Barron County Waste-to-Energy and Recycling Facility (Almena, Wisconsin)

City of Ames, Iowa

City and County of Honolulu, Hawaii

City of Huntsville Solid Waste Disposal Authority (Huntsville, Alabama)

County Sanitation Districts of Los Angeles County (Whittier, California)

ecomaine (Portland, Maine)

Kent County Board of Public Works, Waste-to-Energy Facility (Grand Rapids, Michigan)

Lancaster County Solid Waste Management Authority (Lancaster, Pennsylvania)

Lee County Public Utilities Department (Lee County, Florida)

Marion County, Oregon

Mid-Maine Waste Action Corp. (Auburn, Maine)

Northeast Maryland Waste Disposal Authority (Baltimore, Maryland)

Solid Waste Authority of Palm Beach County (Palm Beach County, Florida)

Spokane Regional Solid Waste System (Spokane, Washington)

Wasatch Integrated Waste Management District (Layton, Utah)

York County Solid Waste Authority (York, Pennsylvania)

** In coordination with the U.S. Conference of Mayors/ Municipal Waste Management Association*

LOCAL GOVERNMENT COALITION FOR RENEWABLE ENERGY

America's Need for Clean, Renewable Energy: THE CASE FOR WASTE-TO-ENERGY

- Waste-to-energy (WTE) is one of the most environmentally protective sources of renewable energy.
- In fact, the World Economic Forum's report, *Green Investing – Towards a Clean Energy Infrastructure*, recognizes **WTE as one of eight "key renewable energy sectors" and "particularly promising in terms of . . . abatement potential" for carbon emissions**. p. 27, http://www3.weforum.org/docs/WEF_IV_GreenInvesting_Report_2009.pdf.
- Nevertheless, WTE is a largely untapped resource in the United States – only 7.6% of our municipal solid waste (MSW) is directed to WTE while 63.5% is landfilled. *See Generation and Disposition of Municipal Solid Waste (MSW) in the United States – A National Survey*, p. 19, http://www.seas.columbia.edu/earth/wtert/sofos/Dolly_Shin_Thesis.pdf (2014); *see also* http://www.biocycle.net/2010/10/26/the-state-of-garbage-in-america-4 (estimating WTE-processed MSW in the U.S. at 7%).

***Here are the facts*:**

WTE HELPS MITIGATE CLIMATE CHANGE – WTE's role in reducing greenhouse gas (GHG) emissions is widely recognized:

- Important context here is the widespread recognition that "because of its potency as a GHG and its atmospheric life, **reducing methane emissions is one of the best ways to achieve a near-term beneficial impact in mitigating global climate change**." *Emission Guidelines, and Compliance Times, and Standards of Performance for Municipal Solid Waste Landfills; Advance Notice of Proposed Rulemaking (ANPRM)*, 79 Fed. Reg. 41772, 41774/1 (July 17, 2014).
- As EPA's solid waste management planning methodology recognizes, WTE reduces GHG emissions in three ways by (i) generating electricity and/or steam without having to use fossil fuel sources, (ii) avoiding the potential methane emissions that would result if the same waste was landfilled, and (iii) recovering ferrous and nonferrous metals, which avoids the additional energy consumption that would be required if the metals were produced from virgin ores. *Is it Better to Burn or Bury for Clean Electricity Generation?*, pp. 1711-14, http://pubs.acs.org/doi/pdf/10.1021/es802395e (hereafter "*Better to Burn or Bury*"); *see also Life After Fresh Kills*, Part B, Summary and pp. B-23 to B-32, http://www.seas.columbia.edu/earth/EEC-SIPA-report-NYC-Dec11.pdf.
- In fact, use of EPA's model for determining the life-cycle GHG emissions from alternative MSW management methods shows that **for every ton of MSW that is directed to WTE rather than landfilled, between 1.62 and 4.1 tons of GHG emissions are avoided**.[1]

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- Consistent with EPA's analysis, the Intergovernmental Panel on Climate Change (IPCC), a leading forum of independent scientific experts on climate change, **emphasizes WTE's dual benefits of (i) offsetting fossil fuel combustion and (ii) avoided landfill methane emissions**. *Mitigation of Climate Change*, p. 601, http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter10.pdf.
- Similarly, the Kyoto Protocol's Clean Development Mechanism **approves WTE as a source of tradeable GHG emission reduction credits that displaces electricity from fossil fuels and avoids landfill methane emissions**. *Approved Baseline and Monitoring Methodology AM0025*, pp. 1-3, https://cdm.unfccc.int/UserManagement/FileStorage/-9WVIN7Z06A8UGLFPO4Y51BDMJ23QXT.
- In addition, the United Nations' November 2011 report, *Bridging the Emissions Gap*, concludes that **waste sector GHG emissions can be reduced 80% if there is significant diversion of currently landfilled waste to WTE**. *See* http:/www.unep.org/pdf/bridginggap.pdf, pp. 37-38.
- WTE's GHG reduction benefits can also be evaluated by considering an equivalent reduction in automobile emissions. If the U.S. could increase its usage of WTE from the current 7.6% to the average WTE usage rate of the EU 28, which is 27%[2], the additional reduction in annual CO_2-equivalent emissions in the U.S. would be between 122 million and 309 million tons, which is equivalent to **removing 23,600,000** to **59,700,000 passenger cars from the nation's roads** (the range reflects the difference between using a methane GWP of 34 [100-year timescale] vs. a methane GWP of 86 [20-year timescale]).[3]

MODERN WTE FACILITIES – TRUE "GREEN" TECHNOLOGY – In addition to its benefits in reducing GHGs, WTE's status as a very clean and efficient energy source is evident on many other bases:

- Reflecting state and federal requirements for the most advanced emissions control technology, WTE emissions have plummeted since the late 1980's (e.g., annual WTE emissions of dioxin have decreased by a factor of 1,000 to less than 12 grams), *Waste-to-energy: A Review of the Status and Benefits in the USA*, p. 1722[4], and WTE emissions are lower than landfill emissions for 9 of 10 major air pollutants, *Life After Fresh Kills*, *supra*, p. B-30.
- EPA's analysis shows that **WTE yields the best results (compared to landfills) in terms of maximum energy recovery and lowest GHG and criteria pollutant emissions**. *Better to Burn or Bury*, *supra*, pp. 1711-14, 1716-17.
- As a result, EPA recognizes WTE as a renewable energy source that "produce[s] 2800 megawatts of electricity with **less environmental impact than almost any other source of electricity**."[5]
- EPA's hierarchy for "integrated waste management" **recommends waste combustion with energy recovery over landfilling** (as does the European Union).[6]
- WTE's efficiency and reliability are clear as well:

- WTE recovers approximately 600 kWh of electricity per ton of waste, which is approximately **10 times the electric energy recoverable from a ton of landfilled waste**. *Better to Burn or Bury*, *supra*, p. 1714; *see also Life After Fresh Kills*, *supra*, p. B-29.
- In addition, WTE is the **paradigm example of "distributed generation"** that serves nearby load without the need for new long-distance transmission lines.
- WTE is also **base-load generation**, available 24/7 and unaffected by days that are cloudy or calm.

- It should also be noted that **GHG emissions from WTE are primarily of biogenic origin** (approximately two-thirds). *Better to Burn or Bury*, *supra*, p. 1716.
  - These emissions are already part of the natural carbon cycle because the biogenic carbon that comprises paper, food and other biomass in municipal waste is removed from the atmosphere as part of the plant growth-natural carbon cycle.
  - The remaining petrochemical-based material (approximately one-third) can also be considered renewable (it's generated year after year), but when relegated to landfilling rather than combustion with energy recovery, the result is the loss of a vast amount of valuable energy – **WTE recovers the energy equivalent of one barrel of oil from each ton of MSW**.
- Not surprisingly, The Nature Conservancy commends WTE's sound environmental protection benefits. *See Climate Change and Renewable Energy*, The Nature Conservancy, presentation to Covanta Energy, Feb. 11, 2009, p. 24 (copy on file with author); *see also Ask the Conservationist; August 2011: Can Trash Solve Our Energy Problems?* http://www.nature.org/science-in-action/science-features/ask-the-conservationist-august-2011.xml.

WTE ENCOURAGES RECYCLING – Finally, WTE is also entirely compatible with recycling:

- WTE communities **routinely outperform non-WTE communities in recycling**, with recycling rates that are typically **well in excess of the national average and in some cases lead the nation in recycling**.
- This point is confirmed by a May 2014 national survey. *See* http://energyrecoverycouncil.org/wp-content/uploads/2016/03/ERC-2014-Berenyi-recycling-study.pdf.
- Although recycling rates are driven by state policies that apply equally to WTE and non-WTE communities, **WTE communities' recycling rates are typically higher than the overall recycling rates for their respective states**. *Id.*, pp. 5, 9-11.
- In fact, the Center for American Progress describes the use of WTE, in conjunction with recycling and composting, as "a win-win-win" for the United States. https://cdn.americanprogress.org/wp-content/uploads/2013/04/EnergyFromWaste-PDF1.pdf.

RECAP AND CONCLUSIONS

► WTE – a significant source of renewable energy that substantially reduces GHG emissions by (a) displacing electric power generation from fossil fuels, (b) avoiding methane emissions

from landfill disposal of municipal waste, and (c) facilitating post-combustion recovery and reuse of ferrous and non-ferrous metals.

- ► Clean, baseload energy with very low emissions.
- ► Recovers 10 times the energy (electric power) from a ton of waste in comparison to landfill methane recovery-reuse.
- ► "Distributed" generation, i.e., energy is used where it is generated, which reduces the environmental impact and cost of transporting both waste and energy.
- ► WTE complements recycling programs rather than competing with recycling.
- ► But as is often the case with environmentally preferred alternatives, WTE can cost more (at least on a short-term and intermediate basis) **– Our communities accept the higher cost precisely because the result is better for the environment**.

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[1] *See* https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/airem.html (scroll to "Greenhouse Gases"). The cited URL refers to a 1-ton-avoided metric, which is based on a now-superseded global warming potential (GWP) value for methane of 21 times carbon dioxide on a 100-year timescale. Assessment Report 5 (2014) of the Intergovernmental Panel on Climate Change (IPCC) increases methane's GWP to 34 times CO_2 on a 100-year timescale and 86 times CO_2 on a 20-year timescale. The corresponding change in the tons-avoided metric (i.e., tons of CO_2-equivalent emissions avoided) is 1.62 tons avoided based on a 100-year timescale and 4.1 tons avoided using a 20-year timescale. Given methane's status as a potent short-lived climate pollutant, use of the 20-year timescale GWP of 86 – and the corresponding 4.1 tons-avoided metric – is more accurate. *See* 79 Fed. Reg. at 41774/1 (referring to "methane's potency as a GHG and its [12-year] atmospheric life"); *Emission Guidelines, Compliance Times, etc.*, 80 Fed. Reg. 52100, 52105/1 (August 27, 2015) (same).

[2] http://cewep.eu/information/recycling/m_1486. A portion of the 27% figure (between 0 and 5 percentage points) represents older MSW combustion facilities for which the original design did not include energy recovery. In recent years, a number of older EU facilities have been retrofitted for energy recovery (and even non-retrofitted facilities provide two of the three GHG reduction benefits that WTE facilities provide – avoided emissions of landfill methane and recovery of ferrous and nonferrous metals from post-combustion waste, i.e., avoiding the additional energy consumption that would be required to produce the same metals from virgin ores).

[3] The calculation is based on the 2011 MSW landfill disposal volume of 247 million tons shown at http://www.seas.columbia.edu/earth/wtert/sofos/Dolly_Shin_Thesis.pdf, p. 19, *supra*, and EPA data for annual CO_2-equivalent emissions per passenger car (5.18 tons). *See* https://www.epa.gov/sites/production/files/2016-02/documents/420f14040a.pdf.

[4] This document is not readily available on the internet. A copy is on file with the author.

[5] *See* http://energyrecoverycouncil.org/wp-content/uploads/2016/07/030214-EPA-letter.pdf.

[6] *Municipal Solid Waste in the United States: 2007 Facts and Figures*, p. 11, http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1001UYV.PDF.