A New Resource for the WTE Industry: The Waste-to-Energy Research and Technology Council

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Earth Engineering Center, Columbia University
Chair, WTERT
Participating Academic Groups

Earth Engineering Center, Columbia
Departments of Earth & Environmental Eng. and Civil Engineering, Columbia
Marine Sciences Research Center, SUNY
Department of Civil and Environmental Engineering, Temple
Dept. of Applied Earth Sciences, TU Delft
Sheffield University Waste Incineration Centre
Current Financial Support by:

Department of Earth & Env’l Eng. (Henry Krumb School of Mines), Columbia University

Earth Institute and Earth Eng. Center at Columbia University

IWSA (American Ref-Fuel, Covanta, Montenay, Wheelabrator)

Green Fund (Energy Answers Corp.)

Chlorine Chemistry Council

Wastes Processing Division, ASME
Quantifying the downward and upward flows of materials in the Martin Reverse Acting Grate (EEC)
Environmental Studies Regarding WTE

Collaborators: Dr. Alan Eschenroeder, Harvard School of Public Health,

Studies already conducted: Mercury, Dioxins (presented at NAWTEC 11), Estimate of greenhouse gas reduction.

Study in progress: NOx

Planned study: Flaring of landfill biogas
Study in progress: University Consortium on Advancing Beneficial Uses of Ash from Waste-To-Energy Combustion
(Progress report to be presented by Dr. Karsten Millrath at NAWTEC 11)

Participating universities: Columbia, Stony Brook, Temple
Tests with an infra red camera:

- Project proposal was submitted to NSF/EPA’s Sustainable Development Program for modeling and experimental work on WTE combustion chamber (with help of Covanta and ARF).

- Covanta Energy will provide Infra Red Camera to be installed possibly at Union County WTE for initial tests.
Mathematical modeling of WTE combustion chamber:

• The until now parallel efforts of American-fuel (ARF) and Earth Engineering Center (EEC) will be coordinated.

• Modeling of bed on grate using the FLIC program of University of Sheffield.

• Modeling of combustion chamber using the FLUENT program.

• Meeting of ARF and EEC with Sheffield University in June to discuss further development of the FLIC code.
Some results of mathematical modeling at Columbia (release of combustion heat)

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>Combustion Heat Release [kW/m^3]</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martin2D</td>
<td>31 hr 54 min 44 sec 999 msec</td>
<td>Sat Apr 26 00:26:44 2003</td>
</tr>
</tbody>
</table>

FLIC (Version 1.1) - SUWIC
Some results of mathematical modeling at Columbia (temperature in UC combustion chamber)
WTERT: Keep on the lookout for major developments in WTE technology (E.g., the SYNCOM PLUS for Arnoldstein, Austria)
Semi-vitrified bottom ash from Coburg tests of SYNCOM PLUS Process

< 8mm

< 2 mm
WTERT: Inform the General Public

NY Academy of Sciences Public Seminar (Nov. 18, 2002)

• BioCycle Jan. 2003 article, where “WTE” is separated from “landfills” instead of lumping them together and calling them “Disposal”, as in current EPA/Franklin reports.

• Informing major environmental organizations, such as NRDC and EDF, of the scientific facts re WTE.
ATTAINING NATIONAL PROMINENCE
(BioCycle, January 2003)

WASTE GENERATION AND RECYCLING RATES

ANALYZING DATA IN STATE OF GARBAGE IN AMERICA, EPA REPORTS

Researchers at Columbia University analyze why there are differences between BioCycle and EPA statistics concerning waste generation and amounts recycled.

Nickolas J. Themelis

their office, or when they go to a restaurant. The artificial differentiation between "residential" and "commercial" MSW in New York City can result in misleading comparisons with other cities. For example, a historical analysis of the stream collected by DOS, reported by the New York Times in November 2002, showed that the generation of residential MSW in the city had remained nearly constant in recent years at about 0.5 tons per capita. In contrast, the EPA report, Municipal Solid Waste in the U.S.: 2000 Facts and Figures — conducted by Franklin Associates — showed that the average U.S.
Highlighting the contribution of WTE community to Waste Management

WTERT is asking EPA to do the same as of next annual review of MSW Management in the U.S.
Inform Everyone who Wants to be Informed about the benefits of IWM:


- Provided Frequently Asked Questions subpage in WTERT web.

- Will provide full copies of WTERT PowerPoint presentations on various subjects (e.g., Dioxins, Energy from MSW, etc.). So anyone can use in own communities, meetings with government, etc.

- Publications/presentations in U.S. and international journals/meetings (e.g. Waste Management World, ISWA Journal, TMS, ASME, BioCycle, etc.).
### Environmental advantage vs. landfilling: Greenhouse gas reduction

**Table 4. Greenhouse Gas Reduction by combusting instead of landfilling**

129 million tons of MSW in 1997

<table>
<thead>
<tr>
<th>Source of greenhouse gas reduction</th>
<th>Tons of carbon equivalent Per ton MSW</th>
<th>Million tons of carbon equivalent (U.S. total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generating electricity by combustion of MSW</td>
<td>0.17</td>
<td>21.93</td>
</tr>
<tr>
<td>Avoiding methane emissions at landfill</td>
<td>0.18</td>
<td>23.22</td>
</tr>
<tr>
<td>Minus loss in thermal energy of captured methane at landfills</td>
<td>-0.02</td>
<td>-2.93</td>
</tr>
<tr>
<td>Total GHG reduction</td>
<td>0.33</td>
<td>42.22</td>
</tr>
</tbody>
</table>

Globally: 80 million tons of carbon equivalent emitted from waste disposal.
In closing:

• It is well known that a company, and also an industry, can become what it wants and plans to be.

• There is little question that WTE is part and parcel of “Sustainable Development” and that it offers significant advantages over the other method of MSW disposal.

• One of these advantages is that WTE is the low-hanging fruit in reducing carbon emissions and conserving non-renewable resources.

• The WTERT Council aims to bring together and develop further intellectual resources in academia and in the WTE industry and effectively become the research resource of the WTE industry.