



## Climate Change 2017 Information Request Waste Management, Inc.

### Module: Introduction

#### Page: Introduction

#### CC0.1

##### Introduction

Please give a general description and introduction to your organization.

Waste Management (WM) is North America's leading provider of waste management environmental services and the largest recycler of post-consumer waste. We are capturing value from waste streams- by processing wastes to replace raw materials with recycled materials that have lower carbon footprints or by generating clean energy from landfill gas plants, or by investing in new technologies to convert post-recycled residuals into lower carbon fuel or chemicals. Our customers look to us to help them participate in the "circular economy" by helping them avoid creating waste, design for recycling, and convert discards into new products. Our customers are recognizing that they can reduce costs and improve their operations by meeting recycling goals. The WM Sustainability Services team helps customers reach their sustainability goals by evaluating every aspect of their operations, recommending overall strategies to improve sustainability – providing strategies to maximize recycling and reduce waste as well as avoiding the generation of waste. WM has four climate-change related sustainability goals that have been shaping our business and our investments since 2007:

- i) To increase waste-based energy production: In 2016, WM created enough energy through our waste-to-energy operations to power nearly one-half million homes. In our drive to provide pragmatic sustainability options, we now focus on the technologies most likely to serve our customers' sustainability needs, including our new CORE® technology, which provides municipalities a cost-effective means to convert organic wastes into increased production of renewable energy, and landfill gas to fuel facilities that provide renewable natural gas to our natural gas collection fleet.
- ii) To increase the volume of recyclable materials we process: WM continues to be North America's largest residential recycler. Our goal to manage more than 20 million tons of recyclables each year by 2020 represents 48.9 million MTCO<sub>2</sub>e avoided emissions. To this end, we actively advocate for customers and regulators to evaluate and communicate their waste reduction and recycling progress in the form of GHG reductions achieved in order to shift from simply weight-based metrics to a more science-based delineation of climate change benefits. In 2016, we managed 14.7 million tons of recyclables.
- iii) To invest in cleaner technologies: WM set a goal in 2007 to reduce CO<sub>2</sub> emissions and increase fleet efficiency by 15 percent. We exceeded that goal in 2011, reducing CO<sub>2</sub> emissions by 20 percent and continue to exceed our 2020 goal year-over-year despite acquisitions and changes in the US EPA methodology for calculating efficiency. We are implementing a range of technologies to make our trucks more efficient, including using on-board camera-assisted efficiency logistics; using alternative fuels; optimizing truck design; using hybrid "yellow iron" vehicles; investing in the largest natural gas heavy-duty fleet in the U.S; actively supporting improvements in heavy-duty truck fuel efficiency standards; and investing in green technologies to convert waste to fuel and/or chemicals, convert landfill gas to liquefied natural gas or diesel, and converting organic waste to high-octane transportation fuel and high value compost products. We innovate in collection logistics to reduce emissions. Our At Your Door Special Collection provides a simple, one trip option for collecting special household waste items. We are using on-board computers to optimize routes, and compactor monitoring technologies to time pick-ups when the compactor is full.
- iv) To protect more wildlife habitat across North America: We achieved our fourth goal of providing wildlife habitat at 100 of our landfills – 10 years ahead of schedule. Please note that answers in this questionnaire are supplied on behalf of Waste Management, Inc., which is a holding company; all operations are conducted by its subsidiaries. Hereafter, Waste Management, Inc., its consolidated subsidiaries and consolidated variable interest entities are referred to as "Waste Management", "WM", "the company", "we" or "us".

#### CC0.2

##### Reporting Year

Please state the start and end date of the year for which you are reporting data.

The current reporting year is the latest/most recent 12-month period for which data is reported. Enter the dates of this year first.

We request data for more than one reporting period for some emission accounting questions. Please provide data for the three years prior to the current reporting year if you have not provided this information before, or if this is the first time you have answered a CDP information request. (This does not apply if you have been offered and selected the option of answering the shorter questionnaire). If you are going to provide additional years of data, please give the dates of those reporting periods here. Work backwards from the most recent reporting year. Please enter dates in following format: day(DD)/month(MM)/year(YYYY) (i.e. 31/01/2001).

Enter Periods that will be disclosed  
Fri 01 Jan 2016 - Sat 31 Dec 2016

#### CC0.3

##### Country list configuration

Please select the countries for which you will be supplying data. If you are responding to the Electric Utilities module, this selection will be carried forward to assist you in completing your response.

Select country  
United States of America  
Canada

#### CC0.4

##### Currency selection

Please select the currency in which you would like to submit your response. All financial information contained in the response should be in this currency.

USD(\$)

#### CC0.6

##### Modules

As part of the request for information on behalf of investors, companies in the electric utility sector, companies in the automobile and auto component manufacturing sector, companies in the oil and gas sector, companies in the information and communications technology sector (ICT) and companies in the food, beverage and tobacco sector (FBT) should complete supplementary questions in addition to the core questionnaire.

If you are in these sector groupings, the corresponding sector modules will not appear among the options of question CC0.6 but will automatically appear in the ORS navigation bar when you save this page. If you want to query your classification, please email [respond@cdp.net](mailto:respond@cdp.net).

If you have not been presented with a sector module that you consider would be appropriate for your company to answer, please select the module below in CC0.6.

#### Further Information

### Module: Management

#### Page: CC1. Governance

#### CC1.1

Where is the highest level of direct responsibility for climate change within your organization?

Board or individual/sub-set of the Board or other committee appointed by the Board

#### CC1.1a

Please identify the position of the individual or name of the committee with this responsibility

- (i) Job Titles: Two members of WM's senior team are charged by the Board to oversee the work of WM's senior team (Senior Vice President and Chief People Officer; and Vice President Disposal Operations Support) oversee the work of the WM Carbon Footprint Team. (ii) Description: The members of the senior team described above report on issues relating to climate change (including recycling productivity, renewable energy generation and pending regulatory matters) to the WM Board of Directors at least twice a year, which then gives strategic advice to the business in response. Reporting to the Vice President for Disposal Operations Support, the Vice President for Environmental Engineering and the Sr. Director of Air Programs coordinate climate change legislative and regulatory issues for the Company through a multi-disciplinary team comprising the Legal, Government Affairs, Communications, and Environmental Management

departments. The Waste Management Sustainability Services Voluntary GHG Reporting Team coordinates the corporate-wide reporting efforts such as data collection, calculation, updates and report composition.

CC1.2

**Do you provide incentives for the management of climate change issues, including the attainment of targets?**

Yes

CC1.2a

**Please provide further details on the incentives provided for the management of climate change issues**

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
Chief Executive Officer (CEO)	Monetary reward	Emissions reduction project Other: Improve waste diversion	The WM CEO has set goals for conversion to lower GHG emissions fleet, engages with the investment community on the importance of lower GHG emissions vehicles, frequently does presentations on carbon reduction services like recycling, and is rewarded for his leadership on this matter.
Management group	Monetary reward	Efficiency project	Management is rewarded for execution of WM's logistics efficiency protocols, which reduce fuel use, vehicle miles and emissions.
Process operation managers	Monetary reward	Efficiency project	Management is rewarded for execution of WM's logistics efficiency protocols, which reduce fuel use, vehicle miles and emissions.
Environment/Sustainability managers	Monetary reward	Efficiency project Other: Behaviour change related indicator	Environmental managers are personally rewarded for success in achieving regulatory and internal corporate goals to reduce emissions, e.g., seek efficiency in operating gas collection systems, seek to employ "green remediation" practices, seek energy efficiencies.

Further Information

Page: CC2. Strategy

CC2.1

**Please select the option that best describes your risk management procedures with regard to climate change risks and opportunities**

Integrated into multi-disciplinary company wide risk management processes

CC2.1a

**Please provide further details on your risk management procedures with regard to climate change risks and opportunities**

Frequency of monitoring	To whom are results reported?	Geographical areas considered	How far into the future are risks considered?	Comment
Annually	Board or individual/sub-set of the Board or committee appointed by the Board	United States and Canada	> 6 years	WM goes through steps to capture the impact and sensitivity of risks based on the operational or economic driver of the risk, including current and future impact of climate change to its business operations. WM's Executive Officers, Board of Directors and Audit Committee, Corporate Public Affairs and Disposal Operations, WM Sustainability Services, Public Sector Service group, Venturing group, and Engineering department each have specific roles in assessing risk and risk management, adapting processes and integrating them into the Company's strategy, including in short- and long-time frames and customer preferences and service offerings.

CC2.1b

**Please describe how your risk and opportunity identification processes are applied at both company and asset level**

At company level, WM initiated an enterprise risk management (ERM) committee in 2009 and continues to expand and refresh the analytical tools for its risk assessment. While the ongoing responsibility for risk assessments rests with various field and corporate management, the Committee determines which risks are most significant to WM and should be reported to the Board. Board members are polled on significant risks facing WM. In 2016, the Board charged the Committee to take a deeper dive into risks and mitigation plans concerning subcategories of solid waste landfills in terms of both physical and regulatory risk and mitigation. At asset level, Government Affairs, Public Sector, Industrial Sales, Engineering and WM Sustainability Services benchmark risks, including assessment of likelihood and severity, known controls and metrics to monitor the risks. External stakeholders and independent organizations are consulted on an ongoing basis (identity is disclosed in WM's biennial sustainability reporting) to provide the equivalent of open-source advice on risks and mitigation. The impacts of climate change as a physical, regulatory and legislative risk and the opportunities that may be presented by climate change response and mitigation are increasingly key elements of these consultations. Information is shared with WM's Corporate Venturing department, which briefs the Board at least annually on potentially disruptive technologies, sometimes related to customer expectations with regard to carbon reduction services. At company and asset level, WM's Government Affairs evaluate the location and degree of risks and opportunities to the business posed by legislative, regulatory and policy initiatives, in particular tracking the evolution of thinking on carbon reduction and pricing and complex accounting issues involving application of carbon pricing to non-point sources.

CC2.1c

**How do you prioritize the risks and opportunities identified?**

Both risks and opportunities are prioritized according to materiality (financial impact of risk/opportunity), timing (long or short term), and likelihood. The enterprise risk management program uses standard terms and templates to gather risk and opportunity assessments from senior staff, executives, the Board of Directors and external experts. These data are reviewed and priorities identified by the ERM Committee and are communicated to the Senior Leadership Team and the WM Board of Directors annually.

CC2.2

**Is climate change integrated into your business strategy?**

Yes

CC2.2a

**Please describe the process of how climate change is integrated into your business strategy and any outcomes of this process**

- Our sustainability goals related to climate change affect 100% of our business strategy, either as market development opportunities for recycling, renewable energy and sustainability consulting services, or as potential operational costs.
- For example, cross-disciplinary teams continuously monitor customer needs for carbon reduction (i.e., use of our recycling, renewable energy, natural gas fleet, fueling stations, waste, energy reduction and consulting services), regulatory developments, and lower-carbon financial incentives, which are analyzed by Senior Leadership in our Market Business Strategy annual assessment, used in capital allocation. Our 15% emissions reduction goal for fleet underlies our capital allocation for trucks.
- Aspects of climate change influencing strategy include 1) the need for adaptation: weather events can threaten our business continuity, leading us to refine and improve our disaster response plans for disposal facilities, using FEMA flood maps to expand our list of "Key Facilities" receiving supplemental electrical generating capacity; we re-evaluate where emergency equipment should be and pre-position fuel and disaster supplies; 2) regulatory changes: we monitor developments that may affect our or our customers' operations and engage with federal, state and provincial governments, and a broad array of stakeholders to recommend frameworks that produce meaningful GHG reductions at reasonable cost; 3) green business opportunities: WMSS consulting, recycling, renewable energy production and carbon sequestration in landfills are all carbon-reducing services, and our ability to provide verifiable metrics on carbon reduction to our customers will be a competitive advantage. We monitor customer advocacy and goals based upon the Paris Agreement for market trends affecting our renewable energy portfolio, recognizing that our multinational customers are shaping their procurement strategies on factors beyond U.S.-driven climate policy.
- The short-term strategy is to improve the sustainability of recycling economics by providing tools for our customers to realize the GHG reductions achieved through recycling, thus motivating them to procure the kinds of information services needed to improve recycling quality and rates, and supporting our goal of managing 20M tons of recyclables (achieving in 2016 GHG emissions reductions over 32,780,115 MTCO2e). Fleet efficiency, renewable fuel production and consumption, data visualization needs, consulting offerings are all influenced by climate change. WMSS provides consulting services to help our customers achieve sustainability and climate change goals through our "zero waste" services for large events, plus a full range of recycling, waste reduction, renewable energy, water conservation and environmental education services.
- Our long-term strategy, development and incorporation of new technologies has been influenced by climate change. WM has analyzed lower-carbon technologies, markets, equipment limits,

feedstock availability and quality, regulatory conditions, synergies with existing assets, local economic factors, and competition. We are focused on deployment of the lower-carbon technologies we have already commercialized and identifying geographic targets for our commercial recycling and green fuel projects over a 5-year time frame; for projects seeking to create products from renewable feed stock, our time frame extends to 15 years. The need to address climate change and GHG regulations are a primary driver of our customers' goals to increase recycling and use lower-carbon fuels. Most of our current and planned capital projects will lower GHG emissions in our and our customers' supply chains. As global competition for raw materials and fuel increases, sustainable solutions for managing materials will become a necessity, and by offering sustainable, lower carbon management options, WM is becoming competitive in new areas, and insulating itself from long-term losses.

vi. Substantial Business Decisions: Our campaign to improve the quality, quantity and profitability of recycling has impacted our short-term decisions in retaining substantial recycling assets and our long-term plans for asset acquisition and expansion. Beyond this fundamental service line, we are also evaluating commercial viability of treatment capacity for more difficult to recycle material. WM developed a Process Engineered Fuel plant that converts municipal solid waste into fuel with energy value equal to coal, with projected 15% GHG reductions (excluding additional CO2 savings from the plant's enhanced metals recycling). We continue to invest in and develop other innovations to convert waste materials into energy and other low-carbon products while perfecting the technical processes, logistics, and match of products to market demand. WM opened two commercial scale facilities to manage foodwaste in areas with regulations requiring source separated food waste collection and processing. WM's CORE facility is a cost effective solution for cities seeking to divert food, with minimal infrastructure requirements. The CEO has continued a public dialogue on GHG reductions as the key benefit to recycling, which has driven WM's advocacy and operational refinements to maximize recovery of targeted commodities (e.g., paper).

#### CC2.2c

##### Does your company use an internal price on carbon?

Yes

#### CC2.2d

##### Please provide details and examples of how your company uses an internal price on carbon

In 2014, we prepared for review by the Board of Directors a benchmarking of companies projecting a cost of carbon, and we continue to update the Board on changes in WM's footprint, with the on-going obligation to update the Board in the event of a major change in customers' disclosed carbon pricing strategies. We review how carbon pricing models or cap-and-trade programs are applied in North America. We have concluded that because of the complex nature of our business and high variability in state approaches, with carbon emissions offset by carbon-reducing services like WM Sustainability Services consulting, recycling, renewable energy production and carbon sequestration in landfills, the absence of a clear regulatory framework for carbon pricing for our sector makes price projections unreliable. Our assessment has been further complicated by recent U.S. position changes on climate strategy, and we monitor state government and customer response strategies closely. Anticipating a price on carbon is part of our initiative to change reporting on recycling productivity from tonnage to GHG reductions gained. We believe our ability to provide verifiable metrics on carbon reduction to our customers will be a competitive advantage.

#### CC2.3

##### Do you engage in activities that could either directly or indirectly influence public policy on climate change through any of the following? (tick all that apply)

Direct engagement with policy makers  
Trade associations  
Funding research organizations  
Other

#### CC2.3a

##### On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
Clean energy generation	Support	If Congress chooses to renew incentives for renewable energy as part of comprehensive tax reform, it may establish a framework to incentivize the production of renewable energy based upon energy value. Active coordination with other companies and trade associations focused on incentivizing the production of renewable energy (e.g., wind, solar, biomass); direct lobbying of US Congress on comprehensive reform and on retaining current renewable incentives absent comprehensive reform. Active coordination with other companies and trade associations focused on incentivizing the production of renewable energy (e.g., wind, solar, biomass); direct lobbying of US Congress.	Include in tax reform legislation incentives for renewable energy options
Clean energy generation	Support	State renewable energy incentives are essential means to address climate change by encouraging renewable, low carbon substitutes. Active coordination with other companies and trade associations focused on incentivizing the production of renewable energy (e.g., wind, solar, biomass); direct lobbying of US Congress.	Each state should provide renewable energy incentives as consistent with state environmental priorities and finances
Mandatory carbon reporting	Support	US EPA should make use of the best available information and protocols to establish an accurate GHG inventory for each sector. Active coordination with public and private sector landfill, landfill gas-to-energy and associated equipment owners; active communications with US EPA. WM has worked with EPA extensively in 2014-2016 on enhancing estimation of methane reductions in landfill cover. EPA's final revisions to the landfill emissions methodology were finalized in 2016 and reflected many of the enhancements in site-specificity and precision WM advocated.	Site-specific data are more precise than sector-wide default assumptions. Advocacy to retain funding for the inventory undertaken in 2017.
Other: Reporting recycling impacts in terms of carbon reduction	Support	WM believes that the value of recycling must be communicated by framing success in terms of GHG and energy reduction rather than simple tonnage processed. A major report advocating this point was developed by WM- sponsored Sustainable Materials Management Coalition and communicated broadly during 2016. Dialogue with U.S. EPA and some states and industrial trade associations have further developed into broad advocacy on the specific GHG emissions reductions achieved by each recycled commodity and the relative prices, adding transparency to municipal and individual company programs to increase GHG reductions. Internal protocol has been developed to estimate GHG reductions per recyclable commodity and services provided. WM has been actively communicating these tools and emissions reduction opportunities to stakeholders.	US EPA, states and local governments should encourage or mandate that materials management goals be developed based on GHG emissions reduction potential. The State of Oregon has already adopted legislation and an implemented program based upon the concepts contained in the Sustainable Materials Management Coalition report, and this kind of GHG reduction-based life cycle approach is now being actively considered in other states and at the local level.
Other: Regulatory treatment of biogenic CO2 Emissions from waste-derived fuels under the federal GHG Tailoring Rule and Clean Power Plan	Support	Beginning in 2011, WM has worked with U.S. EPA, the municipal and private waste sector, and academia to develop a framework for accounting and treating biogenic emissions of CO2 from collection and combustion of landfill gas and combustion of fuels derived from biogenic components of MSW. WM commented extensively on EPA's evolving draft Biogenic Accounting Framework and provided comments to EPA's Science Advisory Board (SAB), we commented on treatment of biogenic CO2 under the GHG Tailoring Rule as proposed, finalized and revised. We have also communicated extensively with EPA on treatment of biogenic CO2 from combustion of waste-derived fuels by utilities under the federal Clean Power Plan.	U.S. EPA should finalize its Biogenic Accounting Framework for combustion of landfill gas and waste-derived fuels to recognize the carbon neutrality of those CO2 emissions as recommended by EPA in its draft framework and as recommended by EPA's SAB in their review of various iterations of the framework. EPA regulations should reflect the scientific determinations made by the Agency and its SAB.
Other: Clean Transportation Fuel	Support	WM has directly lobbied the U.S. Congress in support of maintaining EPA's Renewable Fuels Standard (RFS2) program. WM has also provided technical support and data to EPA for implementation of the RFS2 program. WM has developed three renewable fuels projects that produce cellulosic biofuel from landfill gas that we use in our fleet. We have also contracted with other landfill owners to purchase their renewable (cellulosic) natural gas in our vehicles. In 2016, 5,031 of our collection vehicles were using renewable natural gas. Use of renewable natural gas results in 90% reduction of CO2 emissions as compared to use of diesel fuel it replaces.	Congress and EPA should continue implementation of the RFS2 program, which promotes production and use of renewable alternatives to many fossil-based transportation fuels.
Other: Phase 2 heavy-Duty Truck GHG Rule -- The EPA and the Department of Transportation proposed Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium and Heavy-Duty Engines and Vehicles -- Phase 2 on July 13, 2015	Support	WM engaged with EPA and DOT providing technical information on our fleet and its operations and providing recommendations on ways to promote continued conversion of vehicles to clean natural gas.	The rule, when finalized in the fall of 2016 will increase fuel economy standards and reduce vehicle emissions standards for our collection fleet between model years 2021 and 2027; however, we expect to be able to purchase compliant natural gas vehicles that can meet our operational needs in 2017, supporting continuance of the heavy duty truck standards.

#### CC2.3b

**Are you on the Board of any trade associations or provide funding beyond membership?**

Yes

**CC2.3c****Please enter the details of those trade associations that are likely to take a position on climate change legislation**

Trade association	Is your position on climate change consistent with theirs?	Please explain the trade association's position	How have you, or are you attempting to, influence the position?
Solid Waste Management Association of North America (SWANA)	Consistent	Supports renewable energy development, Supports accurate accounting of GHG emissions from the solid waste sector.	Yes, as part of our Board membership we advocate for renewable portfolio standards that support low-carbon energy development like our landfill gas to energy facilities. In 2016 and 2017, we have encouraged SWANA to participate in advocacy to improve the accuracy of GHG emissions accounting under U.S. EPA rules and for Congress to support the EPA resources to maintain the GHG inventory and the GHG assessment tools on which the public and private waste sector, states and local governments and NGOs depend.
Environmental Industries Association (EIA)	Consistent	Supports renewable energy deployment, precision in GHG accounting	Yes, as Board members we participate in direct lobbying in Congress for extension of the renewable energy production tax credits for our landfill gas to energy facilities.
Board, American Biogas Council (ABC)	Consistent	Supports renewable energy deployment	Yes, we lobby Congress and U.S. EPA for regulations that encourage development of landfill gas to energy projects and anaerobic digesters.
Board, Energy Security Leadership Council	Consistent	Supports precision in GHG accounting	Yes, as Board members, we lobby Congress to enhance domestic security by encouraging through tax incentives use of domestic natural gas and lobby the Administration to improve mileage performance by heavy-duty trucks, reducing GHGs associated with climate change concerns.
Board, National Association of Manufacturers (NAM)	Consistent	Supports fossil fuel and renewable energy development equally	Yes, as Board members, we press to assure NAM advocacy includes support for renewable energy tax incentives, including those for our landfill gas to energy facilities. We have seen progress in their support for renewable energy in an "all of the above" strategy.
Board, Secure America's Future Energy (SAFE)	Consistent	Supports renewable energy deployment	Yes, as Board members, we lobby Congress to enhance domestic security by encouraging through tax incentives use of domestic natural gas and lobby the Administration to improve mileage performance by heavy-duty trucks, reducing GHGs associated with climate change concerns.
Renewable Natural Gas (RNG) Coalition	Consistent	Supports renewable natural gas for electricity & transportation fuel	Yes, as part of our membership we advocate in support of EPA's Renewable Fuel Standard Program and for federal incentives to produce and use renewable transportation fuel and renewable electricity.
Natural Gas Vehicles of America (NGVAmerica) Coalition	Consistent	Supports growth in natural gas and renewable natural gas-fueled vehicles, and fueling infrastructure.	Yes, as part of our membership we advocate for federal and state incentives to promote growth in use of natural gas and renewable natural gas fueled vehicles, and incentives to promote growth of fueling infrastructure for NG vehicles.
Board, American Institute for Packaging and the Environment (Ameripen)	Consistent	Supports	Yes, as a Board member of Ameripen, we are working with state regulators to promote concepts of Lifecycle Thinking decision making and materials management goals.

**CC2.3d****Do you publicly disclose a list of all the research organizations that you fund?**

No

**CC2.3e****Please provide details of the other engagement activities that you undertake**

U.S. EPA has established a Sustainable Materials Management framework that works to reduce climate change impacts by reducing waste, increasing the volume and environmental benefits of recycling, and increasing the use of waste diversion technologies that, under life cycle evaluation, provide environmental benefits. WM has sponsored three terms of the Sustainable Materials Management Coalition, a stakeholder group including regulators, representatives of local and state officials, environmentalists, community advocates, academia and business and industry, convened to make recommendations on sustainable materials management, life cycle thinking and improving the performance and understanding of recycling. See <https://www.michaeldbaker.com/portfolio-items/guidance-on-taking-a-life-cycle-perspective-to-sustainability/>. In 2016, the Coalition produced its work on the recycling report and members participated in U.S. EPA's G7 Symposium on sustainable materials management.

**CC2.3f****What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?**

WM has a multi-disciplinary team with members from the Legal, Government Affairs, Communications, Environmental Management and WM Sustainability Services (WMSS) departments which monitors emerging sustainability and greenhouse gas (GHG) regulatory programs and other events and provides feedback internally to our SVP and Chief People Officer and SVP and Chief Legal Officer, our Board of Directors and our business units, as well as externally to legislators and regulators on elements that may impact the company and the environmental services industry at policy level. The same cross-functional team ensures that engagements and activities that may influence a policy, directly or indirectly are properly monitored and vetted for consistency with the company's overall climate change strategies, particularly with regard to reducing fleet emissions, enhancing recycling and providing renewable energy. An internal Public Policy Group oversees federal and state legislative and regulatory response to enhance the consistency of WM advocacy across multiple forums. This group reports to the SVP and Chief People Officer and coordinates closely with the Chief Legal Office and VP Disposal Operations. Individual responsibility for policy oversight for issues with climate change implications (e.g., clean air regulations, natural gas vehicle incentives, recycling policy) is identified on the WM intranet site to enhance consistency and coordination.

**Further Information****Page: CC3. Targets and Initiatives****CC3.1****Did you have an emissions reduction or renewable energy consumption or production target that was active (ongoing or reached completion) in the reporting year?**

Absolute target  
Renewable energy consumption and/or production target

**CC3.1a****Please provide details of your absolute target**

ID	Scope	% of emissions in scope	% reduction from base year	Base year	Base year emissions covered by target (metric tonnes CO2e)	Target year	Is this a science-based target?	Comment
Abs1	Scope 1	9%	21%	2010	1880932	2020	Yes, but this target has not been approved as science-based by the Science Based	Previously this goal was described as reducing WM's scope 1, mobile GHG emissions and increase fleet efficiency by 15 percent by 2020. We moved our base year from 2007 to 2010 and increased the intended reduction from base year from 15 to 21%, which may be adjusted as we continue in the process of setting science-based targets. We are implementing a range of technologies to make our trucks more efficient, including controlling emissions, using alternative fuels and optimizing truck design. For every diesel truck we replace with natural gas we reduce our use of diesel fuel by an average of 8,000 gallons per year along with a reduction of 22 metric tons of greenhouse gas

ID	Scope	% of emissions in scope	% reduction from base year	Base year	Base year emissions covered by target (metric tonnes CO2e)	Target year	Is this a science-based target?	Comment
							Targets initiative	emissions per year (the equivalent of a 21 percent emissions reduction per truck). Our vehicles powered by natural gas emit nearly zero particulate emissions, cut greenhouse gas emissions by over 20 percent, and are far quieter than diesel trucks. We also use Renewable Natural Gas (RNG) in 40% of our natural gas trucks. These trucks reduce carbon emissions by over 80%. We innovate in collection logistics to reduce emissions by eliminating trips all together. Our Single Stream recycling facilities collect commingled source-separated recyclables in one truck for processing in facilities operated to minimize the potential for air releases. Our At Your Door Special Collection provides a one trip option for collecting special household waste items such as home cleaners, garden chemicals, electronics, paint products and universal materials; New technologies like our Efficiency Management and Planning (EMAP) on-board computing system and Service Delivery Optimization (SDO) initiative helps us streamline routes for our fleet, cutting the amount of fuel we need and lowering our carbon footprint. As a result, our customers will also enjoy a reduction in their supply chain transportation emissions.
Abs2	Scope 1+2 (location-based)+3 (upstream)	85%	19%	2011	13006771	2020	Yes, but this target has not been approved as science-based by the Science Based Targets initiative	Previously this goal was described as managing 20 million tons of recyclable material annually by 2020. ABS 2 is a medium-term science-based target to meet CDP's definition of 'ambitious'. Material management choices have a direct impact on greenhouse gas emissions generated. For example, according to the EPA's Waste Reduction Model (WARM), three times the lifecycle emissions are generated when mixed recyclable material is put in a landfill instead of being recycled. This target affects WM's scope 1 emissions by reducing emissions from landfill, scope 2 emissions by using renewable natural gas to generate electricity, and scope 3 by reducing customers' emissions. 25,750,786 MTCO2e are the lifecycle emissions that would have been generated if the material management choice had been decomposition in landfill instead of recycling, generating electricity or creating compost from organics materials in the base year. 85% of emissions are affected by the change. Use of WARM is currently the most effective method of calculating these reductions. Successfully achieving our goal has required a transformational change within WM to educate our customers on recycling. This includes communities, schools, companies, non-profits, governments, and CEOs. WM developed a comprehensive recycling education campaign that we share with our customers, called "Recycle Often. Recycle Right.®" Achieving this goal also requires that we work with designers and the manufacturing industry to avoid raw material processing, reduce the degree of material processing, and include recycled materials in their products. We do this by utilizing our materials recovery facility infrastructure to teach designers and manufacturers about the recycling process and through our Sustainability Services consulting group. WM's recycling activities result in a wide variety of GHG reductions that otherwise very likely would not occur. Since 2015 we are explicitly advocating that GHG reductions become the focus of federal, state and local government and private sector recycling goals, replacing current weight-based goals with science-based emissions reductions goals. The base year emissions were previously reported using incorrect units and has been adjusted.
Abs3	Scope 1+2 (location-based)+3 (upstream)	85%	50%	2011	13006771	2036	Yes, but this target has not been approved as science-based by the Science Based Targets initiative	Previously this goal was described as managing 20 million tons of recyclable material annually by 2020. ABS 3 is long-term science-based target to meet CDP's definition of 'ambitious'. Material management choices have a direct impact on greenhouse gas emissions generated. For example, according to the EPA's Waste Reduction Model (WARM), three times the lifecycle emissions are generated when mixed recyclable material is put in a landfill instead of being recycled. This target affects WM's scope 1 emissions by reducing emissions from landfill, scope 2 emissions by using renewable natural gas to generate electricity, and scope 3 by reducing customers' emissions. 25,750,786 MTCO2e are the lifecycle emissions that would have been generated if the material management choice had been decomposition in landfill instead of recycling, generating electricity or creating compost from organics materials in the base year. 85% is the percent of emissions that come from WM landfills, which is affected by the change. Use of WARM is currently the most effective method of calculating these reductions. Successfully achieving our goal has required a transformational change within WM to educate our customers on recycling. This includes communities, schools, companies, non-profits, governments, and CEOs. WM developed a comprehensive recycling education campaign that we share with our customers, called "Recycle Often. Recycle Right.®" Achieving this goal also requires that we work with designers and the manufacturing industry to ensure their products avoid raw material processing, reduce the degree of material processing, and include recycled materials in their products. We do this by utilizing our materials recovery facility infrastructure to teach designers and manufacturers about the recycling process and through our Sustainability Services consulting group. WM's recycling activities result in a wide variety of GHG reductions that otherwise very likely would not occur. Since 2015 we are explicitly advocating that GHG reductions become the focus of federal, state and local government and private sector recycling goals, replacing current weight-based goals with science-based emissions reductions goals. The base year emissions were previously reported using incorrect units and has been adjusted.

CC3.1d

Please provide details of your renewable energy consumption and/or production target

ID	Energy types covered by target	Base year	Base year energy for energy type covered (MWh)	% renewable energy in base year	Target year	% renewable energy in target year	Comment
RE1	Other: Renewable Energy Production from Landfill Gas	2011	8930042	15%	2035	25%	RE1 is a renewable energy production target that will be achieved through investment in companies developing sustainable energy technologies. In the base year, 2011, WM consumed 8,930,042 MWh of energy, equal to 15% of the renewable energy produced in 2011. In the target year, WM will increase renewable energy produced to 20% of the MWh consumed in 2011. We have invested in technologies to convert materials into ultra low sulfur diesel and other transportation fuels and petroleum products; small scale gasification to convert solid biomass feedstock, as well as other combustible feedstocks into a high hydrogen and carbon monoxide rich synthetic gas; thermal chemical conversion of waste materials into advanced biofuels such as ethanol, as well as renewable chemicals; production of intermediate and basic chemicals from syngas derived from municipal solid waste; accelerated high solids aerobic and anaerobic

ID	Energy types covered by target	Base year	Base year energy for energy type covered (MWh)	% renewable energy in base year	Target year	% renewable energy in target year	Comment
							digestion to produce renewable energy from organics; conversion of landfill gas (LFG) into liquefied natural gas (LNG) to power vehicles, generate power on- or off-site, use as a heating fuel, processed into natural gas quality; and conversion of biomass into organic salts that can be converted into a high octane gasoline that, in turn, can be blended directly into a refiner's fuel pool, avoiding many of the blending and logistics challenges presented by ethanol. WM continues as an active participant in EPA's Landfill Methane Outreach Program (LMOP).

## CC3.1e

**For all of your targets, please provide details on the progress made in the reporting year**

ID	% complete (time)	% complete (emissions or renewable energy)	Comment
Abs1	60%	100%	To achieve this new science-based ambitious target, WM continues to transition to alternative fuels and implement other fleet efficiency measures. WM has invested over \$1B in natural gas transportation and innovation in the two decades and we have grown our fleet to 5,791 trucks operating, the largest private fleet user of heavy duty natural gas trucks in the nation. For every diesel truck we replace with natural gas we reduce our use of diesel fuel by an average of 8,000 gallons per year along with a reduction of 22 metric tons of greenhouse gas emissions per year (the equivalent of a 21 percent emissions reduction per truck); 40% of our natural gas trucks run on Renewable Natural Gas, which reduces emissions by 90% over diesel. Our vehicles powered by CNG emit nearly zero particulate emissions, cut greenhouse gas emissions by over 20 percent, and are far quieter than diesel trucks.
Abs2	56%	100%	WM is the largest residential recycler in North America, providing a firm platform for additional growth. WM is regularly investing in new programs such as our "Recycle Often. Recycle Right.®" campaign to encourage our residential, commercial and municipal customers to recycle and decrease contamination. WM is engaged broadly with stakeholders on means to increase the productivity and sustainable economics of recycling, in 2015 inaugurating a Sustainable Materials Management Coalition on recycling, headed by a former US EPA Assistant Administrator for Solid Waste and Emergency Response. By the end of 2016, WM operated 43 organics processing plants and 104 recycling facilities, and managed 14.7 million tons of recyclables annually.
RE1	21%	81%	WM is focusing on how new technologies can be matched to our logistical and operational strengths. Our innovative low carbon and renewable fuels projects are proceeding at a deliberate pace, with the addition of a landfill gas to natural gas fuel plant in Fairmont City, Illinois and a new gas to liquid venture in Oklahoma. WM expects to see progress toward its renewable energy goal as these technologies mature. At December 31, 2016, we had 131 landfill gas beneficial use projects producing commercial quantities of methane gas at WM and third-party landfills. The gas is used to fuel electricity generators, and the electricity is then sold to public utilities, municipal utilities or power cooperatives; used at the landfill or delivered by pipeline to industrial customers as a direct substitute for fossil fuels in industrial processes; processed to pipeline-quality natural gas and then sold to natural gas suppliers; processed into liquefied natural gas and used as vehicle fuel and at another, gas from the landfill fuels WM natural gas trucks.
Abs3	20%	45%	WM is the largest residential recycler in North America, providing a firm platform for additional growth. WM is regularly investing in new programs such as our "Recycle Often. Recycle Right.®" campaign to encourage our residential, commercial and municipal customers to recycle and decrease contamination. WM is engaged broadly with stakeholders on means to increase the productivity and sustainable economics of recycling, in 2015 inaugurating a Sustainable Materials Management Coalition on recycling, headed by a former US EPA Assistant Administrator for Solid Waste and Emergency Response. By the end of 2016, WM operated 43 organics processing plants and 104 recycling facilities, and managed 14.7 million tons of recyclables annually.

## CC3.2

**Do you classify any of your existing goods and/or services as low carbon products or do they enable a third party to avoid GHG emissions?**

Yes

## CC3.2a

**Please provide details of your products and/or services that you classify as low carbon products or that enable a third party to avoid GHG emissions**

Level of aggregation	Description of product/Group of products	Are you reporting low carbon product/s or avoided emissions?	Taxonomy, project or methodology used to classify product/s as low carbon or to calculate avoided emissions	% revenue from low carbon product/s in the reporting year	% R&D in low carbon product/s in the reporting year	Comment
Company-wide	Increasing the volume of recyclable and organics materials we process shares GHG benefits among all the parties involved in the process. Direct emissions are avoided from harvesting, processing and delivering virgin material, and a decrease in methane emissions results from avoiding anaerobic decomposition of this material in the landfill. Indirect emissions are avoided from the additional processing associated with virgin material and supply stream emissions are avoided by parties using the recycled materials and electricity generated from organic materials.	Avoided emissions	Other: EPA WARM		Less than or equal to 10%	Emissions Avoided: 34,611,468 MTCO2e in 2014 32,483,904 MTCO2e in 2015 and 32,571,862 MTCO2e in 2016. 2014 and 2015 avoided emissions were updated for consistency; total tons of fiber were further broken down in the WARM model into OCC and office paper; and newspaper and mixed paper were combined into "mixed paper" category.

## CC3.3

**Did you have emissions reduction initiatives that were active within the reporting year (this can include those in the planning and/or implementation phases)**

Yes

## CC3.3a

**Please identify the total number of projects at each stage of development, and for those in the implementation stages, the estimated CO2e savings**

Stage of development	Number of projects	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	30	0
To be implemented*	0	0
Implementation commenced*	0	0
Implemented*	5	35487436
Not to be implemented	2	0

## CC3.3b

**For those initiatives implemented in the reporting year, please provide details in the table below**

Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
Transportation: fleet	Starting in 2007, we increased our fleet efficiency and reduced its GHG emissions by 2.1% year over year for an 18.9% reduction by 2020. We are implementing a range of technologies to make our trucks more efficient, including controlling emissions, using alternative fuels and optimizing truck design. At the time of this report, we have 5,791 natural gas powered trucks in our fleet. Natural gas vehicles in WM's typical duty cycle reduce NOx emissions up to 50%, and GHG 21%. 40% of our natural gas trucks operate on Renewable Natural Gas (natural gas produced from landfill gas in this case), which reduced GHG emissions by over 80% over diesel fuel. We installed 5 minute maximum idletime limiters, enforced protocols on tire pressure, employed a vehicle weight tracker (which reduced GHG emissions by 1.77%), and rethread over 150,000 tires, saving 13 gallons of petroleum per tire. We are a U.S. EPA SmartWay Partner and previous winner of the Natural Gas Vehicle Industry Achievement Award. Our fleet efficiency program, "Service Delivery Optimization" or SDO, aims to optimize our logistics through a combination of technological advancement in on board computing, fleet maintenance, route management and overall safety. We continue to invest in hybrid Caterpillar D7Es for our landfill operations, which replace D8 tractors at many of our landfills and continue to produce a solid 40%+ fuel savings per hour. We continue to run the first-ever Deere 644K diesel-electric loader at our Hillsboro, OR MRF, and are currently running a number of Caterpillar's 336EL hybrid excavator with fuel savings ranging from 15-25% over the non-hybrid units. In California, we are piloting a Volvo wheel loader that is very much a hybrid, diesel-electric, but completely different in design: the 13-liter diesel engine is replaced with a much smaller 3.6-liter engine whose sole function is to recharge a large system of batteries, running only when battery power reaches a pre-set level. Tests show a 39% fuel savings and nearly 60% improvement in productivity. We are an EPA NONROAD Model Supporter.	205720	Scope 1	Voluntary	100000000	6500000000	1-3 years	Ongoing	These emissions reduction initiatives are part of WM's overall sustainability and climate change mitigation strategies. While market and economic conditions change year over year, these initiatives remain a part of our corporate strategic and transformation goals. Annual monetary savings when fully implemented is based on savings in fuel, labor and maintenance costs savings. Investment required is based on converting trucks to CNG, investing in efficiencies, fueling infrastructure and maintenance facilities. Previously WM reported investment required per year; this has been corrected to show investment required over the lifetime of the project. In actuality, we have become more efficient at building stations, causing investment required per station to decrease.
Low carbon energy installation	Our innovative low carbon and renewable fuels projects include the additional landfill gas to natural gas fuel plants gas to liquid ventures. WM has two landfill gas to pipeline natural gas projects in place as of the end of 2016, one landfill gas to liquid natural gas, and one landfill to pipeline natural gas project under construction. WM expects to see progress toward its renewable energy goal as these technologies mature. At December 31, 2016, we had 131 landfill gas beneficial use projects producing commercial quantities of methane gas at WM and third-party landfills. The gas is used to fuel electricity generators, and the electricity is then sold to public utilities, municipal utilities or power cooperatives; used at the landfill or delivered by pipeline to industrial customers as a direct substitute for fossil fuels in industrial processes; processed to pipeline-quality natural gas and then sold to natural gas suppliers; processed into liquefied natural gas and used as vehicle fuel.	2473141	Scope 2 (location-based) Scope 3	Voluntary	0	0	1-3 years	Ongoing	These emissions reduction initiatives are part of WM's overall sustainability and climate change mitigation strategies. While market and economic conditions change year over year, these initiatives remain a part of our corporate strategic and transformation goals.
Other	Increase the amount of recyclables we manage. Successfully achieving our goal has required a transformational change within WM to educate our customers on recycling. This includes educating communities, schools, companies, non-profits, governments, and CEOs. Our Recycle Often. Recycle Right.® education program is used in cities and schools across the country to help our customers know how to recycle right. Achieving this goal also requires that we work with the designers and the manufacturing industry to avoid raw material processing, reduce the degree of material processing, and include recycled materials in their products. We do this by utilizing our materials recovery facility infrastructure to teach designers and manufacturers about	32780115	Scope 1 Scope 2 (location-based) Scope 3	Voluntary	0	0	4-10 years	Ongoing	These emissions reduction initiatives are part of WM's overall sustainability and climate change mitigation strategies. While market and economic conditions change year over year, these initiatives remain a part of our corporate strategic and transformation goals.

Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
	the recycling process and through our Sustainability Services consulting group. WM's recycling activities result in a wide variety of GHG reductions (scopes 1, 2 and 3) that otherwise very likely would not occur.								
Transportation: use	Renewable Natural gas is created from biogas created from landfill and anaerobic digester biogas and used as a fuel in WM trucks.	27887	Scope 1	Voluntary	0	0	16-20 years	Ongoing	Renewable Natural Gas used in Natural Gas vehicles reduces GHG emissions by 90% over the use of diesel fuel.
Low carbon energy installation	Renewable Natural gas is created from biogas created from landfill and anaerobic digester biogas and used in place of natural gas on site.	573	Scope 1	Voluntary	0	0	16-20 years	Ongoing	Renewable Natural Gas used instead of conventional natural gas reduces GHG emissions.

## CC3.3c

## What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Internal finance mechanisms	Our CEO has set and our Board has approved aggressive sustainability goals with ambitious emissions reduction benefits. Moreover, there are many emissions reduction activities available to a highly diversified company like WM. Therefore, those opportunities presented to WM from outside or inside the company that have the best potential to deliver high degrees of emission reduction at low cost or to deliver emission reductions combined with a positive return are given priority for implementation. Our goal setting and disclosure of progress on production of renewable energy, recycling and fuel efficiency are important factors in our investment strategy. In 2014 – 2015, we began a nationwide campaign, Recycle Often. Recycle Right SM, to leverage partnerships and community engagement to increase recycling productivity. We will continue to grow our natural gas fleet, and to expand our capacity to produce renewable natural gas from landfill gas and other biogas projects. In 2016, WM opened two new foodwaste processing facilities – in New York City and in Boston. These are in addition to our existing facility in Orange County, CA. Our technology, called CORE processes source separated food into a bioslurry (EBS®) that we deliver directly to waste water treatment facility digesters, increasing their energy output by as much as 70%. These facilities provide customers solutions at with reasonable capital investments.

## Further Information

## Page: CC4. Communication

## CC4.1

## Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s)

Publication	Status	Page/Section reference	Attach the document	Comment
In voluntary communications	Complete	pp. 3-4, 7-8, 10, 12-15, 17, 20, 25-27, 30-33, 39, 41, 44-45, 48, 51, 55-59, 98-100, 102, 104-106, 109-111, 113, 115, 124, 135	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC4.1/1-2016SustainabilityReport_WM.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC4.1/1-2016SustainabilityReport_WM.pdf</a>	No comment.
In voluntary communications	Complete	Complete pp.1-4	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC4.1/2-2016WMPOSustainabilityReportUpdate.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC4.1/2-2016WMPOSustainabilityReportUpdate.pdf</a>	No comment.
In voluntary communications	Complete	p. 10	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC4.1/3-2014%20Greenbiz%20Recycling2-0_Webcast_FinalSlides[1].pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC4.1/3-2014 Greenbiz Recycling2-0_Webcast_FinalSlides[1].pdf</a>	<a href="http://pinetreeacreslandfill.wm.com/documents/2014%20Greenbiz%20Recycling2-0_Webcast_FinalSlides[1].pdf">http://pinetreeacreslandfill.wm.com/documents/2014%20Greenbiz%20Recycling2-0_Webcast_FinalSlides[1].pdf</a>
In voluntary communications	Complete	Case Study	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC4.1/4-Sustainability%20Assessment%20-%20DJSI%20Sustainability%20Assessment%202015%20-%20Waste%20Management%20Inc.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC4.1/4-Sustainability Assessment - DJSI Sustainability Assessment 2015 - Waste Management Inc.pdf</a>	<a href="https://www.epa.gov/transforming-waste-tool/less-waste-case-study-renton-wa">https://www.epa.gov/transforming-waste-tool/less-waste-case-study-renton-wa</a>
In voluntary communications	Underway - previous year attached	pp. 16, 44, 46, 72-74, 77-79	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC4.1/5-2016%20WM%20EPA%20GHG%20Webcast_8-9-16.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC4.1/5-2016 WM EPA GHG Webcast_8-9-16.pdf</a>	No comment.
In mainstream reports (including an integrated report) but have not used the CDSB Framework	Complete	pp. 14-24	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC4.1/6-WasteManagement_10K_20170216%20(1).pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC4.1/6-WasteManagement_10K_20170216 (1).pdf</a>	No comment.
In other regulatory filings	Underway - previous year attached	pp. 1-14		No comment.

## Further Information

## Module: Risks and Opportunities

## Page: CC5. Climate Change Risks

## CC5.1

**Have you identified any inherent climate change risks that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply**

- Risks driven by changes in regulation
- Risks driven by changes in physical climate parameters
- Risks driven by changes in other climate-related developments

## CC5.1a

**Please describe your inherent risks that are driven by changes in regulation**

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Air pollution limits	Air pollution limits – Federal regulation of MSW Landfills: On August 29, 2016, the US EPA promulgated two new rules: New Source Performance Standards (NSPS) for MSW Landfills (40 CFR 60 Subpart XXX) and Emission Guidelines (EG) for Existing MSW Landfills (40 CFR Subpart Cf). The NSPS XXX and EG Cf include a more stringent emissions threshold (limit) compared to the 1996 MSW Landfill rules still in effect (40 CFR 60 Subpart WWW and 40 CFR 60 Subpart Cc). The lower emissions threshold will require sites to install gas collection and control technology earlier to mitigate landfill gas emissions. It will also require sites with existing gas control technology to operate the technology longer compared to the 1996 rules, thus expanding the number of WM landfills using this technology and lengthening their period of active operation.	Increased capital cost	1 to 3 years	Direct	Virtually certain	Low-medium	The 2016 Federal NSPS and EG rules require expanded monitoring, recordkeeping and reporting beyond the 1996 rules which will add cost for each facility subject to the new rules. The cost to complete surface emissions monitoring will likely double due to additional monitoring and new equipment requirements which are more stringent than the 1996 rules. The 2016 rules include new recordkeeping elements, specifically root cause and corrective action analysis for wellhead temperature and pressure exceedances. The 2016 rules also include new reporting requirements, specifically annual liquids addition reporting and most sites will be required to modify existing Title V permits to incorporate the 2016 rule requirements which translates to increased compliance costs, potentially increasing annual costs by \$10M.	WM government affairs and technical staff have formed a coalition of the public and private municipal waste service providers to advance specific terms for making the new rules as precise and site-specific as possible in order to accurately inform the public and provide a reliable base of information on landfill gas emissions and their relative contribution to climate change. Precision in this report is essential to accurately project the GHG emissions reductions provided by conversion of landfill gas to electricity and fuel. It would be essential data over the longer term in the event of a carbon pricing proposal that included this category of sources. To successfully advocate for improvement in these regulations, WM assembled a coalition of municipal and private sector landfill operators, filed administrative and judicial action, implemented a communications plan to engage U.S. EPA personnel on the need for change in these regulations. The Coalition also is advocating for correction under the new Administration's Regulatory Reform initiative. In addition, WM has assembled a coalition of industry and state governments advocating for U.S. EPA to receive appropriations sufficient to correct this rule and fully maintain associated climate change informational sites and platforms to calculate GHG emissions from waste operations.	WM foresees experiencing delays, and associated costs, in receiving updated air permits particularly as state agencies will be managing additional and unfamiliar permitting requirements. Because of omissions and conflicts between the existing and newly released regulations, all permitted parties are vulnerable to state-assessed penalties of up to \$37,500 per day. In 2016, estimated cost to manage is less than 1% of total revenue of \$13.6B.

## CC5.1b

**Please describe your inherent risks that are driven by changes in physical climate parameters**

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Uncertainty of physical risks	(i) WM incurs increased operational costs from responding to and maintaining contingency response plans and supplies for severe storm events at most of its facilities due to the uncertainty of risk associated with severe storm events. Facilities located in coastal areas engage in hurricane preparedness; facilities near bodies of water and in low lying areas engage in flood preparedness and even inland facilities engage in tornado/severe thunderstorm preparedness. (ii) Physical risks, including flooding/storm surges and wind damage from severe storm events, have potential to damage WM facilities, necessitate repairs to facilities and disrupt the logistics of our delivery of services. Associated electricity outages and fuel shortages have the potential to exacerbate the initial impacts. This in turn could reduce revenues and	Increased operational cost	>6 years	Direct	Very likely	Low	The financial implications for WM posed by potential increases in severe floods and storms include costs associated with the repair of damaged facilities, equipment and loss of revenue from logistics interruption. Emergency plan development undertaken in response to recent climatic events has allowed us to improve our facility design and IT capabilities to mitigate this risk, which we estimate to be \$250,000 for each week of facility disruption, at each landfill located in the impacted area.	We are managing these risks with business continuity planning, emergency response planning, investigating innovations like use of vegetative cover for landfills to reduce repair costs, and mapping our facilities to identify those in water challenged areas. Actions taken: 1. Three years ago, rolled out GIS based spatial visualization program, Waste Analyzer and Visualization Explorer (WAVE), a multi-disciplinary tool that functions as a disaster management tool for our facilities in the field to anticipate potential impact of an incoming storm and plan ahead to provide efficient services in aid of clean-up and disaster recovery. In 2016, we added more layers to enhance its functionality and information attributes and users are able to create and maintain spatial boundaries on maps specific to their market	In 2016, the costs of emergency planning, WAVE and LEED certification are modest (less than 0.1 percent annual cost of \$8.5B) because internal staffs manage each program. Our business continuity planning carefully monitors fuel prices, availability and relies on the natural hedges resulting from our development and use of a variety of fuels (petroleum, NG, CNG, electricity). For emergency response, our disaster plan now calls for prepositioning of fuel supplies in vulnerable areas.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	increase operational costs. In addition, the unpredictability of these events requires that our facilities be prepared to respond at all times, requiring significant investments in response planning, supplies and equipment. WM has expanded its emergency plan in response to recent, more extreme climatic events like Hurricanes Katrina and Sandy, which has allowed us to make modest adjustments in facility design and IT capabilities to mitigate this risk. We are changing the configuration of electrical systems, making provision for emergency fuel and upgrading our logistics capacity to maintain service in these events. We are also prioritizing our emergency planning by using climatological mapping. These additional costs have represented less than 1% annual operating cost. Increased operational cost of 1-3% of operating cost of \$8.5B.							areas and businesses. 2. After significant storms like Hurricane Sandy, we reviewed our flood maps, identified facilities that are at risk, and implemented broader mitigation measures that have shown to be effective. 3. WM Areas identified through these processes incorporate mitigation measures like elevation of equipment, use of in-vehicle internet capability to assure efficient logistics during storm events and during the subsequent cleanup when we provide essential services. In 2016, we used our internal communications capacity to disseminate information on emergency resources available for emergency response.	

CC5.1c

Please describe your inherent risks that are driven by changes in other climate-related developments

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Reputation	(i)WM is a full service environmental services company, not just a landfill company. WM is able to make this claim because of a reputation built over years of doing "more than the minimum" to provide sustainable materials management solutions. Our demonstrated progress in providing GHG reducing services like recycling and production of renewable energy differentiates WM in the environmental service market and provides the bona fides for our >400 member consulting firm providing full service environmental tracking and solutions services. WM's Venturing Department manages a broad portfolio of investments in innovate waste reduction and treatment technologies in order to maintain WM's competitive edge in environmental technology adoption. This differentiation is critical to our market advantage for 50% of our annual revenues.	Reduced demand for goods/services	>6 years	Direct	About as likely as not	Medium	Our contracts with municipalities and medium and large private sector customers rely upon the quantity and quality of WM's recycling and renewable energy capabilities as well as its capacity to provide environmental data management and waste elimination/reduction/recycling services. If our revenue was to decrease 1% due to negative public perception of our capabilities or long-term investment in sustainable assets, that could be a loss of \$120 million dollars.	WM provides emissions disclosure and quantification; sustainability reporting and communications dept seek to publicize progress in recycling and renewable fuel generation to distinguish WM from competitors; fund and actively participate in multi-stakeholder coalitions to more broadly publicize the environmental benefits of recycling and waste reduction. Actions taken: 1. In 11/2016 (updated 11/2017), published extensive G4-based Sustainability Report, reported to CDP, DJSI and FTSE4Good. Reporting expanded to on-line capabilities to attract new audiences, tailor company data and info to multiple customers and audiences; implemented a Recycle Often, Recycle Right campaign to educate our customers on how to recycle right, developed "Spectrum Project" that links our services with GHG reductions and the cost of various ways of achieving those reductions to advocate nationally; publicized sponsorship of the Sustainable Materials Management Coalition, which stressed market transparency and use of GHG reduction and other environmental benefits to shape state policy encouraging productive waste elimination and recycling; participated with U.S. EPA and a broad-based coalition on the ReFed project to reduce food waste and its associated GHGs; 2. In 2016, WMSS increased its role internally by fully managing and expanding our GHG reporting program; 3. WMSS expanded market for proprietary ENSPIRE program to help external customers aggregate and visualize waste diversion and recycling data.	WM has partnered with over 30 innovators, and manages investments in firms evaluating innovative treatment technologies across North America and Europe. In 2016, the cost of this investment is less than 1% of annual revenues. We have prioritized our investments to focus on continued funding of those projects most likely to succeed at commercial scale. In addition, we spend over \$1 million per year on sustainability research and coalition support fees for such organizations as the Sustainable Materials Management Coalition, ReFed, the Business Council for Social Responsibility, the Coalition for Renewable Natural Gas, the Green Sports Alliance, the National Waste & Recycling Association, The Recycling Partnership, Sustainable Brands, Keep America Beautiful, AMERIPEN, the US Green Building council and the Wildlife Habitat Council.

## Further Information

## Page: CC6. Climate Change Opportunities

## CC6.1

Have you identified any inherent climate change opportunities that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

- Opportunities driven by changes in regulation  
 Opportunities driven by changes in physical climate parameters  
 Opportunities driven by changes in other climate-related developments

## CC6.1a

Please describe your inherent opportunities that are driven by changes in regulation

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Fuel/energy taxes and regulations	(i) WM is finding increased demand for renewable fuels, which reduce GHGs and in particular reduce NOx 90%. The Federal Renewable Fuels Standard and state incentive programs encourage investment in our facilities that produce renewable fuel from landfill gas. (ii) Similarly, our Organics Recycling Group has developed and taken to market in several cities technology to help municipalities substantially expand the renewable energy produced from their wastewater treatment facilities. These treatment plants, created to meet strict Clean Water Act discharge standards, can produce revenue from increased sale of renewable fuel. WM has contracts in Los Angeles, CA, Boston, MA and NY, NY to use its CORE technologies to deliver a food waste-derived bioslurry that can be used to create renewable fuel credits.	Investment opportunities	>6 years	Direct	Virtually certain	Medium	The financial implications of pursuing organic waste derived fuel and energy technologies may include enhanced business growth in both WM's new and established lines of business. As our newer alternative fuel and energy activities are executed, this sometimes results in additional business for WM's recycling, reuse and waste hauling businesses. Our 2016 sustainability report shows recycling constitutes 9% of total revenues of \$13.6B. Green energy constitutes 8% of total revenues of \$13.6B. Therefore, the financial implications of not pursuing organic waste derived fuel and energy technologies would result in a loss of revenue of less than 5% of our \$13B revenue for 2016.	WM's Government Affairs, Legal, Organics and Public Sector Sales departments coordinate to sustain and increase legislative and regulatory support for renewable fuels. Progress is tracked, priorities set, and the Board of Directors is briefed yearly on the value achieved from federal and state support for this technology. Our Communications Department works with municipal sales to use this service offering as a means to obtain contracts and differentiate WM from its competitors. Mutual support on regulatory advocacy and environmental management has been particularly beneficial due to the shortage of well-trained personnel available in the current market. Actions taken: 1. WM has established lines of communication among our various lines of business so that their business activities, regulatory advocacy efforts and communications activities are coordinated and complementary to each other. This allows for identification and correction of potential conflicts before they develop and for mutual support. 2. In California, WM's Organics Group is implementing organics processing facilities to support the state's plan to eliminate organics in its landfills in 2 to 3 years in line with SB32 implementation.	The cost of providing organic waste based fuel and energy projects and capitalizing on business opportunities arising from these projects is not a severable cost item. It is part of the investment in building a new line of business, promoting it and executing it. As such in 2016, the "cost" is offset by revenue gained by operating the business and revenue gained by other lines of business benefiting from these projects.

## CC6.1b

Please describe your inherent opportunities that are driven by changes in physical climate parameters

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Change in precipitation extremes and droughts	(i) Extreme weather events do not produce "opportunities"; they produce loss and hardship. However, our services can be an important means to assist the community and relieve hardship. Because WM facilities are equipped and WM personnel are trained to respond quickly and safely to certain damage caused by extreme weather events such as floods and high winds, we do so when such services are needed. (ii) WM facilities have equipment, supplies and	Increased demand for existing products/services	>6 years	Direct	Very likely	Low-medium	WM's emergency plan development in response to recent storms allowed us to adjust facility design and IT capabilities. WM avoided comparable loss and was able to serve other customers displaced by outage at other facilities. Revenues from that diversion were estimated to exceed \$1M based on our	WM has support infrastructure in place to respond to extreme weather events that may potentially affect its businesses and customers. Actions taken: 1. "Green Team": elite drivers and mechanics trained to mobilize to respond to exceptional events. 2. Waste Analyzer and Visualization Explorer, an internal GIS-based program for advance logistical planning, updated in 2016, allows for truck route planning, spatial visualization of available assets on the	In 2016, these modifications continue to entail costs estimated at the equivalent of under 1 percent of annual revenues of \$13B. Profits from one storm event in one year exceeded \$1 million.

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	trained staff to secure its own interests after damage from extreme weather events. They also can offer assistance to others who may not be so well equipped. WM facilities offer the equipment and skills needed for the early response and cleanup of extreme events such as floods and high winds that are key to securing and preserving the health and property of the communities we serve. WM is proud to be able to offer these services, as well as support for later phase state and federally mandated clean-ups, to help the communities we serve recover from events as quickly, safely, and cost effectively as possible. Moreover, after Hurricane Sandy, WM determined that its emergency response planning avoided the kind of loss a competitor experienced (\$9 million in lost revenues) and in fact was able to service the competitor's customers. It also informed our on-going emergency planning for elevating electrical equipment, adding generator capacity, upgrading logistical capabilities during storm events at priority sites identified by climatological mapping. Costs for this planning are less than 1% of operating costs of \$10.9B.						experience with Hurricane Sandy. We believe that this remains an accurate basis for estimating in 2016 and in the coming year, the potential financial implication of the opportunity for other climate-related changes.	ground before a disaster strikes, anticipate and rapidly deploy local, and further our ability to respond to disaster associated with climate and weather patterns. 3. Safety and Engineering divisions provide extensive guidance documents and training on procedures for wind/ severe weather/ natural disasters: mandatory reporting, alter systems, equipment, external notifications, shutdown procedures, and response team chain of command. Annual drills are required for both high wind and severe weather/disaster events. For example, in 2016-2017 Sustainability Services was trained on severe weather safety and response, including best practices organizing a site safety plan with procedures and equipment; hazardous materials emergency action plans were updated in early 2017, including continued natural disaster training, and all operational personnel were trained. Market Area specific local response plans are updated corresponding and posted on Share Point. Third party contractors receive comparable safety training.	

CC6.1c

Please describe your inherent opportunities that are driven by changes in other climate-related developments

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Changing consumer behavior	(i) Recent consumer response to climate change could result in more value being assigned to opportunities for recycling and ability to use renewable alternative fuels and renewable energy. This would enhance the revenue generation of WM's recycling, renewable fuel and energy and sustainability consulting offerings, and it could give us a market advantage because of the breadth of our offerings both in variety of technology and variety of locations, including locations not commonly provided with the opportunity to use such products and services. WM has launched a major educational campaign to inform consumers about the benefits, including carbon reduction benefits (i.e., displaying the CO2e reductions per ton of commodity recycling), of recycling. We are partnering with The Recycling Coalition, Keep America Beautiful, the National Waste and Recycling Association, Solid Waste Association of North America (SWANA), numerous associations representing consumer product manufacturers, U.S. EPA and local governments to increase recycling rates and thereby achieve carbon reductions beyond those to which WM has committed as a company. We sponsored the Coalition for Sustainable Materials Management, which authored two reports on increasing recycling and more sustainable materials management throughout the life cycle of consumer and business product use. See <a href="http://www.michaeldbaker.com/portfolio-items/sustainable-materials-management-coalition/">http://www.michaeldbaker.com/portfolio-items/sustainable-materials-management-coalition/</a> Most of the costs of this campaign are internalized; the contribution to the Coalition has been \$50,000 in 2015 and \$15,000 in	Increased production capacity	>6 years	Direct	Very likely	Medium	Customers change their behavior based on a driver, such as financial incentives or other policies implemented in response to climate change and the limited supply of resources. WM is investing in methods and projects to facilitate our customers' ability to act on their concerns. If our recycling revenue of \$1.6B were to grow 5% due to changing consumer behavior and increased recycling demand, revenues could increase over \$100M. Reducing contamination by the consumer when producing the recyclables we receive saves us \$125 per ton in processing costs and lost commodity sales, and it lowers our potential GHG reductions from recycling. To improve consumer recycling practices, we have implemented a public education campaign called Recycle Often. Recycle Right. See <a href="http://recycleoftenrecycleright.com/">http://recycleoftenrecycleright.com/</a> .	WMRS, WMSS, WM Organic Growth, Sales and Marketing compile supply chain questionnaires to understand customer trends and tailor our service offerings to market demand. These efforts are analyzed by WM Financial Planning and Analysis for each of the business units offering sustainability services. Annually, our assessment of trends in customer demand, sustainability mandates and incentives are checked in comparison with interviews of representative third party experts. WM offers multiple renewable energy options in many markets, and is now offering natural gas refueling stations. Actions taken: 1. WM offers innovative	The cost developi technolo respond custome demand make it e the cust respond sunk cos these an investme that are intended expecte generate revenue profit for company 2016, th thus rerr zero.

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cos manag
	2016. The potential benefits of significantly increased recycling are enormous. According to the EPA, in 2012 87 million tons of recycled or composted waste provided an annual benefit of more than 168 million metric tons of carbon dioxide equivalent (MMTCO <sub>2</sub> E) emissions reduced, comparable to the annual GHG emissions from more than 33 million passenger vehicles.							renewable fuels such as Renewable Natural Gas (RNG). WM's single-stream recycling system allows consumers to put all recyclables into one bin, resulting in up to 40% increase in volumes of recyclables collected. Over the life cycle, recycling avoids emissions related to resource extraction, and single stream reduces emissions from transportation and processing. 2. Our single-stream recycling activities focused on "Recycle Often. Recycle Right" public campaign to increase productivity from community recycling programs. 3. WM has 84 natural gas fueling facilities, 28 of which serve the public or pre-approved third parties, in 30 states and three Canadian provinces.	
Reputation	(i) Reputation is very important to WM. We have worked very hard at developing a reputation as a "green" company and as a company that works hard to know our customers better, extract more value from materials, and innovate and optimize business better than any other service provider. Our reputation is a key reason we obtain opportunities to invest in innovative sustainable technologies and projects. (ii) WM has been successful in undergoing a focused transformation from being a responsible waste disposer to a full service environmental solutions provider. We are capitalizing on existing reputation and logistical assets in waste recovery and expanding our focus on recycling, waste-to-energy and integration with consulting and project management services. The transformation effort has increased customer satisfaction and has enabled the company to sustain business during what has been an economically challenging decade.	Investment opportunities	>6 years	Direct	Likely	Medium	Increasing public desire to address climate change and its recognition that sustainable practices such as recycling and renewable energy as means to do so has enhanced WM's reputation for service innovation and its competitive position with customers with sustainability goals. We are able to demonstrate that in 2016 we processed 14.7M tons of recyclables and used renewable energy equivalent to 2.5M tons of coal, and preserved 25,000 acres of land in certified wildlife habitat. Therefore, the financial implications of not capitalizing on innovations driven by sustainability practices due to climate change and its positive implication to WM's business would likely result in a loss of revenue of approximately 10% less than 1% of our \$13.6B revenue for 2016.	Through our recycling infrastructure investments, our sustainability reports and our routine communications, we enhance our reputation through the following actions: 1. By disclosing our capabilities and achievement in recycling and renewable energy generation. 2. WM also uses major sporting events like the Phoenix Open to provide a widely televised forum for ways in which major public venues can increase recycling, approach zero waste, and employ other renewable energy sources into venue operations. 3. WM employees in continuing communications messages convey WM's sustainability goals and progress to reinforce throughout our workforce our commitment to recycling and renewable energy generation.	The cost transfor from a disposal company material manage company investme processi infrastru meet ou custome processi expectat These investme fully inte and expi to gener revenue profit for company and for r years into future. F example cost of It innovativ bring to "greenin events li Phoenix is being by marki and sale opportur In 2016, cost thus remains

Further Information

Module: GHG Emissions Accounting, Energy and Fuel Use, and Trading

## Page: CC7. Emissions Methodology

CC7.1

Please provide your base year and base year emissions (Scopes 1 and 2)

Scope	Base year	Base year emissions (metric tonnes CO2e)
Scope 1	Thu 01 Jan 2009 - Thu 31 Dec 2009	20505750
Scope 2 (location-based)	Thu 01 Jan 2009 - Thu 31 Dec 2009	137207
Scope 2 (market-based)	Tue 28 Feb 2017 - Tue 28 Feb 2017	

CC7.2

Please give the name of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

Please select the published methodologies that you use
The Climate Registry: General Reporting Protocol
US EPA Mandatory Greenhouse Gas Reporting Rule
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
IPCC Guidelines for National Greenhouse Gas Inventories, 2006

CC7.2a

If you have selected "Other" in CC7.2 please provide details of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

Solid Waste Industry for Climate Solutions (SWICS) Protocol by SCS Engineers, version 2.2, January 2009, amended November 2012.  
 EIA. <http://www.eia.gov/electricity/data/eia861/index.html>. 2014.  
 eGRID. <http://www.epa.gov/cleanenergy/energy-resources/egrid/>. 2013.  
 IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.  
 IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgale. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

CC7.3

Please give the source for the global warming potentials you have used

Gas	Reference
CO2	IPCC Fourth Assessment Report (AR4 - 100 year)
N2O	IPCC Fourth Assessment Report (AR4 - 100 year)
CH4	IPCC Fourth Assessment Report (AR4 - 100 year)
HFCs	IPCC Fourth Assessment Report (AR4 - 50 year)
CO2	IPCC Second Assessment Report (SAR - 100 year)
N2O	IPCC Second Assessment Report (SAR - 100 year)
CH4	IPCC Second Assessment Report (SAR - 100 year)

CC7.4

Please give the emissions factors you have applied and their origin; alternatively, please attach an Excel spreadsheet with this data at the bottom of this page

Fuel/Material/Energy	Emission Factor	Unit	Reference
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Further Information

Page: CC8. Emissions Data - (1 Jan 2016 - 31 Dec 2016)

CC8.1

Please select the boundary you are using for your Scope 1 and 2 greenhouse gas inventory

Operational control

CC8.2

Please provide your gross global Scope 1 emissions figures in metric tonnes CO2e

15618745.73

CC8.3

Please describe your approach to reporting Scope 2 emissions

Scope 2, location-based	Scope 2, market-based	Comment
We are reporting a Scope 2, location-based figure	We have operations where we are able to access electricity supplier emissions factors or residual emissions factors, but are unable to report a Scope 2, market-based figure	Because there is no confirmed residual mix for the US, our calculations default to the location-based emission factors, and thus the same quantity as the Scope 2 location-based calculation. EPA is working on a residual mix and Green-e calculates a residual mix, but it was not recommended because it is not a reliable account for the entire scope of US renewable energy.

CC8.3a

Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e

Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
236273		No comment.

CC8.4

Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

No

CC8.5

Please estimate the level of uncertainty of the total gross global Scope 1 and 2 emissions figures that you have supplied and specify the sources of uncertainty in your data gathering, handling and calculations

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
Scope 1	More than 5% but less than or equal to 10%	Metering/ Measurement Constraints	Direct GHG emissions from WM facilities include process-based emissions from landfilling, power generation, fuel for support services and heating, fleet vehicles, refrigerants. While the amount of landfill gas that is collected can be measured, the amount of landfill gas generated in total emitted to the atmosphere as fugitive emissions must be modelled. WM uses the most accurate methodology available, the SWICS (Solid Waste Industry for Climate Solutions) Protocol. Where we find EPA's rule exempts a facility included in our reporting, we use SWICS to calculate a default representing the proportion of emissions to allow our emissions to be compared year over year. WM estimates HFC emissions as de minimis under the TCR General Reporting Protocol. Emissions from one landfill in Canada are third party verified by RWDI AIR, Inc. for 2014 and GHD for 2015 and 2016 as part of the Alberta Provincial Mandatory GHG reporting program. Massachusetts modified its GHG inventory program to no longer require third party verification of facility GHG reports effective third quarter of 2015. Three landfills in California were required to report GHG emissions, for which third party verification is required for only one landfill. Analytical Environmental Service (AES) completed verification of 2015 mandatory GHG emissions report by July 2016 as required by State of California mandatory reporting program. In 2016, WM engaged Lloyd's Register (LRQA) to conduct a third-party verification of the company's 2015 carbon footprint. All of our facilities subject to the federal GHG Mandatory Reporting Rule for 2016 (over 200 landfills) are subject to rigorous validation checks by U.S. EPA as part of its compliance assurance and enforcement program for the reporting rule. For fleet vehicles, data collection reliability is high as WM continues to be a USEPA SmartWay Transport Partner. We use data from tax filings and accounts payable, and consumption, engine hours, and maintenance activities to calculate emissions from fuel. Fuel consumption, engine hours, and maintenance activities for support services and heating is tracked and recorded via WM's fleet management. In 2015, WM acquired Deffenbaugh; in December 2014, WM divested Wheelabrator Technologies, Inc.
Scope 2 (location-based)	More than 5% but less than or equal to 10%	Metering/ Measurement Constraints	All of Waste Management's indirect GHG emissions are attributable to electricity emissions, which continue to be a de minimis portion of WM's carbon footprint (less than 2% of total GHG emissions). By the end of 2014, WM had contracted with a leader in energy intelligence software to track the data on usage from invoices as part of an enterprise wide Utility Bill Management Program (UBM) spear-headed by WM's Supply Chain Procurement Managers. The program is rolled out by region/division. Every invoice goes through a pre-audit tariff rate review, is tracked in detail with itemized reporting availability by site, is processed and submitted to WM in an AP File for payment to the utilities, and Energy Star data is extracted for upload to the appropriate regulatory authorities. With this approach, our data collection and reporting program is more robust and transparent than ever before. Since the UBM system data integration was phased, some facilities are missing data from the months leading up to their integration. These data gaps are closed by first using actual data from 2016 where available, second using projections whereby data is auto-populated based on historical information on the invoice, and third by using facility-specific monthly averages.
Scope 2 (market-based)	More than 5% but less than or equal to 10%	Metering/ Measurement Constraints	All of Waste Management's indirect GHG emissions are attributable to electricity emissions, which continue to be a de minimis portion of WM's carbon footprint (less than 2% of total GHG emissions). By the end of 2014, WM had contracted with a leader in energy intelligence software to track the data on usage from invoices as part of an enterprise wide Utility Bill Management Program (UBM) spear-headed by WM's Supply Chain Procurement Managers. The program is rolled out by region/division. Every invoice goes through a pre-audit tariff rate review, is tracked in detail with itemized reporting availability by site, is processed and submitted to WM in an AP File for payment to the utilities, and Energy Star data is extracted for upload to the appropriate regulatory authorities. With this approach, our data collection and reporting program is more robust and transparent than ever before. Since the UBM system data integration was phased, some facilities are missing data from the months leading up to their integration. These data gaps are closed by first using actual data from 2016 where available, second using projections whereby data is auto-populated based on historical information on the invoice, and third by using facility-specific monthly averages.

## CC8.6

Please indicate the verification/assurance status that applies to your reported Scope 1 emissions

Third party verification or assurance process in place

## CC8.6a

Please provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/section reference	Relevant standard	Proportion of reported Scope 1 emissions verified (%)
Annual process	Complete	Reasonable assurance	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.6a/West%20ED%20Final%20Verification%20Report_2016.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC8.6a/West ED Final Verification Report_2016.pdf</a>	p. 25-35	Alberta Specified Gas Emitters Regulation (SGER)	1
Annual process	Complete	Reasonable assurance	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.6a/Altamont%20Verification%20Report.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC8.6a/Altamont Verification Report.pdf</a>	p. 3-5	California Mandatory GHG Reporting Regulations (CARB)	1
Annual process	Complete	Limited assurance	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.6a/WM%20CY16%20Assurance%20Statement.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC8.6a/WM CY16 Assurance Statement.pdf</a>	p. 1-3	ISO14064-3	100

## CC8.7

Please indicate the verification/assurance status that applies to at least one of your reported Scope 2 emissions figures

Third party verification or assurance process in place

## CC8.7a

Please provide further details of the verification/assurance undertaken for your location-based and/or market-based Scope 2 emissions, and attach the relevant statements

Location-based or market-based figure?	Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 2 emissions verified (%)
Location-based	Annual process	Complete	Limited assurance	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.7a/WM%20CY16%20Assurance%20Statement.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC8.7a/WM CY16 Assurance Statement.pdf</a>	p. 1-3	ISO14064-3	100
Market-based	Annual process	Complete	Limited assurance	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.7a/WM%20CY16%20Assurance%20Statement.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC8.7a/WM CY16 Assurance Statement.pdf</a>	p. 1-3	ISO14064-3	100

## CC8.8

Please identify if any data points have been verified as part of the third party verification work undertaken, other than the verification of emissions figures reported in CC8.6, CC8.7 and CC14.2

Additional data points verified	Comment
Other: Biogenic Scope 1 Emissions	Biogenic Scope 1 Emissions include emissions from renewable landfill gas used in WM vehicles and carbon from MSW that is permanently sequestered by the landfill. Total emissions in 2016, described in the WM CY16 Assurance Statement attached in CC8.6a, equal to 11,555,035MTCO2e.

CC8.9

**Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?**

Yes

CC8.9a

**Please provide the emissions from biologically sequestered carbon relevant to your organization in metric tonnes CO2**

30369

**Further Information**

CC8.9a: Emissions from biologically sequestered carbon emissions are relevant to WM and includes emissions from renewable landfill gas used in WM vehicles, scope 1 but reported separately as per The Greenhouse Gas Protocol due to being biogenic. An additional source, excluded from section CC8.9a but still relevant, is carbon from MSW that is permanently sequestered by the landfill, which acts as a sink, allowing these emissions to be avoided (11,524,665 MTCO2e in 2016). Verified Scope 1 Biogenic Emissions are equal to 11,555,035MTCO2e, which comes from 30,369MTCO2e reported in CC8.9a and 11,524,665MTCO2e described above.

**Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2016 - 31 Dec 2016)**

CC9.1

**Do you have Scope 1 emissions sources in more than one country?**

Yes

CC9.1a

**Please break down your total gross global Scope 1 emissions by country/region**

Country/Region	Scope 1 metric tonnes CO2e
Canada	796488.32
United States of America	14822257.41

CC9.2

**Please indicate which other Scope 1 emissions breakdowns you are able to provide (tick all that apply)****Further Information****Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2016 - 31 Dec 2016)**

CC10.1

**Do you have Scope 2 emissions sources in more than one country?**

Yes

CC10.1a

**Please break down your total gross global Scope 2 emissions and energy consumption by country/region**

Country/Region	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
Canada	12035.21			
United States of America	223969.33			

CC10.2

**Please indicate which other Scope 2 emissions breakdowns you are able to provide (tick all that apply)****Further Information****Page: CC11. Energy**

CC11.1

**What percentage of your total operational spend in the reporting year was on energy?**

More than 10% but less than or equal to 15%

CC11.2

**Please state how much heat, steam, and cooling in MWh your organization has purchased and consumed during the reporting year**

Energy type	MWh
Heat	1705524.60
Steam	0
Cooling	0

CC11.3

**Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year**

8641320.70

CC11.3a

**Please complete the table by breaking down the total "Fuel" figure entered above by fuel type**

Fuels	MWh
Diesel/Gas oil	5133373.25
Motor gasoline	42410.79
Jet kerosene	7454.05
Distillate fuel oil No 2	3192.96
Natural gas	1615929.67
Other: Compressed Natural Gas	1580076.17

Fuels	MWh
Liquefied Natural Gas (LNG)	131746.80
Landfill gas	40376.97
Other: Acetylene	358.07
Propane	38689.98
Other: Methanol	126.04
Other: Used Oil	30814.08
Kerosene	16771.87

CC11.4

Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

Basis for applying a low carbon emission factor	MWh consumed associated with low carbon electricity, heat, steam or cooling	Emissions factor (in units of metric tonnes CO2e per MWh)	Comment
Off-grid energy consumption from an on-site installation or through a direct line to an off-site generator owned by another company	3426	0.264898	Off-grid energy consumption from an on-site installation. The emissions factor varies across locations from 0.264898 to 0.394172 MTOC2/mwh. In 2016, WM consumed approximately 3426 MWh of electricity generated from landfill gas. WM meters the electricity delivered to the landfills, which is included on monthly operating reports.

CC11.5

Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

Total electricity consumed (MWh)	Consumed electricity that is purchased (MWh)	Total electricity produced (MWh)	Total renewable electricity produced (MWh)	Consumed renewable electricity that is produced by company (MWh)	Comment
500353	496927	3460019	3460019	3426	In 2016, WM consumed approximately 3426 MWh of renewable electricity generated from landfill gas on site. WM meters the electricity delivered to the landfills, which is included on monthly operating reports. WM also generated the equivalent of 3,460,019 MWh of renewable electricity from renewable landfill gas projects.

Further Information

Page: CC12. Emissions Performance

CC12.1

How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to the previous year?

Decreased

CC12.1a

Please identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined) and for each of them specify how your emissions compare to the previous year

Reason	Emissions value (percentage)	Direction of change	Please explain and include calculation
Emissions reduction activities	3.83	Decrease	i) Renewable natural gas produced from processed landfill gas now fuels 40 percent of our natural gas trucks. By the end of 2016, WM had 5,031 CNG trucks, more in 2016 than 2015, and fewer diesel trucks. CNG fuel generates fewer GHG emissions than diesel; ii) WM operates the world's largest fleet of Caterpillar D7E bulldozers, a diesel-electric hybrid machine with a smaller diesel engine powering an electric generator that provides the tractive effort as well as powering many previously gear driven components. Each unit saves approximately 9,440 gallons of diesel fuel annually; iii) Change in methane collection efficiency at some WM landfills is related to change in type of cover (daily, intermediate and final) and change in surface area of each type of cover at sites with gas collection and capture systems. More final cover surface area will increase collection efficiency and decrease methane emissions. In some cases, fluctuation is due to installation of gas systems or significant expansion of gas systems; iv) In 2016, WM transferred responsibility for all Charleston Landfill compliance and reporting back to the City of Charleston; we are merely a "push contractor" for this site and are not the owner/operator. Emission reduction activities resulted in 3.83% decrease. In the reporting year, 627,851 MTCO2e were reduced by our emissions reduction activities. Previous year's Scope 1 and scope 2 emissions, 16,392,940 MTCO2e, have been used to calculate the emissions value (%). Therefore, we achieved a 3.83% decrease: $(627,851/16,392,940)*100 = 3.83\%$ .
Divestment	0.35	Decrease	As of June 2015 WM had completely divested of Wheelabrator waste-to-energy facilities. This result was a decrease of 57,495 MTCO2e, a 0.35% decrease in emissions and not enough to require an emissions baseline adjustment. $(57,495/16,392,940)*100 = 0.35\%$
Acquisitions			
Mergers			
Change in output			
Change in methodology	0.90	Increase	i) In 2015, 10% of WM's emissions from natural gas usage (excluding Wheelabrator WTI operations) and 14% of purchased electricity emissions were extrapolated from 2014 and 2013 data. In 2016, 100% of natural gas and purchased electricity data came from WM's Utility Bill Management (UBM) Program's utility invoices or algorithms based on actual data. Emissions from these sources remain de minimis; ii) Emissions from jet fuel was previously calculated using the emission factor for aviation gasoline. Changes in methodology resulted in a 0.90% emissions increase.
Change in boundary			
Change in physical operating conditions			
Unidentified			
Other			

CC12.1b

Is your emissions performance calculations in CC12.1 and CC12.1a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Location-based

CC12.2

Please describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO2e per unit currency total revenue

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator: Unit total revenue	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.001147153527159	metric tonnes CO2e	13609000000	Location-based	9.30	Decrease	GHG emissions per dollar of total revenue increased between 2015 and 2016 because GHG emissions (numerator) had a 4.77% decrease while revenue had a 5.00% increase. In 2016, scope 1 and scope 2 emissions were reported as 15,852,892 MTOC2e. Some reasons for the changes include emission reduction activities: i.) Renewable natural gas produced from processed landfill gas now fuels 40 percent of our natural gas trucks. By the end of 2016, WM had 5,031 CNG trucks, more in 2016 than 2015, and fewer diesel trucks. CNG fuel generates fewer GHG emissions than diesel. For every diesel truck we replace with natural gas we reduce our use of diesel fuel by an average of 8,000 gallons per year along with a reduction of 22 metric tons of greenhouse gas emissions per year (the equivalent of a 21 percent emissions reduction per truck). ii.) WM operates the world's largest fleet of Caterpillar D7E bulldozers, a diesel-electric hybrid machine with a smaller diesel engine powering an electric generator that provides the tractive effort as well as powering many previously gear driven components. Each unit saves approximately 9,440 gallons of diesel fuel; iii) Change in methane collection efficiency at some WM landfills is related to change in type of cover (daily, intermediate and final) and change in surface area of each type of cover at sites with gas collection and capture systems. More final cover surface area will increase collection efficiency and decrease methane emissions. In some cases, fluctuation is due to installation of gas systems or significant expansion of gas systems; in addition, in 2016 WM transferred responsibility for all Charleston Landfill compliance and reporting back to the City of Charleston; we are merely a "push contractor" for this site and are not the owner/operator; iv.) Reporting methodologies have changed, becoming more accurate, while we continue to collect data from what we believe to be the most reliable sources.

CC12.3

Please provide any additional intensity (normalized) metrics that are appropriate to your business operations

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator	Metric denominator: Unit total	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.479297509952221	metric tonnes CO2e	unit of production	32571862	Location-based	1.24	Decrease	WM engages in many materials management activities as well as other activities, and with such a diversified offering, there is no normalized unit applicable to all of WM's key activities. However, the number of tons of materials managed by WM's landfill and recycling does represent many of WM's activities directly, and some others, such as renewable energy from landfill gas to energy projects, indirectly. As such, the potential avoided greenhouse gas emissions from these activities is an appropriate metric for comparison to company-wide GHG emissions. Avoided emissions from materials managed per total scope 1 and scope 2 emissions of total revenue decreased between 2015 and 2016 because GHG emissions (numerator) had a 4.77% decrease while avoided emissions from recycling (denominator), an emissions reduction activity, had a 0.27% increase. Recycling materials leads to potentially avoided greenhouse gas emissions, a decrease in emissions for WM and our customers. WM saw a 4% increase in materials managed from 2015 to 2016, from 14.12 to 14.72 million tons, and an increase in avoided emissions. Potential avoided emissions was 32571862 MTOC2e in 2016. In addition, actual emissions from non-exempt landfills decreased year over year. We are using the most current version of the EPA WARM model, with the most reasonable assumptions on landfill gas collection and energy recovery based on our WM sites' engineering controls, and reporting the results in metric tonnes of carbon dioxide equivalent.

Further Information

Page: [CC13. Emissions Trading](#)

CC13.1

Do you participate in any emissions trading schemes?

Yes

CC13.1a

Please complete the following table for each of the emission trading schemes in which you participate

Scheme name	Period for which data is supplied	Allowances allocated	Allowances purchased	Verified emissions in metric tonnes CO2e	Details of ownership
Alberta Emissions Trading Regulation	Fri 01 Jan 2010 - Sat 31 Dec 2016	0	0	443954	Facilities we own and operate

CC13.1b

What is your strategy for complying with the schemes in which you participate or anticipate participating?

The Alberta Environment GHG Reduction Program is a mandatory, intensity based GHG reduction program in which WM is currently engaged. After it began in 2007, WM elected to approach compliance for its one subject facility, an MSW landfill, aggressively. Instead of paying an emissions fee or buying offsets annually, WM installed a landfill gas collection system to actually reduce GHG emissions from the site. This approach is now generating the benefit of excess, saleable allowances (Emission Performance Credits) because the operation of the landfill gas collection system exceeds the requirements of the associated rule.

CC13.2

Has your organization originated any project-based carbon credits or purchased any within the reporting period?

Yes

CC13.2a

## Please provide details on the project-based carbon credits originated or purchased by your organization in the reporting period

Credit origination or credit purchase	Project type	Project identification	Verified to which standard	Number of credits (metric tonnes CO2e)	Number of credits (metric tonnes CO2e): Risk adjusted volume	Credits canceled	Purpose, e.g. compliance
Credit origination	Landfill gas	West Edmonton Landfill (Alberta) LFG Recovery and Destruction	Other: West Edmonton Landfill (Alberta) LFG Recovery and Destruction	443954	443954	Yes	Voluntary Offsetting

## Further Information

## Attachments

[https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/ClimateChange2017/CC13.EmissionsTrading/Altamont\\_Verification\\_Report.pdf](https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/ClimateChange2017/CC13.EmissionsTrading/Altamont_Verification_Report.pdf)

## Page: CC14. Scope 3 Emissions

## CC14.1

## Please account for your organization's Scope 3 emissions, disclosing and explaining any exclusions

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
Purchased goods and services	Relevant, calculated	634960.66	WM used the actual spend on furniture, fixtures and office equipment as reported in WM's annual 10-K filings, relying on the GHG Protocol Scope 3 Evaluator tool to calculate the GHG emissions from Purchased Goods and Services.	10.00%	No explanation necessary.
Capital goods	Relevant, calculated	7517267.45	WM used the actual spend on land, vehicles, large machinery and equipment, and buildings as reported in WM's annual 10-K filings, relying on the GHG Protocol Scope 3 Evaluator tool to calculate the GHG emissions from purchased Capital Goods.	10.00%	No explanation necessary.
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Relevant, calculated	8020.45	WM uses fuel generated and eGRID emissions factors to calculate emissions from fuel and energy related activities.	100.00%	Conversion of landfill gas into renewable natural gas to generate power off-site.
Upstream transportation and distribution	Not relevant, explanation provided				WM's Scope 1 and 2 emissions already accounts for emissions under this category as a result of our emissions reporting consolidation.
Waste generated in operations	Not relevant, explanation provided				Being an environmental solutions provider, waste generated through WM operations is managed by WM. Therefore, emissions generated from these services are Scope 1 and Scope 2 and reported in those sections. There is a very small number of WM employees who work in non-WM facilities; Scope 3 emissions from their activities are reported by those non-WM facilities.
Business travel	Relevant, calculated	19642.44	Since 2009, WM has been encouraging employees to use alternate means of communication in place of person-to-person meetings that require travel. Scope 3 emissions for business travel have been calculated for this time period using information on costs incurred for vehicle travel. In 2016, WM's third party travel agent provided miles travelled. Emissions were calculated using from the World Resources Institute (2015). GHG protocol tool for mobile combustions. Version 2.6.	100.00%	WM's business travel data include air and vehicle miles, which totaled 19,642.44 MtCO2e. Prior to 2015, WM submitted vehicle travel under employee commuting. Combining it with air business travel has resulted in an increase in MtCO2e the past few years. WM's GHG emissions from air business travel decreased in 2016. Emissions from air travel in 2016 were 6,200.49 metric tonnes CO2e, compared to 8,708.71 MtCO2e in 2015, 8,287 MtCO2e in 2014, 6,466.78 MtCO2e in 2013, 7,076 MtCO2e in 2012, 6,245 in 2011, and 5,911 MtCO2e in 2010. Emissions from vehicle travel were 13,441.95 MtCO2e in 2016, an increase from the 2015 total of 12,828.72 MtCO2e. Prior to 2015, the data did not include mileage from internal expense report. Emissions were 12,917.96 MtCO2e in 2014, 10,427 MtCO2e in 2013; 12,211 MtCO2e in 2012; and 12,434 MtCO2e in 2011. New technologies for tracking vehicle business travel since 2011 has resulted in an increase in emissions.
Employee commuting	Relevant, calculated	202971.56	WM used the U.S. Census 2011 average one-way commute time to calculate an average of 51 miles for a round-trip commute, 49 work weeks (245 work days) in the year, and the World Resources Institute (2015). GHG protocol tool for mobile combustions. Version 2.6 to calculate emissions from employee commuting.	5.00%	2015 was the first year WM reported emissions from employee commutes. Less than 1% of WM employees telecommute, while the other 99% travel a typical daily commute. In 2016, WM employee commuting resulted in 202,971.56 MtCO2e. The calculation is based on accounting for the total employee count of 41,200. In 2015, WM reported 4,694.79 MtCO2e as the emissions from employee commuting because in the GHG Protocol template spreadsheet, selecting "Passenger Car - Fuel Unknown" as the general vehicle type resulted in calculations of CH4 and N2O emissions only; CO2 emissions were not calculated. When corrected to "Passenger Car - Gasoline - Year 2005-Present," the emissions are 198,015.51 MtCO2e. In addition, the 2007 IPCC Fourth Assessment Report GWP was used to be consistent with our scope 1 reporting.
Upstream leased assets	Not relevant, explanation provided				All emissions from WM's leased sites are included in Scope 1 and 2 reporting.
Downstream transportation and distribution	Not relevant, explanation provided				WM does not distribute sold products. Unlike other companies where products are produced and/or sold and distributed, WM conducts its business by offering hauling, recycling and consulting services to consumers.
Processing of sold products	Not relevant, explanation provided				WM does not process any sold, intermediate products. WM does create SpecFuel™ (see "Fuel-and-energy-related activities"); however, emissions generated from these services are Scope 1 and Scope 2 and reported in those sections.
Use of sold products	Not relevant, explanation provided				WM does not use sold products. Unlike other companies where products are produced and/or sold, WM conducts its business by offering hauling, recycling and consulting services to consumers.
					WM does not process sold products nor treat its end of life. Unlike other companies where products are produced and/or sold, WM

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
End of life treatment of sold products	Not relevant, explanation provided				conducts its business by offering hauling, recycling and consulting services to consumers. End of life treatment is done for companies who are availing our services.
Downstream leased assets	Relevant, calculated	1945.77	Using the Office and Other building averages from the Commercial Building Energy Consumption Survey (Table C13, released May 2016), WM calculated electricity consumption from leased sites based on square footage, and average consumption per square foot.	25.00%	WM's GHG from Upstream Leased Assets total 2442.11 MtCO2e for 2016.
Franchises	Not relevant, explanation provided				WM does not have franchises.
Investments	Not relevant, explanation provided				WM is not a financial institution.
Other (upstream)	Not relevant, explanation provided				WM has no other relevant upstream activity to report.
Other (downstream)	Not relevant, explanation provided				WM has no other relevant downstream activity to report.

## CC14.2

**Please indicate the verification/assurance status that applies to your reported Scope 3 emissions**

Third party verification or assurance process in place

## CC14.2a

**Please provide further details of the verification/assurance undertaken, and attach the relevant statements**

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 3 emissions verified (%)
Annual process	Complete	Limited assurance	<a href="https://www.cdp.net/sites/2017/15/20515/Climate%20Change%202017/Shared%20Documents/Attachments/CC14.2a/WM%20CY16%20Assurance%20Statement.pdf">https://www.cdp.net/sites/2017/15/20515/Climate Change 2017/Shared Documents/Attachments/CC14.2a/WM CY16 Assurance Statement.pdf</a>	p. 1-3	ISO14064-3	100

## CC14.3

**Are you able to compare your Scope 3 emissions for the reporting year with those for the previous year for any sources?**

Yes

## CC14.3a

**Please identify the reasons for any change in your Scope 3 emissions and for each of them specify how your emissions compare to the previous year**

Sources of Scope 3 emissions	Reason for change	Emissions value (percentage)	Direction of change	Comment
Business travel	Change in output	8.8	Decrease	WM engages with employees on evaluating the importance of travel to ensure it is meeting the needs of the business. Due to emissions reduction activities, there was an 8.8% decrease over the previous year, the result of a decrease in the number of 2016 long distance flights (>700 air miles). WM is additionally working on company-wide travel and reimbursement training that will be administered in 2017.
Employee commuting	Other: Incorrect vehicle input and GHG Protocol spreadsheet error	2.5	Increase	2015 was the first year WM reported emissions from employee commutes. Less than 1% of WM employees telecommute, while the other 99% travel a typical daily commute. In 2016, WM employee commuting resulted in 202,971.56 MtCO2e. The calculation is based on accounting for the total employee count of 41,200. In 2015, WM reported 4,694.79 MtCO2e as the emissions from employee commuting because in the GHG Protocol template spreadsheet, selecting "Passenger Car - Fuel Unknown" as the general vehicle type resulted in calculations of CH4 and N2O emissions only; CO2 emissions were not calculated. When corrected to "Passenger Car - Gasoline - Year 2005-Present," the emissions are 198,015.51 MtCO2e. In addition, the 2007 IPCC Fourth Assessment Report GWP was used to be consistent with our scope 1 reporting. While the 2016 total, 202971.56 MtCO2e, is a 4223.3% increase over the previously reported total, it is only a 2.5% increase when the 2015 data is corrected.

## CC14.4

**Do you engage with any of the elements of your value chain on GHG emissions and climate change strategies? (Tick all that apply)**

Yes, our suppliers  
Yes, our customers  
Yes, other partners in the value chain

## CC14.4a

**Please give details of methods of engagement, your strategy for prioritizing engagements and measures of success**

Methods of Engagement: 1. At the WMPO, we conduct periodic meetings 9 months prior to event to set new goals, manage expectations and to give every stakeholder the opportunity to provide feedback and recommendations for improvement. This continuous stakeholder engagement also gives us the chance to know more about our supplier processes, which lead us to better management of our material flow – a critical component of our success in our zero waste challenge program. 2. We actively engage with customers and other partners on ways to reduce GHG emissions from heavy duty vehicles, not only in direct dialogue, but in coalitions convened to address both sector emissions reductions (Securing America's Energy Future, Coalition for Renewable Natural Gas, Energy Security Leadership) and throughout the supply chain (Automotive Suppliers Partnership). 3. We work with value chain partners to include more diesel-electric hybrid off-road vehicles, including piloting new machinery and providing feedback on efficiencies. 4. WM is a member of a number of coalitions that specifically focus on disclosing and reducing GHG emissions by means of recycling – the National Waste & Recycling Association, the Solid Waste Association of North America, The Recycling Partnership, AMERIPEN, the Association of Lighting and Mercury Recyclers, the Association of Plastics Recyclers, the Coalition for American Electronics Recycling, the Food Industry Environmental Council, the Institute of Scrap Recycling, Sustainable Brands, the Sustainable Materials Management Coalition, and the Sustainable Packaging Coalition, among others. All of these groups include WM customers and suppliers.

Prioritizing Engagement: 1. Our strategy at WMPO is to understand the vendor's contribution to the event's overall waste stream. Vendors that generate more materials to be composted or recycled are prioritized more in terms of education, training, and materials tracking. 2. Our engagement with customers and suppliers on lower-emissions heavy duty vehicles began with a focus on improving municipal customer satisfaction with our services by employing lower-emitting services vehicles, and expanded after a partnership with EDF, our key suppliers and academics to determine the GHG emissions from heavy duty vehicles and design changes (now implemented) to reduce emissions. 3. We work with customers and suppliers that have GHG reduction goals, report scope 3 emissions, and wish to dig deeper into their impacts on evaluating their waste management choices to determine the best environmental benefit and associated costs. We work

with other customers and suppliers, in particular those involved in generating or managing municipal solid waste, who focus primarily on recycling. Through our work with the associations listed above and our RecycleOften.RecycleRight.® campaign, we seek to convince them to shape their waste management and recycling practices to maximize GHG reductions. See <http://recycleoftenrecycletright.com/>.

Our Measures of Success: 1. We create an annual WMPO sustainability report discussing collaboration with industry non-profit organizations and highlighting the tournament impact on the (a) environment, through use of resources such as energy, water and waste we generate; (b) community, through public awareness and education, charitable giving, safety and overall experience; and (c) economic, through the tournament's impact on the local economy. Since 2013 we have worked with the Council for Responsible Sport, which formally recognizes the successful completion of a socially and environmentally responsible sporting events, and achieved the highest level of certification. We also work with UL to achieve an ever higher level of diversion, "Zero Waste to Landfill Operations with 10% incineration with energy recovery." 2. Greenhouse gas emissions avoided from managing waste: increased recycling, waste reduction, organics recycling; measurable decrease in residual material that must be landfilled. 3. Generation and sales of renewable natural gas from landfills and use of public fueling stations; GHG reductions from use of CNG in our fleet. 4. Customer growth and retention. Continuous traffic to our RecycleOften.RecycleRight.® website.

#### CC14.4b

**To give a sense of scale of this engagement, please give the number of suppliers with whom you are engaging and the proportion of your total spend that they represent**

Type of engagement	Number of suppliers	% of total spend (direct and indirect)	Impact of engagement
Active engagement	157	45%	Please see "Further Information" as the response text exceeded the maximum length of this section.

#### Further Information

54 Suppliers, 5% of Spend, Impact: Our suppliers are diverse, from vendors and entertainers to service personnel who are WMPO participants. They are building contractors, exhibitors, concessionaires, waste & sanitary services, security, transportation, musicians. There are 25+ Expo vendors and 25+ food & beverage vendors. The percentage of our total spend is difficult to calculate due to different layers of products and services, thus an estimate of 5%. 3 Suppliers, 20% of Spend, Impact: 3 vehicle suppliers are responsible for 20% of WM's supply chain spend. We actively engage with them on ways to reduce GHG emissions from heavy duty vehicles, not only in direct dialogue, but in coalitions convened to address both sector emissions reductions (Securing America's Energy Future, Coalition for Renewable Natural Gas, Energy Security Leadership) and throughout the supply chain (Automotive Suppliers Partnership). See 2016 SR p. 128. Our engagement on lower-emissions heavy duty vehicles began with a focus on improving municipal customer satisfaction with our services by employing lower-emitting services vehicles, and expanded after a partnership with CDF, our key suppliers and academics to determine the GHG emissions from heavy duty vehicles and design changes (now implemented) to reduce emissions. <http://wvutoday.wvu.edu/stories/2017/01/05/new-study-examines-pump-to-wheels-methane-emissions-from-natural-gas-fueled-heavy-duty-transportation-sector>. 100 Suppliers, 20% of Spend, Impact: Expanding and refocusing recycling on obtaining the maximum feasible GHG reductions has been key to WM's advocacy on recycling for the past two years. WM is a member of a number of coalitions that specifically focused on disclosing and reducing GHG emissions by means of recycling – the National Waste & Recycling Association, the Solid Waste Association of North America, The Recycling Partnership, AMERIPEN, the Association of Lighting and Mercury Recyclers, the Association of Plastics Recyclers, the Coalition for American Electronics Recycling, the Food Industry Environmental Council, the Institute of Scrap Recycling, Sustainable Brands, the Sustainable Materials Management Coalition, and the Sustainable Packaging Coalition, among others. All of these groups include WM customers and suppliers. The focus of these efforts can be viewed at <http://recycleoftenrecycletright.com/>, 2015 SR pp. 32-33, and <https://www.michaeldbaker.com/portfolio-items/reducing-environmental-impact-materials-use/>. \*Please note that b/c of the breadth of our engagement on the topic of GHG emissions reduction and the number of suppliers participating in each association in any given year, these estimates are necessarily approximate. MORE WMPO Background - we started tracking supplier delivery processes to estimate their greenhouse gas emissions. While we don't yet track every element of their operations, in many cases we prioritize choosing suppliers who are in line with our environmental initiatives in particular, the implementation of sustainable best practices. All food and beverage materials are required to be compostable or recyclable. Since the 2012 event, vendors are provided a list of acceptable materials to bring on site and required to adhere to this list. Sponsors are provided with a similar list for promotional items. Vendors who showed up to the event with materials not on the list were required to remove said materials. We continue to focus on measuring key performance indicators such as GHG emissions to drive changes in our supply chain's behaviors. Our 100% diversion rate for the 2013 through 2016 WMPO tournaments demonstrates that we are on the right track and our suppliers are responding every year. We track all energy and water use, and estimate transportation emissions for attendees, intrasite transport, and golfers. The 2016 WMPO Sustainability Report Update (<http://www.wm.com/thinkgreen/pdfs/2016WMPOSustainabilityReportUpdate.pdf>) reports all of the inputs and outputs and associated greenhouse gas (GHG) emissions from the WMPO. The World Resources Institute Greenhouse Gas Protocol, The Climate Registry General Reporting Protocol, and the U.S. EPA's WARM model were used to calculate GHG emissions. In addition, WM worked with Wildlife Works to offset all greenhouse gas emissions from WMPO operations, volunteer travel, and player travel, a total of 720 MTCO<sub>2</sub>e through sustainable forest management programs that prevents the release of GHG emissions in areas like the Congo Basin. Greenhouse gas emissions from WMPO operations totaled 226 MTCO<sub>2</sub>e while player travel generated 70 MTCO<sub>2</sub>e. Methods of Engagement We continue to engage and recognize our stakeholders from all sectors of our operations and event. As such, we conduct periodic meetings as early as 9 months before the next WMPO takes place. This is to manage expectations, set new goals and to give every stakeholder the opportunity to provide feedback and recommendations to improve WMPO. This continuous stakeholder engagement also gives us the chance to know more about our supplier processes, which lead us to better management of our material flow – a critical component of our success in our zero waste challenge program. Prioritizing Engagement The strategy we have from the beginning in vendor engagement is to understand the vendor's contribution to the event's overall waste stream. Therefore, the vendors that provide high volumes of materials that will be composted or recycled – such as the larger food catering groups and signage manufacturers – are prioritized more in terms of education, training, and materials tracking. Our Measures of Success We measure success year over year through inclusion in our sustainability report, collaborating with industry non-profit organizations and highlighting the tournament impact on the (1) environment, through use of resources such as energy, water and waste we generate; (2) community, through public awareness and education, charitable giving, safety and overall experience; and (3) economic, through the tournament's impact on the local economy. In 2013, we worked with the Council for Responsible Sport (the Council), which formally recognizes the successful completion of a socially and environmentally responsible sporting event with a two-year certification. We achieved Gold certification from the Council, marking the first certification for a golf tournament, and we improved in 2015, reaching Evergreen certification for the first time. WM also worked with Underwriters Laboratories Environment Inc. (UL) for a third-party verification of the 2013 event's diversion, achieving 100% landfill diversion rate with 12% incineration with energy recovery. In 2014, we worked with UL to achieve an even higher level of diversion, "Zero Waste to Landfill Operations with 10% incineration with energy recovery," and in 2015 and 2016, we maintained the UL validation. In October 2014, the Waste Management Phoenix Open was honored with the "Sport For The Environment" Award from Beyond Sport. The Global Awards, supported by Sport Relief, are Beyond Sport's flagship award program. Each year, the Official Shortlist is selected through an in-depth judging process made up of experts in the field. The Shortlisted initiatives are invited to the annual Beyond Sport Summit and Awards. As the award recipient, Waste Management received global recognition, strategic support and access from exclusive business partners and monetary funding to help further the impact zero waste has on sports. Performance Indicators Additional reuse efforts intended to maximize the lifecycle of materials and products used at the WMPO included: - The main WM logo water feature was made with 140,000 reused golf balls. - The other WM water feature incorporated 750,000 reused golf tees made from 100% recycled content. Both the golf balls and tees will be reused next year. - In 2016, 18,300 pounds of unused food was donated to Waste Not Perishable Food Rescue and Delivery as well as Church on the Street, local non-profit food donation organizations. Energy and transportation highlights from the 2016 WMPO include: - Continued effort to only use generators running on alternative energy on course. Several generators were plugged in to run on renewable power, and the rest ran on biodiesel. - Since 2011, 100% of electricity, including golf carts, has been provided by renewable energy, purchased through the local utility, APS. - Solar power has been used to completely power WM's hospitality tent since 2011. - Solar light towers and solar compactors continue to be used in key locations on the course. - Trucks used to haul waste have been increasingly powered by compressed natural gas (CNG) since 2011, emitting less than half the GHG emissions of diesel.

**Module: Sign Off**

**Page: CC15. Sign Off**

#### CC15.1

**Please provide the following information for the person that has signed off (approved) your CDP climate change response**

Name	Job title	Corresponding job category
James C. Fish, Jr.	President and Chief Executive Officer (CEO)	Chief Executive Officer (CEO)

#### Further Information

CDP: [W][A][P][E]