	Covanta Delano, Inc.	Delaware	Issued: 1,000 shares	100% owned by Covanta Energy Americas, Inc.
16.	Covanta Delaware Valley II, LLC	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
17.	Covanta Delaware Valley OP, LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
18.	Covanta Delaware Valley, L.P.	Delaware	Limited Partnership	1% owned by Covanta Delaware Valley II, LLC as LP and Covanta ARC LLC owns 50% as GP interest and 49% as LP interest
19.	Covanta Energy Americas, Inc.	Delaware	Issued: 1,000 shares	100% owned by Covanta Projects, LLC

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
20.	Covanta Energy Group, LLC (f/k/a Covanta Energy Group, Inc.)	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
21.	Covanta Energy Marketing LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
22.	Covanta Environmental Solutions, LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
23.	Covanta Fairfax, Inc.	Virginia	Issued: 100 shares	100% owned by Covanta Projects, LLC
24.	Covanta Harrisburg, Inc.	Delaware	Issued: 100 shares	100% owned by Covanta Projects, LLC
25.	Covanta Haverhill Associates, LLC (f/k/a Covanta Haverhill Associates)	Massachusetts	Limited Liability Company	100% owned by Covanta Haverhill, Inc.
26.	Covanta Haverhill, Inc.	Massachusetts	Issued: 100 shares	100% owned by Covanta Projects, LLC
27.	Covanta Hempstead II, LLC	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
28.	Covanta Hempstead Company	New York	General Partnership	99% owned by Covanta ARC LLC as GP; 1% owned by Covanta Hempstead II, LLC as GP
29.	Covanta Hennepin Energy Resource Co, LLC (f/k/a Covanta Hennepin Energy Resource Co., Limited Partnership)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
30.	Covanta Hillsborough, Inc.	Florida	Issued: 100 shares	100% owned by Covanta Projects, LLC
31.	Covanta Honolulu Resource Recovery Venture, LLC (f/k/a Covanta Honolulu Resource Recovery Venture)	Hawaii	Limited Liability Company	100% owned by Covanta Projects, LLC
32.	Covanta Hudson Valley Renewable Energy LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
33.	Covanta Huntington, LLC (f/k/a Covanta Huntington Limited Partnership)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
34.	Covanta Huntsville, Inc.	Alabama	Issued: 100 shares	100% owned by Covanta Projects, LLC
35.	Covanta Hydro Operations West, Inc.	Delaware	Issued: 100 shares	100% owned by Covanta Energy Americas, Inc.
36.	Covanta Indianapolis, Inc.	Indiana	Issued: 100 shares	100% owned by Covanta Projects, LLC
37.	Covanta Kent, Inc.	Michigan	Issued: 100 shares	100% owned by Covanta Projects, LLC
38.	Covanta Lake II, Inc.	Florida	Issued: 750 shares common Issued: 250 shares preferred	100% Owned by Covanta Projects, LLC
39.	Covanta Lancaster, Inc.	Pennsylvania	Issued: 100 shares	100% owned by Covanta Projects, LLC
40.	Covanta Lee, Inc.	Florida	Issued: 100 shares	100% owned by Covanta Projects, LLC
41.	Covanta Long Beach	Delaware	Issued: 100 shares	100% owned by Covanta Energy, LLC

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
	Renewable Energy Corp.			
42.	Covanta MacArthur Renewable Energy, Inc.	New York	Issued: 100 shares	100% owned by Covanta Energy, LLC
43.	Covanta Marion Land Corp.	Oregon	Issued: 1000 common shares 300 preferred shares	100% owned by Covanta Projects, LLC
44.	Covanta Marion, Inc.	Oregon	Issued: 10 shares	100% owned by Covanta Projects, LLC
45.	Covanta Mendota, LLC (f/k/a Covanta Mendota, L.P.)	California	Limited Liability Company	100% owned by Covanta Energy Americas, Inc.
46.	Covanta Metals Marketing LLC	Delaware	Limited Liability Company	100% owned by Covanta Lancaster, Inc.
47.	Covanta Montgomery, Inc.	Maryland	Issued: 100 shares	100% owned by Covanta Projects, LLC
48.	Covanta Niagara I, LLC (f/k/a Covanta Niagara, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
49.	Covanta Onondaga Two LLC (f/k/a Covanta Onondaga Two Corp.)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
50.	Covanta Operations of Union, LLC	New Jersey	Limited Liability Company	100% owned by Covanta Projects, LLC
51.	Covanta Pasco, Inc.	Florida	Issued: 100 shares	100% owned by Covanta Projects, LLC
52.	Covanta Pittsfield, LLC (f/k/a eco/Pittsfield, LLC)	New York	Limited Liability Company	100% owned by Covanta Projects, LLC
53.	Covanta Plymouth Renewable Energy, LLC (f/k/a Covanta Plymouth Renewable Energy Limited Partnership)	Delaware	Limited Liability Company	100% ownership by Covanta Energy, LLC
54.	Covanta Power International Holdings, Inc.	Delaware	Issued: 1,000 shares	100% owned by Covanta Energy Americas, Inc.
55.	Covanta Projects of Wallingford, LLC (f/k/a Covanta Projects of Wallingford, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
56.	Covanta Projects, LLC (f/k/a Covanta Projects, Inc.)	Delaware	Limited Liability Company	100% owned by Covanta Energy Group, LLC
57.	Covanta SECONN LLC	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
58.	Covanta SEMASS, LLC (f/k/a Covanta SEMASS, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
59.	Covanta Southeastern Connecticut, L.P.	Delaware	Limited Partnership	99% owned by Covanta SECONN LLC and 1% owned by Covanta Connecticut (S.E.), LLC
60.	Covanta Springfield, LLC	New York	Limited Liability Company	100% owned by Covanta Projects, LLC
61.	Covanta Stanislaus, Inc.	California	Issued: 100 shares	100% owned by Covanta Projects, LLC

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
62.	Covanta Sustainable Solutions, LLC (f/k/a Covanta 4Recovery, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
63.	Covanta Tulsa Renewable Energy, LLC (f/k/a Covanta WBH, LLC)	Delaware	Limited Liability Company	100% owned by Covanta Lancaster, Inc.
64.	Covanta Union, LLC (f/k/a Covanta Union, Inc.)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
65.	Covanta Warren Energy Resources Co., LLC (f/k/a Covanta Warren Energy Resources Co., Limited Partnership)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
66.	Covanta Waste to Energy of Italy, Inc.	Delaware	Issued: 100 shares	100% owned by Covanta Power International Holdings, Inc.
67.	Covanta York Renewable Energy LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
68.	ECOvanta, LLC	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
69.	GARCO, Inc.	North Carolina	Issued: 1,000 shares	100% owned by Covanta Environmental Solutions, LLC
70.	Koma Kulshan Associates	California	Limited Partnership	48.99% owned by Covanta Energy Americas, Inc. as LP interest and 1% GP interest and 50% owned by third party
71.	Mount Kisco Transfer Station, Inc.	New York	Issued: 10 shares	100% owned by Covanta Sustainable Solutions, LLC
72.	MSW Energy Finance Co. II, Inc.	Delaware	Issued: 3000 shares	100% owned by Covanta Energy, LLC
73.	Peabody Monofill Associates, Inc.	Massachusetts	Issued: 10,000 shares	100% owned by Covanta Projects, LLC
74.	SEMASS Partnership	Massachusetts	Limited Partnership	98% interest owned by Covanta Company of SEMASS, LLC in LP interest and 1% in GP interest and 1% owned by MSW Energy Finance Co. II, Inc. as LP interest
75.	South Fork II Associates Limited Partnership	Washington	Limited Partnership	Covanta Energy Americas, Inc. 49.9995% interest as GP and .0005% as LP interest; 50.0095% owned by third party
76.	Covanta Burnaby Renewable Energy, ULC (f/k/a Montenay Inc.)	Canada	Issued: 10,500 shares	100% owned by Covanta Energy, LLC
77.	Covanta Energy Asia Pacific Limited	Hong Kong	Issued: 32 shares each at HK $10.00 par value	100% Covanta Power International Holdings, Inc.

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date

78.	Covanta Energy Philippine Holdings, Inc.	Philippines	Issued: 52,605 shares at Php 100 par value (Per Philippine law each Covanta director holds 1 share)	100%* owned by Covanta Power International Holdings, Inc. (*per Philippine law each Covanta director holds 1 share)
79.	Covanta Ince Park Limited	United Kingdom	Issued: 1 share Value: £1	100% owned by Covanta Energy Limited
80.	Covanta Rookery South Limited	United Kingdom	Issued: 1 share Value: £1	100% owned by Covanta Energy Limited
81.	Edison (Bataan) Cogeneration Corporation	Philippines	Issued: 4,800,000 common stock (Per Philippine law each Covanta director holds 1 share)	100%* owned by Covanta Power International Holdings, Inc. (*per Philippine law each Covanta director holds 1 share)
82.	Enereurope Holdings III, B.V.	Netherlands	Issued: EUR 20,000 and NLG 44,074.20	100% owned by Covanta Power International Holdings, Inc.
83.	Hidro Operaciones Don Pedro S.A.	Costa Rica	780 shares @ 1,00	100% owned by Covanta Power International Holdings, Inc.
84.	Olmec Insurance Ltd.	Bermuda	Issued: 1,000,000 common shares have been 50% called and paid totaling $500,000	100% owned by Covanta Energy Group, LLC
85.	TransRiver Canada Incorporated	Canada		100% owned by Covanta Energy, LLC
86.	Covanta Burnaby Renewable Energy, ULC	Canada	19,500 Common Shares	100% owned by Covanta Energy, LLC
87.	Covanta Luxembourg S.A. R.L.	Luxembourg	Share capital 17,000 shares @ 1 EURO	100% owned by Covanta Power International Holdings, Inc.
88.	Covanta Luxembourg Global Holding S.A. R.L.	Luxembourg	Share capital 17,000 shares @ 1 EURO	100% owned by Covanta Power International Holdings, Inc.
89.	Covanta Luxembourg Holding S.A. R.L.	Luxembourg	Share capital 17,000 shares @ 1 EURO	100% owned by Covanta Power International Holdings, Inc.
90.	Covanta Protos Development Limited	United Kingdom	1 Ordinary Shares @ £1 each	100% owned by Covanta Power International Holdings, Inc.

91.	Covanta Newhurst Development Limited	United Kingdom	2 Ordinary Shares @ £1 each	100% owned by Covanta Power International Holdings, Inc.
92.	Covanta Carribean SRL	Barbados	1 Common Share @ $1.00	100% owned by Covanta Power International Holdings, Inc.
93.	Chesapeake Waste Solutions LLC	Delaware	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
94.	Covanta Environmental Solutions Carriers II, LLC	Wisconsin	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
95.	Advanced Waste Services of Indiana,	Wisconsin	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
	Company Name	**Jurisdiction of Incorporation**	**Capital Stock or Equity Interests**	**Description of Anticipated Ownership As of the Closing Date**
	LLC			
96.	Recoil, LLC	Pennsylvania	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
97.	Waste Recovery Solutions, LLC	Florida	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
98.	Environmental Pharmaceuticals, LLC	Arizona	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
99.	Industrial Oil Tank Service Corporation	New York	Authorized 400 Common Shares Issued 49 shares voting and 30 shares Class B non-voting	100% owned by Covanta Environmental Solutions, LLC
100.	Covanta OPW Associates, Inc.	Connecticut	100 shares common @ $1.00 par	100% owned by Covanta Projects, LLC
101.	Covanta Wallingford Associates, Inc.	Connecticut	100 shares common @ $1.00 par	100% owned by Covanta Projects, LLC

Pledged Trust Interests: None.

Pledged Debt: None.

Grantor	**Issuer**	**Original Principal Amount**	**Outstanding Principal Balance**	**Issue Date**	**Maturity Date**
Each Grantor, as Payee	**Each Grantor, as Maker**	**N/A**	**N/A**	**Closing Date**	**Demand**

(A) CERTIFICATED LLCs/PARTNERSHIP INTERESTS.

Yes. See entities identified above in Schedule 4.4(A).

INVESTMENT PROPERTY

(A) Pledged Stock, Pledged LLC Interests and Pledged Partnership Interests

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
1.	Camden County Energy Recovery Associates, L.P.	New Jersey	Limited Partnership	1% GP interest owned by Covanta Camden GP, LLC and 99% LP interest owned by Covanta Energy, LLC
2.	Covanta 4Recovery Philadelphia LLC (f/k/a TransRiver Philadelphia LLC)	Delaware	Limited Liability Company	100% owned by Covanta Sustainable Solutions, LLC
3.	Covanta 4Recovery Transfer Systems LLC (f/k/a TransRiver Transfer Systems LLC)	Delaware	Limited Liability Company	100% owned by Covanta Sustainable Solutions, LLC
4.	Covanta Abington Transfer Solutions LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
5.	Covanta Alexandria/Arlington, Inc.	Virginia	Issued: 1,000 shares	100% owned by Covanta Projects, LLC
6.	Covanta ARC LLC	Delaware	Limited Liability Company	100% by Covanta Energy, LLC
7.	Covanta B-3, LLC (f/k/a eco/B-3, LLC)	New York	Limited Liability Company	100% owned by Covanta Projects, LLC
8.	Covanta Babylon, Inc.	New York	Issued: 100 shares	100% owned by Covanta Projects, LLC
9.	Covanta Bristol, Inc.	Connecticut	Issued: 100 shares	100% owned by Covanta Projects, LLC
10.	Covanta Camden GP, LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
11.	Covanta Company of SEMASS, LLC (f/k/a Covanta Company of SEMASS, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
12.	Covanta Connecticut (S.E.), LLC	Delaware	Limited Liability Company	100% owned by Covanta SECONN LLC
13.	Covanta Dade Metals Recovery LLC	Florida	Limited Liability Company	100% owned by Covanta Pasco, Inc.
14.	Covanta Dade Renewable Energy, LLC (f/k/a Covanta Dade Renewable Energy Ltd.)	Florida	Limited Liability Company	100% owned by Covanta Pasco, Inc.
15.	Covanta Delano, Inc.	Delaware	Issued: 1,000 shares	100% owned by Covanta Energy Americas, Inc.
16.	Covanta Delaware Valley II, LLC	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
17.	Covanta Delaware Valley OP, LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
18.	Covanta Delaware Valley, L.P.	Delaware	Limited Partnership	1% owned by Covanta Delaware Valley II, LLC as LP and Covanta ARC LLC owns 50% as GP interest and 49% as LP interest
19.	Covanta Energy Americas, Inc.	Delaware	Issued: 1,000 shares	100% owned by Covanta Projects, LLC

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
20.	Covanta Energy Group, LLC (f/k/a Covanta Energy Group, Inc.)	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
21.	Covanta Energy Marketing LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
22.	Covanta Environmental Solutions, LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
23.	Covanta Fairfax, Inc.	Virginia	Issued: 100 shares	100% owned by Covanta Projects, LLC
24.	Covanta Harrisburg, Inc.	Delaware	Issued: 100 shares	100% owned by Covanta Projects, LLC
25.	Covanta Haverhill Associates, LLC (f/k/a Covanta Haverhill Associates)	Massachusetts	Limited Liability Company	100% owned by Covanta Haverhill, Inc.
26.	Covanta Haverhill, Inc.	Massachusetts	Issued: 100 shares	100% owned by Covanta Projects, LLC
27.	Covanta Hempstead II, LLC	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
28.	Covanta Hempstead Company	New York	General Partnership	99% owned by Covanta ARC LLC as GP; 1% owned by Covanta Hempstead II, LLC as GP
29.	Covanta Hennepin Energy Resource Co, LLC (f/k/a Covanta Hennepin Energy Resource Co., Limited Partnership)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
30.	Covanta Hillsborough, Inc.	Florida	Issued: 100 shares	100% owned by Covanta Projects, LLC
31.	Covanta Honolulu Resource Recovery Venture, LLC (f/k/a Covanta Honolulu Resource Recovery Venture)	Hawaii	Limited Liability Company	100% owned by Covanta Projects, LLC
32.	Covanta Hudson Valley Renewable Energy LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
33.	Covanta Huntington, LLC (f/k/a Covanta Huntington Limited Partnership)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
34.	Covanta Huntsville, Inc.	Alabama	Issued: 100 shares	100% owned by Covanta Projects, LLC
35.	Covanta Hydro Operations West, Inc.	Delaware	Issued: 100 shares	100% owned by Covanta Energy Americas, Inc.
36.	Covanta Indianapolis, Inc.	Indiana	Issued: 100 shares	100% owned by Covanta Projects, LLC
37.	Covanta Kent, Inc.	Michigan	Issued: 100 shares	100% owned by Covanta Projects, LLC
38.	Covanta Lake II, Inc.	Florida	Issued: 750 shares common Issued: 250 shares preferred	100% Owned by Covanta Projects, LLC
39.	Covanta Lancaster, Inc.	Pennsylvania	Issued: 100 shares	100% owned by Covanta Projects, LLC
40.	Covanta Lee, Inc.	Florida	Issued: 100 shares	100% owned by Covanta Projects, LLC
41.	Covanta Long Beach	Delaware	Issued: 100 shares	100% owned by Covanta Energy, LLC

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
	Renewable Energy Corp.			
42.	Covanta MacArthur Renewable Energy, Inc.	New York	Issued: 100 shares	100% owned by Covanta Energy, LLC
43.	Covanta Marion Land Corp.	Oregon	Issued: 1000 common shares 300 preferred shares	100% owned by Covanta Projects, LLC
44.	Covanta Marion, Inc.	Oregon	Issued: 10 shares	100% owned by Covanta Projects, LLC
45.	Covanta Mendota, LLC (f/k/a Covanta Mendota, L.P.)	California	Limited Liability Company	100% owned by Covanta Energy Americas, Inc.
46.	Covanta Metals Marketing LLC	Delaware	Limited Liability Company	100% owned by Covanta Lancaster, Inc.
47.	Covanta Montgomery, Inc.	Maryland	Issued: 100 shares	100% owned by Covanta Projects, LLC
48.	Covanta Niagara I, LLC (f/k/a Covanta Niagara, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
49.	Covanta Onondaga Two LLC (f/k/a Covanta Onondaga Two Corp.)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
50.	Covanta Operations of Union, LLC	New Jersey	Limited Liability Company	100% owned by Covanta Projects, LLC
51.	Covanta Pasco, Inc.	Florida	Issued: 100 shares	100% owned by Covanta Projects, LLC
52.	Covanta Pittsfield, LLC (f/k/a eco/Pittsfield, LLC)	New York	Limited Liability Company	100% owned by Covanta Projects, LLC
53.	Covanta Plymouth Renewable Energy, LLC (f/k/a Covanta Plymouth Renewable Energy Limited Partnership)	Delaware	Limited Liability Company	100% ownership by Covanta Energy, LLC
54.	Covanta Power International Holdings, Inc.	Delaware	Issued: 1,000 shares	100% owned by Covanta Energy Americas, Inc.
55.	Covanta Projects of Wallingford, LLC (f/k/a Covanta Projects of Wallingford, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
56.	Covanta Projects, LLC (f/k/a Covanta Projects, Inc.)	Delaware	Limited Liability Company	100% owned by Covanta Energy Group, LLC
57.	Covanta SECONN LLC	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
58.	Covanta SEMASS, LLC (f/k/a Covanta SEMASS, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
59.	Covanta Southeastern Connecticut, L.P.	Delaware	Limited Partnership	99% owned by Covanta SECONN LLC and 1% owned by Covanta Connecticut (S.E.), LLC
60.	Covanta Springfield, LLC	New York	Limited Liability Company	100% owned by Covanta Projects, LLC
61.	Covanta Stanislaus, Inc.	California	Issued: 100 shares	100% owned by Covanta Projects, LLC

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
62.	Covanta Sustainable Solutions, LLC (f/k/a Covanta 4Recovery, L.P.)	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
63.	Covanta Tulsa Renewable Energy, LLC (f/k/a Covanta WBH, LLC)	Delaware	Limited Liability Company	100% owned by Covanta Lancaster, Inc.
64.	Covanta Union, LLC (f/k/a Covanta Union, Inc.)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
65.	Covanta Warren Energy Resources Co., LLC (f/k/a Covanta Warren Energy Resources Co., Limited Partnership)	Delaware	Limited Liability Company	100% owned by Covanta Projects, LLC
66.	Covanta Waste to Energy of Italy, Inc.	Delaware	Issued: 100 shares	100% owned by Covanta Power International Holdings, Inc.
67.	Covanta York Renewable Energy LLC	Delaware	Limited Liability Company	100% owned by Covanta Energy, LLC
68.	ECOvanta, LLC	Delaware	Limited Liability Company	100% owned by Covanta ARC LLC
69.	GARCO, Inc.	North Carolina	Issued: 1,000 shares	100% owned by Covanta Environmental Solutions, LLC
70.	Koma Kulshan Associates	California	Limited Partnership	48.99% owned by Covanta Energy Americas, Inc. as LP interest and 1% GP interest and 50% owned by third party
71.	Mount Kisco Transfer Station, Inc.	New York	Issued: 10 shares	100% owned by Covanta Sustainable Solutions, LLC
72.	MSW Energy Finance Co. II, Inc.	Delaware	Issued: 3000 shares	100% owned by Covanta Energy, LLC
73.	Peabody Monofill Associates, Inc.	Massachusetts	Issued: 10,000 shares	100% owned by Covanta Projects, LLC
74.	SEMASS Partnership	Massachusetts	Limited Partnership	98% interest owned by Covanta Company of SEMASS, LLC in LP interest and 1% in GP interest and 1% owned by MSW Energy Finance Co. II, Inc. as LP interest
75.	South Fork II Associates Limited Partnership	Washington	Limited Partnership	Covanta Energy Americas, Inc. 49.9995% interest as GP and .0005% as LP interest; 50.0095% owned by third party
76.	Covanta Burnaby Renewable Energy, ULC (f/k/a Montenay Inc.)	Canada	Issued: 10,500 shares	100% owned by Covanta Energy, LLC
77.	Covanta Energy Asia Pacific Limited	Hong Kong	Issued: 32 shares each at HK $10.00 par value	100% Covanta Power International Holdings, Inc.

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
78.	Covanta Energy Philippine Holdings, Inc.	Philippines	Issued: 52,605 shares at Php 100 par value (Per Philippine law each Covanta director holds 1 share)	100%* owned by Covanta Power International Holdings, Inc. (*per Philippine law each Covanta director holds 1 share)
79.	Covanta Ince Park Limited	United Kingdom	Issued: 1 share Value: £1	100% owned by Covanta Energy Limited
80.	Covanta Rookery South Limited	United Kingdom	Issued: 1 share Value: £1	100% owned by Covanta Energy Limited
81.	Edison (Bataan) Cogeneration Corporation	Philippines	Issued: 4,800,000 common stock (Per Philippine law each Covanta director holds 1 share)	100%* owned by Covanta Power International Holdings, Inc. (*per Philippine law each Covanta director holds 1 share)
82.	Enereurope Holdings III, B.V.	Netherlands	Issued: EUR 20,000 and NLG 44,074.20	100% owned by Covanta Power International Holdings, Inc.
83.	Hidro Operaciones Don Pedro S.A.	Costa Rica	780 shares @ 1,00	100% owned by Covanta Power International Holdings, Inc.
84.	Olmec Insurance Ltd.	Bermuda	Issued: 1,000,000 common shares have been 50% called and paid totaling $500,000	100% owned by Covanta Energy Group, LLC
85.	TransRiver Canada Incorporated	Canada		100% owned by Covanta Energy, LLC
86.	Covanta Burnaby Renewable Energy, ULC	Canada	19,500 Common Shares	100% owned by Covanta Energy, LLC
87.	Covanta Luxembourg S.A. R.L.	Luxembourg	Share capital 17,000 shares @ 1 EURO	100% owned by Covanta Power International Holdings, Inc.
88.	Covanta Luxembourg Global Holding S.A. R.L.	Luxembourg	Share capital 17,000 shares @ 1 EURO	100% owned by Covanta Power International Holdings, Inc.
89.	Covanta Luxembourg Holding S.A. R.L.	Luxembourg	Share capital 17,000 shares @ 1 EURO	100% owned by Covanta Power International Holdings, Inc.
90.	Covanta Protos Development Limited	United Kingdom	1 Ordinary Shares @ £1 each	100% owned by Covanta Power International Holdings, Inc.
91.	Covanta Newhurst Development Limited	United Kingdom	2 Ordinary Shares @ £1 each	100% owned by Covanta Power International Holdings, Inc.
92.	Covanta Carribean SRL	Barbados	1 Common Share @ $1.00	100% owned by Covanta Power International Holdings, Inc.
93.	Chesapeake Waste Solutions LLC	Delaware	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
94.	Covanta Environmental Solutions Carriers II, LLC	Wisconsin	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
95.	Advanced Waste Services of Indiana, LLC	Wisconsin	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC

	Company Name	Jurisdiction of Incorporation	Capital Stock or Equity Interests	Description of Anticipated Ownership As of the Closing Date
96.	Recoil, LLC	Pennsylvania	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
97.	Waste Recovery Solutions, LLC	Florida	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
98.	Environmental Pharmaceuticals, LLC	Arizona	Limited Liability Company	100% owned by Covanta Environmental Solutions, LLC
99.	Industrial Oil Tank Service Corporation	New York	Authorized 400 Common Shares Issued 49 shares voting and 30 shares Class B non-voting	100% owned by Covanta Environmental Solutions, LLC
100.	Covanta OPW Associates, Inc.	Connecticut	100 shares common @ $1.00 par	100% owned by Covanta Projects, LLC
101.	Covanta Wallingford Associates, Inc.	Connecticut	100 shares common @ $1.00 par	100% owned by Covanta Projects, LLC

Pledged Trust Interests: None.

Pledged Debt: None.

Grantor	Issuer	Original Principal Amount	Outstanding Principal Balance	Issue Date	Maturity Date
Each Grantor, as Payee	**Each Grantor, as Maker**	**N/A**	**N/A**	**Closing Date**	**Demand**

(B) CERTIFICATED LLCs/PARTNERSHIP INTERESTS.

Yes. See entities identified above in Schedule 4.4(A).

SCHEDULE 4.5
TO PLEDGE AND SECURITY AGREEMENT

INTELLECTUAL PROPERTY

(A) Copyrights

U.S. Copyrights and Copyright Applications Owned By GARCO INC. d/b/a GARCO DISTRIBUTING

Copyright	Registration Number	Issue Date (Filing Date)
Garco dealer catalog: motorcycle parts & accessories	TX0000058924	3/16/78

(B) Copyright Licenses

None.

(C) Patents

U.S. Patents and Patent Applications Owned By COVANTA ENVIRONMENTAL SOLUTIONS, LLC

Patent	Patent Number (Application Number)	Issue Date (Filing Date)
Expanded Size Sludge Vacuum Tanker	8,328,290	12/11/12

U.S. Patents and Patent Applications COVANTA ENERGY LLC

Patent	Patent Number (Application Number)	Issue Date (Filing Date)
Dynamic Control of SNCR System for Semi-Batch Fed Stoker Based on MSW Combustion	7,712,306	5/11/10
Method for Supplying Combustion Gas in Incineration Systems	7,975,628	7/12/11
Tertiary Air Addition to Solid Waste-Fired Furnaces for NOx Control	8,443,739	05/21/13
Gasification Combustion System	8,707,875	04/29/14
Gasification Combustion System	8,701,573	04/22/14
Gasification Combustion System	8,997,664	4/7/15
Aerodynamic Tube Shields	(14/757,495)	(12/23/15)
System and Method for Automatic Control of Differential Pressure in a Baghouse System	9,782,711	10/10/17

U.S. Patents and Patent Applications Owned By COVANTA HOLDING CORP.

Patent	Patent Number (Application Number)	Issue Date (Filing Date)
Method To Improve The Characteristics Of Ash From Municipal Solid Waste Combustors	7,682,446	March 23, 2010

(D) Patent Licenses

None

(E) Trademarks

U.S. Trademark Registrations and Applications Owned By COVANTA ENVIRONMENTAL SOLUTIONS, LLC

Country	Mark	Registration Number (Application Number)	Registration Date (Filing Date)
USA	VACSIMIZER	AN: 77/826,201 RN: 3,780,873	(2/9/10) 4/27/10

U.S. Trademark Registrations and Applications Owned By COVANTA ENERGY CORPORATION

Country	Mark	Registration Number (Application Number)	Registration Date (Filing Date)
USA	COVANTA	AN: 77/054,918 RN: 3,451,902	(12/1/06) 6/24/08
USA	4RECOVERY	AN: 85/417,332 RN: 4,211,745	(9/8/11) 6/20/12
USA	Bolt (Design)	AN: 85/417,331 RN: 4,339,412	(9/8/11) 5/21/13
USA	COVANTA 4RECOVERY	AN: 85/417,335 RN: 4,339,413	(9/8/11) 5/21/13
USA	ECOVANTA	AN: 85/183,842 RN: 4,032,755	(11/23/10) 9/27/11
USA	REF-FUEL	AN: 73/835,929 RN: 1,602,911	(11/3/89) 6/19/90
USA	REF FUEL	AN: 85/286,283 RN: 4,172,649	(4/5/11) 7/10/12
USA	REF FUEL Logo (Design)	AN: 85/286,300 RN: 4,176,687	(4/5/11) 7/17/12
USA	RX4SAFETY	AN: 85/293,670 RN: 4,062,821	(4/13/11) 11/29/11

(F) Trademark Licenses

None.

(G) Trade Secret Licenses

None.

(H) Exceptions to Representations and Warranties in Section 4.5

SCHEDULE 4.5
TO PLEDGE AND SECURITY AGREEMENT

None.

EXHIBIT A

TO PLEDGE AND SECURITY AGREEMENT

PLEDGE SUPPLEMENT

This **PLEDGE SUPPLEMENT** , dated [mm/dd/yy], is delivered by **[NAME OF GRANTOR]** a **[NAME OF STATE OF INCORPORATION]** corporation located at (the " **Grantor** ") is delivered in favor of **BANK OF AMERICA, N.A.** , as Collateral Agent (the " **Collateral Agent** "), pursuant to the Amended and Restated Pledge and Security Agreement, dated as of August 21, 2018 (as it may be from time to time amended, restated, modified or supplemented, the " **Security Agreement** "), among **COVANTA ENERGY LLC** , the other Grantors named therein, and the Collateral Agent. Capitalized terms used herein not otherwise defined herein shall have the meanings ascribed thereto in the Security Agreement.

[Grantor hereby confirms the grant to the Collateral Agent set forth in the Security Agreement of, and does hereby grant to the Collateral Agent, a security interest in and continuing lien on all of Grantor's right, title and interest in and to all Collateral to secure the Secured Obligations, in each case whether now owned or hereafter acquired or arising and wherever the same may be located. Grantor represents and warrants with respect to itself that the attached Supplements to Schedules accurately and completely set forth all additional information required pursuant to the Security Agreement and hereby agrees that such Supplements to Schedules shall constitute part of the Schedules to the Security Agreement.]

IN WITNESS WHEREOF , Grantor has caused this Pledge Supplement to be duly executed and delivered by its duly authorized officer as of **[mm/dd/yy]** .

[NAME OF GRANTOR]

By: _____ Name:
Title:

AMENDED AND RESTATED INTERCOMPANY SUBORDINATION AGREEMENT

This **AMENDED AND RESTATED INTERCOMPANY SUBORDINATION AGREEMENT** , dated as of August 21, 2018 (as may be amended, restated, supplemented, replaced or otherwise modified from time to time, the " **Agreement** ", is entered into by and among **COVANTA ENERGY, LLC** , a Delaware limited liability company (the " **Company** "), **COVANTA HOLDING CORPORATION** , a Delaware corporation (" **Holding** "), **CERTAIN SUBSIDIARIES OF COMPANY** , as Guarantor Subsidiaries under and as defined in the Credit Agreement (defined below) (collectively, the " **Guarantor Subsidiaries** ," and together with the Company and Holding, the " **Covanta Parties** "), **CERTAIN OTHER SUBSIDIARIES OF COMPANY** as Non-Guarantor Subsidiaries under and as defined in the Credit Agreement (defined below) (collectively, the " **Non-Guarantor Subsidiaries** ") and **BANK OF AMERICA, N.A.** , as Administrative Agent (in such capacity, the " **Administrative Agent** ") for the benefit of the Secured Parties (as such term is defined in the Credit Agreement defined below).

RECITALS:

WHEREAS, each capitalized term used but not otherwise defined herein shall have the meaning assigned to such term in the Second Amended and Restated Credit and Guaranty Agreement dated as of the date hereof (as the same may hereafter be amended, restated, supplemented, replaced or otherwise modified from time to time, the " **Credit Agreement** ") by and among the Company, Holding and certain of the other Covanta Parties, the Lenders from time to time party thereto, the Administrative Agent and certain other parties thereto;

WHEREAS, pursuant to the Credit Agreement, the Permitted Hedge Agreements, the Permitted Letters of Credit and the Permitted Cash Management Agreements, the Company and certain other Covanta Parties shall owe the Obligations to the Secured Parties;

WHEREAS, certain of the Covanta Parties are or may become indebted to each other and Non-Guarantor Subsidiaries pursuant to one more Intercompany Notes, including, without limitation, the Amended and Restated Master Intercompany Note identified on Exhibit A hereto (the Indebtedness of each of the Covanta Parties to any other Covanta Party or any NonGuarantor Subsidiary, now existing or hereafter incurred (whether created directly or acquired by assignment or otherwise), and interest and premiums, if any, thereon and other amounts payable in respect thereof are hereinafter collectively referred to as the " **Intercompany Indebtedness** "); and

WHEREAS, the obligations of the Secured Parties under the Credit Agreement, the Permitted Hedge Agreements, Permitted Letters of Credit and the Permitted Cash Management Agreements are subject to the condition, among others, that the Intercompany Indebtedness be subordinated to the Senior Indebtedness (as defined below) in the manner set forth herein.

NOW, THEREFORE, intending to be legally bound hereby, the parties hereto covenant and agree as follows:

1. **Subordination of Liabilities.** Each Covanta Party, for itself, its successors and assigns, covenants and agrees, and each holder of Intercompany Indebtedness by its acceptance thereof likewise covenants and agrees, that the payment of the principal of, and interest on, and all other amounts owing in respect of, Intercompany Indebtedness is hereby expressly subordinated, to the extent and in the manner hereinafter set forth, to the indefeasible payment in full in cash or discharge in full of Senior Indebtedness in cash and cash collateralization of any outstanding letters of credit thereunder. The subordination provisions set forth herein shall constitute a continuing offer to all persons who, in reliance upon such provisions, become holders of, or continue to hold, Senior Indebtedness, and such provisions are made for the benefit of the holders of Senior Indebtedness, and such holders are hereby made obligees hereunder to the same extent as if their names were written herein as such, and they and/or each of them may proceed to enforce such provisions.

" **Senior Indebtedness** " means, at any time, the Obligations as such term is defined in the Credit Agreement, but excluding indemnification and other contingent obligations (other than contingent reimbursement obligations in respect of amounts that may be drawn under outstanding letters of credit) in respect of which no assertion of liability and no claim or demand for payment has been made (and, in the case of indemnification obligations, no notice for indemnification has been issued by the indemnitee) at such time.

2. **Covanta Parties Not to Make Payments with Respect to Intercompany Indebtedness in Certain Circumstances.** (a) Upon the maturity of any Senior Indebtedness (including interest thereon or fees or any other amounts owing in respect thereof), whether at stated maturity, by acceleration or otherwise, all principal thereof and premium, if any, and interest thereon or fees or any other amounts owing in respect thereof, in each case to the extent due and owing at such time, shall first be paid in full in cash or discharged in full, or such payment duly provided for in cash or in a manner satisfactory to the holder or holders of such Senior Indebtedness, including cash collateralization of any outstanding letters of credit thereunder, before any payment is made on account of the principal of (including installments thereof), or interest on, or any amount otherwise owing in respect of, Intercompany Indebtedness. Each holder of Intercompany Indebtedness hereby agrees that, so long as an Event of Default has occurred and is continuing, no amounts owing in respect of Intercompany Indebtedness shall be made, asked, demanded, sued for, or otherwise taken, accepted or received (it being understood that such actions may be taken prior to the maturity of any Senior Indebtedness (whether at stated maturity, by acceleration or otherwise) so long as no Event of Default has occurred and is continuing).

(b) In the event that notwithstanding the provisions of the preceding subsection (a) of this Section 2 , any Covanta Party shall make any payment on account of the principal of, or interest on, or amounts otherwise owing in respect of, Intercompany Indebtedness at a time when payment is not permitted by said subsection (a), such payment shall be held by the holder of such Intercompany Indebtedness, in trust for the benefit of, and shall be paid forthwith

over and delivered to, the holders of Senior Indebtedness or their representative or representatives under the agreements pursuant to which Senior Indebtedness may have been issued, as their respective interests may appear, for application pro rata to the payment of all Senior Indebtedness remaining unpaid to the extent necessary to pay all Senior Indebtedness in full in cash and cash collateralize any outstanding letters of credit thereunder in accordance with the terms of such Senior Indebtedness, after giving effect to any concurrent payment or distribution to or for the holders of Senior Indebtedness. Without in any way modifying the subordination provisions set forth herein or affecting the subordination effected hereby, the relevant Covanta Party shall give holders of Intercompany Indebtedness prompt written notice of any maturity of Senior Indebtedness after which such Senior Indebtedness remains unsatisfied.

3. **Intercompany Indebtedness Subordinated to Prior Payment of all Senior Indebtedness on Dissolution, Liquidation or Reorganization of any Covanta Party.** Upon any distribution of assets of any Covanta Party that constitute Collateral upon any dissolution, winding up, liquidation or reorganization of such Covanta Party (whether in bankruptcy, insolvency or receivership proceedings or upon an assignment for the benefit of creditors or otherwise):

(a) the holders of all Senior Indebtedness shall first be entitled to receive payment in full in cash or in a manner satisfactory to the holder or holders of such Senior Indebtedness of the principal thereof, premium, if any, and interest (including, without limitation, all interest accruing after the commencement of any bankruptcy, insolvency, receivership or similar proceeding at the rate provided in the governing documentation whether or not such interest is an allowed claim in such proceeding) and all other amounts due thereon before the holders of Intercompany Indebtedness is entitled to receive any payment on account of the principal of or interest on or any other amount owing in respect of Intercompany Indebtedness;

(b) any payment or distribution of assets of such Covanta Party of any kind or character that constitute Collateral, whether in cash, property or securities, to which holders of Intercompany Indebtedness would be entitled except for the subordination provisions set forth herein, shall be paid by the liquidating trustee or agent or other person making such payment or distribution, whether a trustee or agent, directly to the holders of Senior Indebtedness or their representative or representatives under the agreements pursuant to which Senior Indebtedness may have been issued, to the extent necessary to make payment in full of all Senior Indebtedness remaining unpaid, after giving effect to any concurrent payment or distribution to the holders of such Senior Indebtedness; and

(c) in the event that, notwithstanding the foregoing provisions of this Section 3 , any payment or distribution of assets of such Covanta Party of any kind or character that constitute Collateral, whether in cash, property or securities, shall be received by holders of Intercompany Indebtedness on account of principal of, or interest or other amounts due on, Intercompany Indebtedness before all Senior Indebtedness is paid in full in cash or in a manner satisfactory to the holder or holders of such Senior Indebtedness or otherwise discharged in full, or effective provisions made for its payment, such payment or distribution shall be received and held in trust for and shall be paid over to the holders of Senior

Indebtedness remaining unpaid or unprovided for or their representative or representatives under the agreements pursuant to which Senior Indebtedness may have been issued, for application to the payment of such Senior Indebtedness until all such Senior Indebtedness shall have been paid in full in cash or in a manner satisfactory to the holder or holders of such Senior Indebtedness or otherwise discharged in full, after giving effect to any concurrent payment or distribution to the holders of such Senior Indebtedness.

Without in any way modifying the subordination provisions set forth herein or affecting the subordination effected hereby, such Covanta Party shall give prompt written notice to holders of Intercompany Indebtedness of any dissolution, winding up, liquidation or reorganization of such Covanta Party (whether in bankruptcy, insolvency or receivership proceedings or upon an assignment for the benefit of creditors or otherwise).

4. **Furtherance of Subordination.** If any proceeding referred to in Section 3 above is commenced by or against any Covanta Party:

(a) the Administrative Agent, acting on behalf of each holder of Senior Indebtedness, is hereby irrevocably authorized and empowered (in its own name or in the name of the holders of Intercompany Indebtedness or otherwise), but shall have no obligation, to demand, sue for, collect and receive every payment or distribution referred to in Section 3(b) and give acquittance therefor and to file claims and proofs of claim and take such other action (including, without limitation, voting the claims arising under Intercompany Indebtedness or enforcing any security interest or other lien securing payment of Intercompany Indebtedness) as it may deem necessary or advisable for the exercise or enforcement of or causing enforcement of any of the rights or interests of the holders of Senior Indebtedness hereunder;

(b) each holder of Intercompany Indebtedness shall duly and promptly take such action as the Administrative Agent may request (i) to collect Intercompany Indebtedness for the account of the holders of Senior Indebtedness and to file appropriate claims or proofs of claim in respect of Intercompany Indebtedness, (ii) to execute and deliver to the Administrative Agent such powers of attorney, assignments or other instruments as the Administrative Agent may request in order to enable the Administrative Agent to enforce any and all claims with respect to, and any security interests and other liens securing payment of, Intercompany Indebtedness, and (iii) to collect and receive any and all payments or distributions that may be payable or deliverable upon or with respect to Intercompany Indebtedness; and

(c) The holders of Senior Indebtedness are hereby authorized to demand specific performance of this Agreement, whether or not such Covanta Party shall have complied with any of the provisions hereof applicable to it, at any time when the holders of Intercompany Indebtedness shall have failed to comply with any of the provisions of this Agreement applicable to it. Each holder of Intercompany Indebtedness hereby irrevocably waives any defense based on the adequacy of a remedy at law that might be asserted as a bar to such remedy of specific performance.

5. **Subrogation** . Subject to the prior payment or discharge in cash in full of all Senior Indebtedness, holders of Intercompany Indebtedness shall be subrogated to the rights of the holders of Senior Indebtedness to receive payments or distributions of assets of any Covanta Party applicable to Senior Indebtedness until all amounts owing in respect of Intercompany Indebtedness shall be paid or discharged in full, and for the purpose of such subrogation no payments or distributions to the holders of Senior Indebtedness by or on behalf of such Covanta Party or by or on behalf of holders of Intercompany Indebtedness by virtue of the subordination provisions set forth herein that otherwise would have been made to the holders of Intercompany Indebtedness, shall be deemed to be payment by such Covanta Party to or on account of Intercompany Indebtedness, it being understood that the subordination provisions set forth herein are and are intended solely for the purpose of defining the relative rights of the holders of Intercompany Indebtedness, on the one hand, and the holders of Senior Indebtedness, on the other hand.

6. **Obligation of the Covanta Parties Unconditional** . Nothing contained in the subordination provisions set forth herein or in the documents evidencing Intercompany Indebtedness is intended to or shall impair, as between any Covanta Party and the holders of Intercompany Indebtedness, the obligation of such Covanta Party, which is absolute and unconditional, to pay to the holders of Intercompany Indebtedness the principal of and interest on Intercompany Indebtedness as and when the same shall become due and payable in accordance with its terms, or is intended to or shall affect the relative rights of the holders of Intercompany Indebtedness and creditors of such Covanta Party other than the holders of Senior Indebtedness, nor shall anything herein or therein prevent the holders of Intercompany Indebtedness from exercising all remedies otherwise permitted by applicable law, subject to the rights, if any, under the subordination provisions set forth herein of the holders of Senior Indebtedness in respect of cash, property, or securities of such Covanta Party received upon the exercise of any such remedy. Upon any distribution of assets of such Covanta Party referred to herein, the holders of Intercompany Indebtedness shall be entitled to rely upon any order or decree made by any court of competent jurisdiction in which such dissolution, winding up, liquidation or reorganization proceedings are pending, or a certificate of the liquidating trustee or agent or other person making any distribution to the holders of Intercompany Indebtedness, for the purpose of ascertaining the persons entitled to participate in such distribution, the holders of Senior Indebtedness and other indebtedness of such Covanta Party, the amount thereof or payable thereon, the amount or amounts paid or distributed thereon and all other facts pertinent thereto or hereto.

7. **Subordination Rights Not Impaired by Acts or Omissions of any Covanta Party or Holders of Senior Indebtedness.** No rights of any present or future holders of any Senior Indebtedness to enforce subordination as herein provided shall at any time in any way be prejudiced or impaired by an act or failure to act on the part of any Covanta Party or by any act or failure to act in good faith by any such holder, or by any noncompliance by such Covanta Party with the terms and provisions of Intercompany Indebtedness, regardless of any knowledge thereof which any such holder may have or be otherwise charged with. The holders of Senior Indebtedness may, without in any way affecting the obligations of the holders of Intercompany Indebtedness with respect thereto, at any time or from time to time and in their absolute discretion, change the manner, place or terms of payment of, change or extend the time of payment of, or renew or alter, any Senior Indebtedness, or amend, modify or supplement any agreement or instrument governing or evidencing

such Senior Indebtedness or any other document referred to therein, or exercise or refrain from exercising any other of their rights under Senior Indebtedness including, without limitation, the waiver of a default thereunder and the release of any collateral securing such Senior Indebtedness, all without notice to or consent from the holders of Intercompany Indebtedness.

8. **Additional Subsidiaries** . Upon execution and delivery after the date hereof by any (x) Guarantor Subsidiary of a counterpart signature page hereto, such Guarantor Subsidiary shall become a "Covanta Party" hereunder or (y) Non-Guarantor Subsidiary of a counterpart signature page hereto, such Non-Guarantor Subsidiary shall become a "Non- Guarantor Subsidiary" hereunder, in each case with the same force and effect as if originally named as a Covanta Party or Non-Guarantor Subsidiary (as applicable) hereunder. The rights and obligations of each Covanta Party hereunder shall remain in full force and effect notwithstanding the addition of any new Covanta Party as a party to this Agreement.

9. **Continuing Force and Effect.** This Agreement shall continue in force for so long as any portion of Senior Indebtedness remains unpaid and any Commitments under the Credit Agreement remain outstanding, it being contemplated that this Agreement be of a continuing nature.

10. **Modification, Amendments or Waivers.** Any and all agreements amending or changing any provision of this Agreement or the rights of the holders of Senior Indebtedness hereunder, and any and all waivers or consents hereunder, shall be made only by written agreement, waiver or consent signed by the Covanta Parties and the Administrative Agent, acting on behalf of the holders of Senior Indebtedness.

11. **Severability.** The provisions of this Agreement are intended to be severable. If any provision of this Agreement shall be held invalid or unenforceable in whole or in part in any jurisdiction, such provision shall, as to such jurisdiction, be ineffective to the extent of such invalidity or unenforceability without in any manner affecting the validity or enforceability thereof in any other jurisdiction or the remaining provisions hereof in any jurisdiction.

12. **Governing Law.** THIS AGREEMENT AND THE RIGHTS AND OBLIGATIONS OF THE PARTIES HEREUNDER SHALL BE GOVERNED BY, AND SHALL BE CONSTRUED AND ENFORCED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK.

13. **Successors and Assigns.** This Agreement shall inure to the benefit of the Secured Parties and their respective successors and assigns, as permitted in the Credit Agreement, and the obligations of the Covanta Parties and the Non-Guarantor Subsidiaries shall be binding upon their respective successors and assigns. The duties and obligations of the Covanta Parties and the Non-Guarantor Subsidiaries may not be delegated or transferred without the written consent of the Requisite Lenders under the Credit Agreement and any such delegation or transfer without such consent shall be null and void.

14. **Counterparts.** This Agreement may be executed in any number of

counterparts and by the different parties hereto on separate counterparts, each of which, when executed and delivered, shall be deemed an original, but all such counterparts shall constitute but one and the same instrument.

15. **Remedies.** In the event of a breach by any of the Covanta Parties or any of the Non-Guarantor Subsidiaries in the performance of any of the terms of this Agreement, the Administrative Agent, on behalf of the Secured Parties, may demand specific performance of this Agreement and seek injunctive relief and may exercise any other remedy available at law or in equity, it being recognized that the remedies of the Administrative Agent, on behalf of the Secured Parties, at law may not fully compensate the Administrative Agent, on behalf of the Secured Parties, for the damages they may suffer in the event of a breach hereof.

16. **Notices.** All notices, statements, requests and demands and other communications given to or made among the Covanta Parties, the Non-Guarantor Subsidiaries, the Administrative Agent or the holders of Senior Indebtedness in accordance with the provisions of this Agreement shall be given or made as provided in Section 10.1 of the Credit Agreement.

17. **Termination.** Upon the Termination Date, this Agreement shall terminate and be of no further force and effect.

18. **Amendment and Restatement** . This Agreement is an amendment and restatement of the Intercompany Subordination Agreement dated as of March 28, 2012 (as such may have been amended, restated, supplemented or further modified and in effect immediately prior to the effectiveness of the Agreement, the " **Original Agreement** ") and is in no way intended to constitute a novation thereof. The provisions of this Agreement shall prevail in the event of any conflict or inconsistency between such provisions and those of the Original Agreement.

Remainder of page intentionally left blank]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed and delivered by their respective officers thereunto duly authorized as of the date fully written above.

COVANTA ENERGY, LLC, A DELAWARE LIMITED LIABILITY COMPANY, AND EACH OF ITS SUBSIDIARIES LISTED ON ANNEX A HERETO

By: /S/ Bradford J. Helgeson

Name: Bradford J. Helgeson

Title: Authorized Officer

COVANTA HOLDING CORPORATION, A DELAWARE CORPORATION

By: /S/ Bradford J. Helgeson

Name: Bradford J. Helgeson

Title: Executive Vice President and Chief Financial Officer

[Signature Page to Amended and Restated Intercompany Subordination Agreement]

BANK OF AMERICA, N.A.

as Administrative Agent

By: /S/ Ronaldo Naval

Name: Ronaldo Naval

Title: Vice President

[Signature Page to Amended and Restated Intercompany Subordination Agreement]

ANNEX A TO SIGNATURE PAGE

Guarantor Subsidiaries

1.	Camden County Energy Recovery Associates, L.P., a New Jersey limited partnership By its General Partner Covanta Camden GP, LLC and Limited Partner Covanta Energy, LLC
2.	Covanta 4Recovery Transfer Systems LLC (f/k/a TransRiver Transfer Systems LLC), a Delaware limited liability company By its Sole Member Covanta Sustainable Solutions, LLC
3.	Covanta Abington Transfer Solutions LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
4.	Covanta Alexandria/Arlington, Inc., a Virginia corporation
5.	Covanta ARC LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
6.	Covanta Bristol, Inc., a Connecticut corporation
7.	Covanta Camden GP, LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
8.	Covanta Company of SEMASS, LLC (f/k/a Covanta Company of SEMASS, L.P.), a Delaware limited liability company By its Sole Member Covanta ARC LLC
9.	Covanta Dade Metals Recovery LLC, a Florida limited liability company By its Sole Member Covanta Pasco, Inc.
10.	Covanta Delaware Valley OP, LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
11.	Covanta Energy Americas, Inc., a Delaware corporation
12.	Covanta Energy Group, LLC (f/k/a Covanta Energy Group, Inc.), a Delaware limited liability company By its Sole Member Covanta Energy, LLC
13.	Covanta Energy Marketing LLC, a Delaware limited liability company By its Sole Member Covanta Energy, LLC
14.	Covanta Fairfax, Inc., a Virginia corporation
15.	Covanta Harrisburg, Inc., a Delaware corporation
16.	Covanta Haverhill, Inc., a Massachusetts corporation
17.	Covanta Haverhill Associates, LLC (f/k/a Covanta Haverhill Associates), a Massachusetts limited liability company By its Sole Member Covanta Haverhill, Inc.
18.	Covanta Hempstead Company, a New York general partnership By its General Partners Covanta Hempstead II, LLC and Covanta ARC LLC
19.	Covanta Hempstead II, LLC, a Delaware limited liability company By its Sole Member Covanta ARC LLC
20.	Covanta Hillsborough, Inc., a Florida corporation
21.	Covanta Honolulu Resource Recovery Venture, LLC (f/k/a Covanta Honolulu Resource Recovery Venture), a Hawaii limited liability company

	By its Sole Member Covanta Projects, LLC
22.	Covanta Huntsville, Inc., an Alabama corporation
23.	Covanta Indianapolis, Inc., an Indiana corporation
24.	Covanta Kent, Inc., a Michigan corporation
25.	Covanta Lake II, Inc., a Florida corporation
26.	Covanta Lancaster, Inc., a Pennsylvania corporation
27.	Covanta Lee, Inc., a Florida corporation
28.	Covanta Long Beach Renewable Energy Corp., a Delaware corporation
29.	Covanta MacArthur Renewable Energy, Inc., a New York corporation
30.	Covanta Marion Land Corp., an Oregon corporation
31.	Covanta Marion, Inc., an Oregon corporation
32.	Covanta Metals Marketing LLC, a Delaware limited liability company By its Sole Member Covanta Lancaster, Inc.
33.	Covanta Montgomery, Inc., Maryland corporation
34.	Covanta Niagara I, LLC (f/k/a Covanta Niagara, L.P.), a Delaware limited liability company By its Sole Member Covanta ARC LLC
35.	Covanta Operations of Union, LLC, a New Jersey limited liability company By its Sole Member Covanta Projects, LLC
36.	Covanta Pasco, Inc., a Florida corporation
37.	Covanta Pittsfield, LLC, a New York limited liability company By its Sole Member and Manager Covanta Projects, LLC
38.	Covanta Plymouth Renewable Energy, LLC (f/k/a Covanta Plymouth Renewable Energy Limited Partnership), a Delaware limited liability company By its Sole Member Covanta Energy, LLC
39.	Covanta Power International Holdings, Inc., a Delaware corporation
40.	Covanta Projects, LLC (f/k/a Covanta Projects, Inc.), a Delaware limited liability company By its Sole Member Covanta Energy Group, LLC
41.	Covanta SECONN LLC, a Delaware limited liability company By its sole Member Covanta ARC LLC
42.	Covanta Springfield, LLC, a New York limited liability company By its Sole Member Covanta Projects, LLC
43.	Covanta Stanislaus, Inc., a California corporation
44.	Covanta Sustainable Solutions, LLC (f/k/a Covanta 4Recovery, L.P.), a Delaware limited liability company By its Sole Member Covanta ARC LLC
45.	Covanta Tulsa Renewable Energy, LLC (f/k/a Covanta WBH, LLC), a Delaware limited liability company By its Sole Member Covanta Lancaster, Inc.
46.	Covanta Warren Energy Resources Co., LLC (f/k/a Covanta Warren Energy Resources Co., Limited Partnership), a Delaware limited liability company By its Sole Member Covanta Projects, LLC
47.	Covanta York Renewable Energy LLC, a Delaware limited liability company By its Sole Member and Manager Covanta Energy, LLC

48.	ECOvanta, LLC, a Delaware limited liability company By its Sole Member Covanta ARC LLC
49.	MSW Energy Finance Co. II, Inc., a Delaware corporation
50.	Peabody Monofill Associates, Inc., a Massachusetts corporation
51.	SEMASS Partnership, a Massachusetts limited partnership By its General Partner and Limited Partner Covanta Company of SEMASS, L.P. and Limited Partner MSW Energy Finance Co. II, Inc.
52.	Chesapeake Waste Solutions LLC, a Delaware limited liability company
53.	Covanta Environmental Solutions Carriers II, LLC, a Wisconsin limited liability company
54.	Advanced Waste Services of Indiana, LLC, a Wisconsin limited liability company
55.	Waste Recovery Solutions, LLC, a Florida limited liability company
56.	Environmental Pharmaceuticals, LLC, an Arizona limited liability company
57.	Industrial Oil Tank Service Corporation, a New York corporation
58.	GARCO, Inc., a North Carolina corporation
59.	Covanta Environmental Solutions, LLC, a Delaware limited liability company

ANNEX B TO SIGNATURE PAGE
Non-Guarantor Subsidiaries

1.	Covanta Babylon, Inc., a New York corporation
2.	Covanta Connecticut (S.E.), LLC, a Delaware limited liability company
3.	Covanta Dade Renewable Energy, LLC (f/k/a Covanta Dade Renewable Energy Ltd.), a Florida limited liability company
4.	Covanta Delano, Inc., a Delaware corporation
5.	Covanta Delaware Valley II, LLC, a Delaware limited liability company
6.	Covanta Delaware Valley, L.P., a Delaware limited partnership
7.	Covanta Essex Company, a New Jersey corporation
8.	Covanta Essex LLC, a Delaware limited liability company
9.	Covanta Essex II, LLC, a Delaware limited liability company
10.	Covanta Huntington, LLC (f/k/a Covanta Huntington Limited Partnership), a Delaware limited liability company
11.	Covanta Hydro Operations West, Inc., a Delaware corporation
12.	Covanta Mendota, LLC (f/k/a Covanta Mendota, L.P.), a California limited liability company
13.	Covanta Onondaga Limited Partnership, a Delaware limited partnership
14.	Covanta Onondaga Two LLC (f/k/a Covanta Onondaga Two Corp.), a Delaware limited liability company
15.	Covanta Southeastern Connecticut Company, a Connecticut corporation
16.	Covanta Southeastern Connecticut, L.P., a Delaware limited partnership
17.	Covanta Union, LLC (f/k/a Covanta Union, Inc.), a Delaware limited liability company
18.	Koma Kulshan Associates LP, a California limited partnership
19.	South Fork II Associates Limited Partnership, a Washington limited partnership
20.	Covanta Burnaby Renewable Energy, Inc., Canada
21.	Covanta Durham York Renewable Energy Limited Partnership, Canada
22.	Covanta Energy (Ireland) Limited, Ireland
23.	Covanta Energy Asia Holdings Ltd., Mauritius
24.	Covanta Energy Asia Pacific Holdings, Ltd., China
25.	Covanta Energy Asia Pacific Ltd., Hong Kong
26.	Covanta Energy China (Delta) Ltd., Mauritius
27.	Covanta Energy China (Gamma) Ltd., Mauritius
28.	Covanta Energy India (Balaji) Limited, Mauritius
29.	Covanta Energy International Investments Limited (f/k/a Covanta Energy India Investments, Ltd.), Mauritius
30.	Covanta Energy Limited, United Kingdom
31.	Covanta Energy Philippines Holdings, Inc., Philippines
32.	Covanta Europe Engineering Limited, Ireland
33.	Covanta Europe Holdings S.a.r.l., Luxembourg
34.	Covanta Europe Operations Limited, Ireland
35.	Covanta Five Ltd., Mauritius

36.	Covanta Holding UK Limited, United Kingdom
37.	Covanta Ince Park LLP, United Kingdom
38.	Covanta Rookery South Ltd., United Kingdom
39.	Covanta Waste to Energy Asia Limited, Hong Kong
40.	Covanta Waste to Energy Asia Ltd., Mauritius
41.	Dublin Waste to Energy Group (Holdings) Limited, Ireland
42.	Dublin Waste to Energy (Holdings) Limited, Ireland
43.	Dublin Waste to Energy Supply Limited, Ireland
44.	Dublin Waste to Energy Limited, Ireland
45.	Edison (Bataan) Cogeneration Corporation, Philippines
46.	Enereurope Holdings III, B.V., Netherlands
47.	Hidro Operaciones Don Pedro S.A., Costa Rica
48.	Olmec Insurance Ltd., Bermuda
49.	TransRiver Canada Incorporated, Canada
50.	Covanta Environmental Solutions, Inc., Canada
51.	Covanta Environmental Solutions Ontario, Inc., Canada
52.	Return-Tech Inc., Canada
53.	35 Industrial Inc., Canada
54.	Covanta Burnaby Renewable Energy, ULC, Canada
55.	Covanta Luxembourg S.A. R.L., Luxembourg
56.	Covanta Luxembourg Global Holding S.A. R.L., Luxembourg
57.	Covanta Luxembourg Holding S.A. R.L., Luxembourg
58.	Covanta Holding 2 UK Limited, United Kingdom
59.	Covanta Holding 3 UK Limited, United Kingdom
60.	Covanta Europe Assets Limited, United Kingdom
61.	Covanta Protos Development Limited, United Kingdom
62.	Covanta Newhurst Development Limited, United Kingdom
63.	Covanta Caribbean SRL, Barbados

EXHIBIT A Intercompany Indebtedness

Amended and Restated Master Intercompany Promissory Note dated August 21, 2018 made by each of the Covanta Parties listed therein.

Exhibit 21.1

COVANTA HOLDING CORPORATION - LIST OF SUBSIDIARIES

Company Name	Jurisdiction of Incorporation
35 Industrial, Inc.	Canada
Advanced Waste Services of Indiana, LLC	Wisconsin
Camden County Energy Recovery Associates, L.P.	New Jersey
Chesapeake Waste Solutions, Inc.	Delaware
Covanta 4Recovery Philadelphia LLC	Delaware
Covanta 4Recovery Transfer Systems LLC	Delaware
Covanta Abington Transfer Solutions LLC	Delaware
Covanta Alexandria / Arlington, Inc.	Virginia
Covanta ARC LLC	Delaware
Covanta B-3, LLC	New York
Covanta Babylon, Inc.	New York
Covanta Bristol, Inc.	Connecticut
Covanta Burnaby Renewable Energy , ULC	Canada
Covanta Camden GP, LLC	Delaware
Covanta Caribbean SRL	Barbados
Covanta Company of SEMASS, LLC	Delaware
Covanta Connecticut (S.E.), LLC	Delaware
Covanta Corporation	Delaware
Covanta Dade Metals Recovery LLC	Florida
Covanta Dade Renewable Energy, LLC	Florida
Covanta Delano, Inc.	Delaware
Covanta Delaware Valley II, LLC	Delaware
Covanta Delaware Valley, L.P.	Delaware
Covanta Delaware Valley OP, LLC	Delaware
Covanta Durhan York Renewable Energy Limited Partnership	Canada
Covanta Energy (Ireland) Limited	Ireland
Covanta Energy Americas, Inc.	Delaware
Covanta Energy Asia Holdings Ltd.	Mauritius
Covanta Energy Asia Pacific Holdings Ltd.	People's Republic of China
Covanta Energy China (Delta) Limited	Republic of Mauritius
Covanta Energy China (Gamma) Limited	Republic of Mauritius
Covanta Energy Group, LLC	Delaware
Covanta Energy India (Balaji) Limited	Republic of Mauritius
Covanta Energy International Investments Limited	Republic of Mauritius
Covanta Energy Limited	United Kingdom
Covanta Energy, LLC	Delaware
Covanta Energy Marketing LLC	Delaware
Covanta Environmental Solutions, Inc. f/k/a Sorinco, Inc.	Canada
Covanta Environmental Solutions, LLC	Delaware
Covanta Environmental Solutions Carriers II, LLC	Wisconsin
Covanta Environmental Solutions Ontario, Inc. f/k/a Quantex Environmental Inc.	Canada
Covanta Energy Philippine Holdings, Inc.	Philippines

Covanta Essex Company	New Jersey
Covanta Essex II, LLC	Delaware
Covanta Essex LLC	Delaware
Covanta Europe Assets Limited	United Kingdom
Covanta Europe Engineering Limited	Ireland
Covanta Europe Holdings S.a.r.l.	Luxembourg
Covanta Europe Operations Limited	Ireland
Covanta Fairfax, Inc.	Virginia
Covanta Five Limited	Republic of Mauritius
Covanta Green Earls Gate Holding Limited	Jersey
Covanta Green Jersey Assets Limited	Jersey
Covanta Green UK Limited	United Kingdom
Covanta Green Rookery Holding Limited	United Kingdom
Covanta Harrisburg, Inc.	Delaware
Covanta Haverhill Associates, LLC	Massachusetts
Covanta Haverhill, Inc.	Massachusetts
Covanta Hempstead Company	New York
Covanta Hempstead II, LLC	Delaware
Covanta Hennepin Energy Resource Co, LLC	Delaware
Covanta Hillsborough, Inc.	Florida
Covanta Holding UK Limited	United Kingdom
Covanta Holding 2 UK Limited	United Kingdom
Covanta Holding 3 UK Limited	United Kingdom
Covanta Honolulu Resource Recovery Venture, LLC	Hawaii
Covanta Hudson Valley Renewable Energy LLC	Delaware
Covanta Huntington, LLC	Delaware
Covanta Huntsville, Inc.	Alabama
Covanta Hydro Operations West, Inc.	Delaware
Covanta Ince Park Limited	United Kingdom
Covanta Indianapolis, Inc.	Indiana
Covanta Insurance Holdings, LLC	Delaware
Covanta Kent, Inc.	Michigan
Covanta Lake II, Inc.	Florida
Covanta Lancaster, Inc.	Pennsylvania
Covanta Lee, Inc.	Florida
Covanta Long Beach Renewable Energy Corp.	Delaware
Covanta MacArthur Renewable Energy, Inc.	New York
Covanta Marion Land Corp.	Oregon
Covanta Marion, Inc.	Oregon
Covanta Mendota, LLC	California
Covanta Metals Marketing LLC	Delaware
Covanta Montgomery, Inc.	Maryland
Covanta Niagara I, LLC	Delaware
Covanta Newhurst Development Limited	United Kingdom
Covanta Onondaga Limited Partnership	Delaware
Covanta Onondaga Two LLC	Delaware

Covanta Operations of Union LLC	New Jersey
Covanta OPW Associates, Inc.	Connecticut
Covanta Palm Beach Resource Recovery LLC	Florida
Covanta Pasco, Inc.	Florida
Covanta Pittsfield, LLC	New York
Covanta Plymouth Renewable Energy, LLC	Delaware
Covanta Power International Holdings, Inc.	Delaware
Covanta Projects of Wallingford, LLC	Delaware
Covanta Projects, LLC	Delaware
Covanta Protos Development Limited	United Kingdom
Covanta SECONN LLC	Delaware
Covanta Southeastern Connecticut Company	Connecticut
Covanta Southeastern Connecticut, L.P.	Delaware
Covanta Springfield, LLC	New York
Covanta Stanislaus, Inc.	California
Covanta Sustainable Solutions, LLC	Delaware
Covanta TARTECH LLC	Delaware
Covanta Tulsa Renewable Energy LLC	Delaware
Covanta Union, LLC	Delaware
Covanta Wallingford Associates, Inc.	Delaware
Covanta Warren Energy Resource Co., LLC	Delaware
Covanta Waste to Energy Asia Limited	Hong Kong
Covanta Waste to Energy Asia Ltd	Mauritius
Covanta Waste to Energy of Italy, Inc.	Delaware
Covanta York Renewable Energy LLC	Delaware
Dublin Waste to Energy Group (Holdings) Limited	Ireland
Dublin Waste to Energy (Holdings) Limited	Ireland
Dublin Waste to Energy Limited	Ireland
Dublin Waste to Energy Supply Limited	Ireland
Earls Gate Energy Centre Limited	Jersey
ECOvanta, LLC	Delaware
Edison (Bataan) Cogeneration Corporation	Philippines
Enereurope Holdings III, B.V.	Netherlands
EGEC Holdings Limited	Jersey
Environmental Pharmaceuticals, LLC	Arizona
GARCO, Inc.	North Carolina
Hidro Operaciones Don Pedro S.A.	Costa Rica
Industrial Oil Tank Services Corp.	New York
Mount Kisco Transfer Station, Inc.	New York
MSW Energy Finance Co. II, Inc.	Delaware
OLMEC Insurance Ltd.	Bermuda
Peabody Monofill Associates, Inc.	Massachusetts
Recoil, LLC	Pennsylvania
Return-Tech, Inc.	Canada
Rookery South Holding Limited	United Kingdom
Rookery South Limited	United Kingdom

SEMASS Partnership	Massachusetts
South Fork II Associates Limited Partnership	Washington
TransRiver Canada Incorporated	Canada
Waste Recovery Solutions, LLC	Florida

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the following Registration Statements:

(1) Registration Statement (Form S-8 No. 333-119609) pertaining to the Covanta Holding Corporation (formerly Danielson Holding Corporation) Equity Award Plan for Employees and Officers and the Covanta Holding Corporation Equity Award Plan for Directors of Covanta Holding Corporation,

(2) Registration Statement (Form S-8 No. 333-130046) pertaining to the registration of an additional 2,000,000 shares of common stock as a result of an increase in the number of shares of common stock issuable under the Covanta Holding Corporation Equity Award Plan for Employees and Officers,

(3) Registration Statement (Form S-8 No. 333-150705) pertaining to the registration of an additional 6,300,000 shares of common stock as a result of an increase in the number of shares of common stock issuable under the Covanta Holding Corporation Equity Award Plan for Employees and Officers and the Covanta Holding Corporation Equity Award Plan for Directors of Covanta Holding Corporation,

(4) Registration Statement (Form S-8 No. 333-195793) pertaining to the Covanta Holding Corporation 2014 Equity Award Plan, and

(5) Registration Statement (Form S-3 No. 333-220460) pertaining to the registration of common stock, preferred stock, warrants, debt securities, subscription rights, purchase contracts, purchase units, and depositary shares of Covanta Holding Corporation

of our reports dated February 19, 2019 , with respect to the consolidated financial statements and schedule of Covanta Holding Corporation and subsidiaries, and the effectiveness of internal control over financial reporting of Covanta Holding Corporation and subsidiaries included in this Annual Report (Form 10-K) for the year ended December 31, 2018 .

/s/ Ernst & Young LLP

Iselin, New Jersey
February 19, 2019

Exhibit 31.1

Certification Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002

I, Stephen J. Jones, certify that:

1. I have reviewed this Annual Report on Form 10-K of Covanta Holding Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ Stephen J. Jones

Stephen J. Jones

President and Chief Executive Officer

Date: February 19, 2019

Exhibit 31.2

Certification Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002

I, Bradford J. Helgeson, certify that:

1. I have reviewed this Annual Report on Form 10-K of Covanta Holding Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ BRADFORD J. HELGESON

Bradford J. Helgeson

Executive Vice President and Chief Financial Officer

Date: February 19, 2019

Exhibit 32

Certification of Periodic Financial Report Pursuant to

Section 906 of the Sarbanes-Oxley Act of 2002

In connection with the Annual Report on Form 10-K for the period ended December 31, 2018 of Covanta Holding Corporation as filed with the Securities and Exchange Commission on the date hereof (the "Report"), Stephen J. Jones and Bradford J. Helgeson, as Chief Executive Officer and Chief Financial Officer, respectively, of Covanta Holding Corporation, each hereby certifies, pursuant to 18 U.S.C. 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of Covanta Holding Corporation;

This certification accompanies the Report pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 and shall not, except to the extent required by the Sarbanes-Oxley Act of 2002, be deemed filed by Covanta Holding Corporation for purposes of Section 18 of the Securities Exchange Act of 1934, as amended.

A signed original of this written statement has been provided to Covanta Holding Corporation and will be retained by Covanta Holding Corporation and furnished to the Securities and Exchange Commission or its staff upon request.

/s/ Stephen J. Jones

Stephen J. Jones

President and Chief Executive Officer

/s/ Bradford J. Helgeson

Bradford J. Helgeson

Executive Vice President and Chief Financial Officer

Date: February 19, 2019