Energy-from-Waste Emissions

Covanta WHITE PAPER

Like all combustion processes (e.g. cars, trucks, fossil-fuel power plants, landfill gas to energy) and nearly all waste management processes (e.g. landfilling, composting, anaerobic digestion, recycling), Energy-from-Waste (EfW) facilities have air emissions. To minimize emissions, EfW facilities employ sophisticated air pollution control equipment. Emissions are monitored both continuously and with periodic testing. Due to combustion and emissions control, 99.9% of what is coming out of the stack are normal components of air, including water vapor, nitrogen, oxygen, and CO_2.

The installation of the sophisticated air pollution control equipment was primarily driven by the Clean Air Act Amendments of 1990 and its Maximum Available Control Technology (MACT) requirement. Following implementation of these requirements, emissions from the industry dropped dramatically, both as the result of closure of outdated facilities and the installation of new air pollution control equipment (Table 1). In reviewing the data, the U.S. EPA noted that "[t]he performance of the MACT retrofits has been outstanding."

Table 1. Change in U.S. EfW Emissions, 1990-2005[1]

Dioxins & Furans	▼99%
Mercury	▼96%
Cadmium	▼96%
Lead	▼97%
Particulate Matter	▼96%
Hydrochloric acid (HCl)	▼94%
Sulfur Dioxide (SO_2)	▼88%
Nitrogen Oxides (NO_x)	▼24%

Emissions from Covanta's facilities ***continue*** to decrease. Since the start of the company's sustainability program in 2007, emissions of pollutants at Covanta operated facilities, as measured over three-year period from 2015-2017, have decreased by up to 68% (Figure 1). As a result, Covanta's facilities operate well below federal standards (Figure 2).

Figure 1. Covanta Emissions Reductions Since 2007

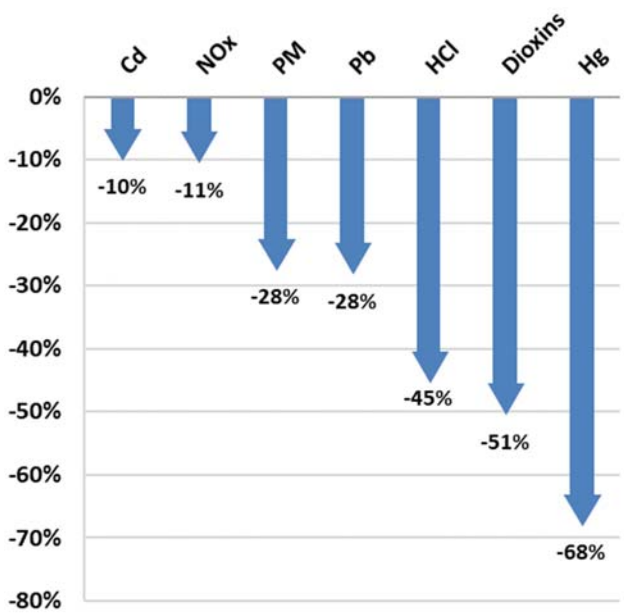
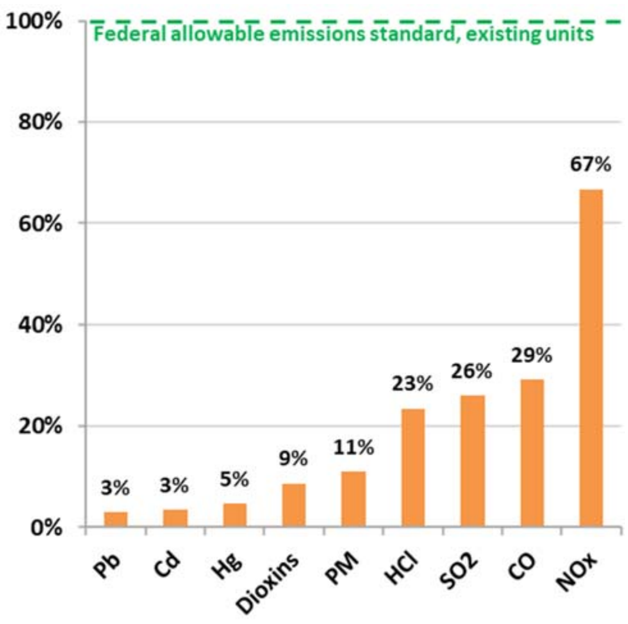


Figure 2. Covanta 2015-2017 U.S. EfW Emissions compared to federal standards



How Are Emissions Measured and Monitored?

Air emissions from EfW facilities are heavily regulated by both the U.S. EPA and state environmental agencies. Emissions from EfW facilities are determined both through routine stack tests (performed at least once a year) and through continuous emissions monitors (CEMS). CEMS monitor flue gases continuously for carbon monoxide (CO), nitrogen

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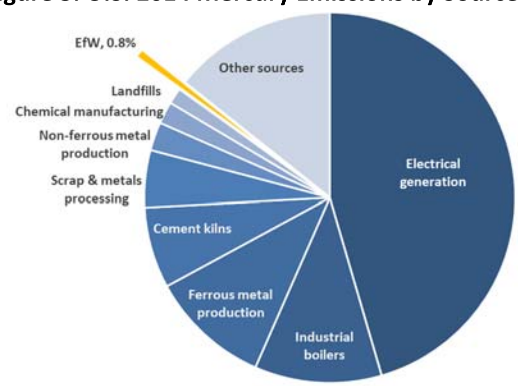
oxides (NO_x), sulfur dioxide (SO_2), opacity, and carbon dioxide and/or oxygen. Facility operators monitor these parameters and adjust as needed to ensure proper operation and compliance. For example, monitoring CO levels continuously allows operators to respond to changes in the waste (e.g. wetter than normal waste that may have been collected during a rainstorm) to ensure complete and efficient combustion.

Other regulated pollutants are checked through a rigorous stack testing program performed by a regulator-approved third-party. The operating parameters under which the stack test is conducted (e.g. activated carbon addition rate, steam flow rate) set the standard for the facility's operation until the next stack test is completed. Operating the combustion process and air pollution control equipment in accordance with these standards ensures compliance. These tests are scheduled well in advance of their performance, and contrary to myth, facility operators do not remove plastics from the waste stream or alter operations in any way to improve emissions performance during the test.

Are EfW Facilities Major Sources of Mercury & Dioxins in the U.S.?

No. Some opponents to EfW facilities cite old data or retain a perception of the industry formed prior to the advent of modern air pollution control. In fact, according to recent peer-reviewed research by Columbia University scientists, the total dioxin emissions of all U.S. EfW plants in 2012 represented less than one-tenth of one percent of total sources of dioxin.[2] Similarly, EfW facilities are a minor source of mercury in the U.S., representing just 0.8% in 2014, roughly half that emitted from landfills (Figure 3). Scrap metal processing and recycling emits 7 times as much mercury as U.S. EfW facilities.[3]

Figure 3. U.S. 2014 Mercury Emissions by Source



What About Nanoparticles?

The vast majority of particulate matter, including nanoparticulate is removed via the air pollution control (APC) equipment installed at EfW facilities. Nanoparticulate that are emitted agglomerate relatively quickly into larger particles, increasing in size and correspondingly decreasing in number within minutes.[5] Other local sources of nanoparticulate are likely more significant. Recent published studies have concluded that EfW's emissions were negligible relative to typical exposures in urban environments[6] and highways.[7] One of the peer reviewed papers concludes that emissions of ultrafine particles from EfW stacks are lower than one single high-duty vehicle.[8]

"The [nanoparticle concentrations] produced by MSW incineration plants are generally reported similar to rural background"[4]

References

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