STATEMENT BEFORE THE HOUSE COMMITTEE ON SCIENCE
ENERGY AND ENVIRONMENT SUBCOMMITTEE
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WASTE MANAGEMENT

Tuesday, February 24, 2009

Chairman Baird, Ranking Member Inglis, and members of the Subcommittee, thank you for the opportunity to speak with you today about Waste Management's greenhouse gas programs and our efforts to measure and understand our company-wide greenhouse gas emissions.

Waste Management (WM) is the leading provider of comprehensive waste management, recycling and environmental services in North America. We are also a leading producer of renewable, waste-based energy – enough to power over one million homes each year. Waste Management is committed as an industry leader and environmental steward to identify our company carbon footprint, voluntarily reduce our greenhouse gas (GHG) emissions, and help our customers do the same.

Waste Management's greenhouse gas emissions include:

- CO_2 emissions from combustion of fossil fuel in our vehicles and in stationary sources at our facilities;
- CO_2 emissions from non-biogenic* waste combusted at our waste-to-energy plants (about 34 percent of an average waste-to-energy plant's total CO_2 emissions). These emissions are more than offset by production of renewable electricity;
- Indirect GHG emissions from our use of electricity; and
- Methane emissions from MSW landfills. These emissions are controlled by operation of gas collection and control systems, some of which generate renewable energy, combined with landfill cover management.

*Non-biogenic describes waste that is not produced from a biological process, and includes materials such as plastics and synthetic textiles.

WM employs a number of innovative technologies to reduce greenhouse gas emissions, including:

- Saving virgin resources and energy through the nation's largest recycling program. We announced in October 2007 that we plan to triple the amount of recyclable materials we manage by 2020;
- Advancing technology for alternative transportation fuels (e.g., landfill gas to liquefied natural gas) and engine design to lower GHG emissions from our vehicles. We are developing a landfill gas to liquefied natural gas plant in Altamont, California, and we plan to direct capital spending of up to $500 million per year over a ten-year period to increase fuel efficiency

of our fleet by 15 percent and reduce our emissions by 15 percent by 2020;

- The operation of landfill-gas-to-energy, waste-to-energy and biomass plants that produce electricity and fuels to replace fossil fuel use. We plan to double our 2008 output of renewable energy by 2020;
- The recovery and destruction of methane gas from landfills in accordance with and beyond that required by regulation; and
- Development of "Next Generation" landfill technology that offers enhanced collection and beneficial use of landfill gas.

The Solid Waste Sector has Substantially Reduced GHG Emissions
Overall, the waste sector is a very small contributor to total U.S. GHG emissions – less than three percent. Through technological advancements, environmental regulations and emphasis on resource conservation and recovery, the solid waste management sector decreased GHG emissions from municipal solid waste (MSW) management by more than 75 percent from 1974 to 1997 -- despite an almost two-fold increase in waste generation during that time period.[1] The EPA's 2008 U.S. GHG Inventory notes that just since 1990, landfill methane emissions have decreased by more than 16 percent.

WM is a Founding Member of the Chicago Climate Exchange
Waste Management was the first company in the solid waste industry to join with others to methodically reduce GHG emissions. As a founding member of the Chicago Climate Exchange (CCX), we meet CCX's membership commitment to decrease greenhouse gas emissions for both Phase I and Phase II of the program, which is a six percent reduction in emissions from our 1998-2001 baseline, in year 2010.

To demonstrate compliance, WM prepares an annual inventory of fuel consumption-related CO_2 emissions per the CCX Rules. Since 2004 WM has annually reported to the CCX our U.S. CO_2 emissions from fuel consumption, as well as waste combustion at our wholly-owned waste-to-energy facilities. This includes CO_2 from combustion of fuel in our U.S. operated collection vehicles and stationary facilities, small quantities of supplemental fossil fuel consumed by our waste-to-energy plants, and combustion of non-biogenic materials (primarily plastics) contained in the waste burned in our waste-to-energy plants. CCX members' annual inventories are third-party audited by the Financial Industry Regulatory Authority (FINRA) at the direction of CCX, and then certified.

Initial inventorying in California. WM joined the California Climate Action Registry (CCAR) in 2006 to pilot greenhouse gas inventorying by voluntarily measuring and reporting emissions from all of our California operations. Waste Management was the first solid waste company to join CCAR and was recently

[1] K. Weitz et al., The Impact of Municipal Solid Waste Management on Greenhouse Gas Emissions in the United States, Journal of Air & Waste Management Association, Volume 52, September 2002.

designated a “Climate Action Leader” by CCAR. As a member of CCAR, we reported our 2006 direct CO_2 emissions from mobile and stationary source fuel consumption, and indirect CO_2 emissions from electricity use that occurred in the State of California in accordance with CCAR quantification and reporting practices. The 2006 emissions report was third-party verified and accepted by CCAR in May 2008. Our 2007 emissions inventory is undergoing verification.

WM is voluntarily reporting to CCAR GHG emissions from our California landfills, using the Solid Waste Industry for Climate Solutions (SWICS) protocol developed by SCS Engineers[2], which we have shared with state regulators, the U.S. EPA, The Climate Registry, CCAR and the Subcommittee. The protocol presents an in depth literature review and makes recommendations on refining current landfill emissions models. It replaces default values for landfill gas collection efficiency and methane oxidation in existing EPA models with ranges, and thus better accounts for effects of climate, landfill design and landfill cover types. The protocol represents a first step in refining existing EPA models and protocols to improve landfill GHG emission estimation. The protocol has been accepted by TCR for inclusion in guidance to be provided, when finalized, to local governments to use in reporting emissions from landfills.

WM also voluntarily reported to CCAR:

- Estimated avoided emissions associated with renewable power production at our California landfill gas to energy projects and our biomass plant;
- GHG reductions associated with the recycling of municipal solid waste materials processed by WM operations in California; and
- Estimated annual carbon sequestration in our California landfills.

These results are publicly available at http://www.climateregistry.org/CARROT/public/reports.aspx under “Waste Management.”

Company-Wide WM Greenhouse Gas Inventory

Our participation in CCX and CCAR has been a useful prelude to developing a company-wide greenhouse gas inventory, or as we are calling it, our company carbon footprint. In anticipation of state and federal regulation and in order to understand and disclose our carbon footprint, in December 2007 WM launched a two-year project using a multi-disciplinary team to inventory our 2009 emissions to be ready for voluntary or mandatory reporting in 2010. Once WM has completed its carbon footprint, we will be able to use the information to further develop GHG management and reduction strategies.

Inventorying GHG emissions is a big task for a large and complex company like Waste Management, which has a total of approximately 2,500 facilities and about 22,000 collection and transfer vehicles. The project team is applying the

[2] SCS Engineers, Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, methane Oxidation and Carbon Sequestration in Landfills, Prepared for Solid Waste Industry for Climate Solutions (SWICS), Version 2.2, Revised January 2009

experience gained through membership in the CCX and voluntary GHG reporting in California. The team is identifying WM sources of GHG, calculating GHG emissions, and – where no methods exist – developing new protocols reflecting the state-of-the-art thinking on the most accurate, available GHG estimation methods.

The WM team is well on the way to meeting our goal of collecting and calculating our 2009 GHG emissions throughout this year and reporting them in 2010. The team organized itself around four major tasks, which have been largely accomplished:

1. Identifying all WM sources of GHG, and identifying existing or developing new protocols for measuring their emissions;
2. Developing the organizational structure for reporting emissions from individual facilities, up to the company as a whole, and identifying internal means to collect emissions data;
3. Benchmarking, selecting and configuring a software tool for managing and reporting WM emissions data, which we have named Climate Care; and
4. Communicating to internal and external stakeholders about what we are doing, and developing training for WM staff who will be involved in data collection.

This year the team's focus will be to provide training and to work with WM field personnel to collect, document and quality assure our 2009 emissions information, upload the data into our Climate Care software and calculate our carbon footprint in early 2010.

For each source category in our inventory we have identified auditable data resources, for example fuel and utility invoices that have been subject to accounting audits. While we are preparing an inventory that can support third-party verification, we believe that third-party verification is unnecessary in a mandatory federal reporting program. There is no precedent for third-party verification in any federal environmental statute under which we operate. We do, however, support third-party verification of greenhouse gas offsets, which are tradable commodities with direct financial value.

The protocols and emission calculation methodologies we will employ for most of our GHG sources are those developed by The Climate Registry in conjunction with CCAR. For indirect emissions from electricity use, we will use monthly invoices to identify usage in kilowatts and calculate emissions using emission factors from U.S. EPA's eGrid table that provides information on the fuel mix used by electric utilities on a state-by-state basis.

To calculate CO_2 emissions from burning fossil fuels in our vehicles and in stationary sources at our facilities, we will use centralized company-wide fuel purchase data and monthly invoices to calculate the amount used of each fuel

type, along with the TCR protocol and U.S. and Canadian tables for calculating the carbon content of each type of fuel used.

On an annual basis we will use stack-testing information along with waste characterization data to calculate CO_2 emissions from our waste-to energy facilities. Further, testing of stack gas from waste-to-energy plants using ASTM Standards D-6866 can determine precisely the percentage of carbon dioxide emissions attributable to biogenic and non-biogenic sources, so that we can differentiate the two for inventory accounting purposes under the TCR protocol.

WM emissions from use of refrigerants and high voltage equipment will be estimated at the end of 2009 and a more detailed inventory process developed for use in 2010.

On an annual basis, WM will be calculating the biogenic CO_2 emissions from landfill flares and landfill gas fired engines and turbines, as well as calculating fugitive emissions of biogenic CO_2 and methane using the SWICS protocol. TCR has recognized the SWICS protocol as additional guidance that may be used by TCR members to report landfill emissions in a protocol due to be published for public comment in the near future. In addition, WM will calculate the carbon sequestration attributable to the portion of annual receipts of biogenic waste that will not decompose in the landfill to produce methane. Inclusion of landfill carbon sequestration as an anthropogenic sink is consistent with both the UN Intergovernmental Panel on Climate Change (IPCC) and U.S. EPA national inventory practices, which account for carbon sequestration of undecomposed wood products, food scraps and yard trimmings disposed of in landfills. Both entities consider carbon sequestration to be an integral component of the landfill carbon mass balance calculations. We have recommended that EPA incorporate carbon sequestration into the landfill GHG emissions calculation methodology it eventually adopts for site-specific federal GHG reporting.

Lessons Learned:

Estimating fugitive landfill emissions is still a work in progress

While modeling aggregated landfill emissions across the U.S. using national default assumptions is possible, estimating individual landfill emissions is still a "work in progress" and not yet ready for site-specific or entity-based mandatory inventorying. A broadly accepted protocol for estimating the carbon mass balance of landfills does not yet exist. However, Waste Management and other landfill operators, along with the State of California and the EPA Office of Research and Development are investing significant resources to refine and improve existing models based on site-specific data.

WM along with other public and private owner/operators of landfills funded development of the SWICS protocol by SCS Engineers. The protocol represents

a first step in refining existing EPA models and protocols to improve landfill GHG emission estimation.

As a second step, WM is conducting field emissions testing using tunable diode lasers and flux boxes, to measure landfill gas (LFG) emissions under a variety of conditions including: slopes and flat surfaces; daily cover and active working face; intermediate cover; final cover (with and without a geomembrane); and to measure seasonal variations in methane oxidation and capture efficiency. Ultimately, WM hopes to develop a database that describes methane emissions over the range of conditions one finds at both operating and closed landfills using field-validated numbers instead of uncertain models. The multiyear testing program will evaluate a minimum of ten cover types over a minimum of two seasons. Concurrently, WM and other waste sector members have also volunteered sites and are cooperating with research being conducted by Dr. Jean Bogner for the California Energy Commission. Additionally, WM and Veolia conducted field research for a comparative analysis of several landfill methane estimation techniques (flux box, tracer gas, micrometeorological, plume mapping, DIAL measurements). Results from this research initiative will be reported in 2009. The EPA's Office of Research and Development participated in the research with us and we are discussing further work with them under a cooperative agreement.

Finally, researchers at Florida State University working with WM are developing a model to evaluate methane oxidation in landfill cover. The FSU model will represent the physical and chemical processes in cover that control emissions and oxidation. This will provide a tool that will allow the design and operation of landfill cover systems, in concert with gas collection systems, to minimize emissions. It may also prove acceptable for use as an emissions inventory tool in a year or two once field validation is accomplished.

A great deal of research is underway or planned for the next two years that will be enormously valuable to EPA and the waste sector in better understanding the estimation and control of landfill methane and CO_2 emissions. We have urged the Agency to consider waiting until after the results of this research can be used to develop more refined emissions estimation methods before requiring landfills to inventory site-specific GHG emissions as part of a federal mandatory reporting program.

A Phased Approach to Inventory Development is More Workable

In our GHG inventory efforts from 2006 to date, WM has learned that developing a complete and accurate GHG inventory requires building an efficient, accurate and verifiable data collection system and identifying or devising reliable, scientifically accurate emission calculation protocols. Both efforts take time, particularly for organizations with a large number of diverse GHG emission sources. We believe a phased approach to inventorying that allows an organization to focus on reporting one GHG, or emissions from a selected set of

sources in the first 2-3 years will allow an organization to develop the tools necessary to transition to full GHG reporting thereafter. Both TCR and CCAR recognize the need for a transitional period and make it available to their members to allow reporters to gain the knowledge and develop the tools necessary to comply with the full complement of the registries' requirements. We recommend that a federal mandatory reporting program, when implemented, incorporate a similar transition period.

Thank you for this opportunity to share with you this summary of our programs and efforts relating to GHG emissions. I will be pleased to try to answer any questions that you may have.