

November 17, 2007

Pasco County Commissioners
(email correspondence)

Dear Commissioners:

It has come to my attention that Pasco County is considering two different means of managing the County's increasing quantities of municipal solid waste (MSW). One is to expand the waste-to-energy facility (WTE). The other is to construct a materials recovery facility (MRF) and a bioreactor landfill for the residues.

The purpose of this correspondence is to point out data that show that the latter option is preferred for two major reasons. The first is that the energy saved by recovering the materials in the MRF is far greater than that obtained in the WTE facility. The second is that greenhouse gas emissions are much greater for WTE than for the MRF and bioreactor. The data that I will cite are from EPA "Solid Waste Management and Greenhouse Gases," available at: www.epa.gov/climatechange/wycd/waste/downloads/greengas.pdf.

For all components of MSW, a life-cycle analysis (see Table I, based on the EPA data) of the energy required for replacing consumed materials with virgin ones shows a *net energy loss* relative to recycling the materials, by factors of up to five, depending on the material. In other words, the energy gained from the fuel is less than the extra energy required to replace the materials with virgin ones.

Furthermore, pollution of water and air are far greater for producing virgin materials to replace those consumed for fuel than for recycling the materials. For paper, recycling requires 80% less water; air pollution is 95% less. Destruction of the Fenholloway River and pollution of the air in Palatka are notorious examples for paper mills. Plastics are even worse and are mostly made from non-renewable fossil fuel. Furthermore, recycling industries provide many jobs that can not be sent off shore, while WTE provides only a few.

The EPA analyzed greenhouse gas emissions (GHGE) using different management methods for MSW, including source reduction, recycling, composting, landfilling with methane (CH₄) recovery (such as occurs in a bioreactor landfill), and combustion. The prioritized order of management options for reducing GHGE is shown in Table II.

For all management options evaluated by EPA for reduction in GHGE, combustion was next to last, superior to only landfilling *without* CH₄ recovery. Landfills with CH₄ recovery used as fuel for electric generation have lower GHGE than WTE plants. The EPA report gives some specific examples for reducing GHGE that clearly show that source reduction and recycling are several times as effective as WTE. (You may calculate your own carbon footprint and the environmental benefits of recycling using the calculator www.epa.gov/climatechange/emissions/ind_calculator.html.)

The report states, “Different wastes and waste management options have different implications for energy consumption, CH₄ emissions, and carbon sequestration, Source reduction and recycling of paper products, for example, reduce energy consumption, decrease combustion and landfill emissions, and increase forest carbon sequestration.”

The EPA document has the following to say about the proposed bioreactor landfill: “Bioreactors are a form of controlled landfilling with the potential to provide reliable energy generation from solid waste, as well a significant environmental and solid waste management benefits. The concept is to accelerate the decomposition process of landfill waste through controlled additions of liquid and leachate recirculation, which enhances the growth of the microbes responsible for waste decomposition. The results is to shorten the period of landfill gas generation, thereby rendering projections of landfill gas generation rates and yields that are much more reliable for landfill gas recovery.”

Thus, I urge you to take advantage of the proposal to construct a MRF and bioreactor landfill as the most effective environmentally and economically beneficial method of managing MSW.

Sincerely,

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Brief Biographical Information: E. Dwight Adams is Professor of Physics Emeritus, University of Florida where he taught physics and did research for 42 years. He has been active in solid waste issues for 25 years, having written numerous technical articles, lectured, and served as expert witness in various hearings. He served as advisers on solid waste to Senator George Kirkpatrick and Representative Sidney Martin during enactment of the 1988 solid waste act. Currently, he is serving as an energy expert on Alachua County’s Energy Conservation Strategies Commission.

Table I: Energy Required Using Recycled and Virgin Content vs WTE

	<u>Al</u>	<u>Steel</u>	<u>Plastics</u>	<u>Paper</u>	<u>OCC</u>
Virgin (10 ⁶ Btu/t)	213.27	36.18	32	39.92	26.44
Recycled	15.25	15.81	4.25	22.03	12.6
Recycling saves	198.02	20.37	27.75	17.89	13.84
Energy content	<0	<0	30	16	14
WTE (19% eff)	0	0	7.6	3.42	2.66

Notes: OCC is the industry label for corrugated cardboard. "Virgin" is the energy required in million Btu/ton for producing the indicated materials from virgin input. "Recycled" is the same quantity using recycled input. "Recycling saves" is the difference in these two. "Energy content" is the maximum energy that could be obtained per ton of materials. "WTE" is the energy obtained in combustion in WTE facilities that have 19% efficiency.

Table II: Prioritized order of Management Options for GHG Emissions

<u>Management Option</u>	<u>GHG Emissions (MTCE/t)</u>
1. SOURCE REDUCTION	-1.0 (approximate)
2. RECYCLING + ANAEROBIC DIGESTION	-1.1 "
3. RECYCLING + COMPOSTING	-1.0 "
4. LANDFILLING W CH ₄ RECOVERY FOR ENERGY	-0.08
5. COMBUSTION (19% efficient)	-0.03
6. LANDFILL (with no CH ₄ recovery or flaring)	0.12

Notes: GHG emissions in (MTCE/t) metric tons carbon equivalent per ton of waste. The EPA convention for GHG emissions is – for reduction in emissions, + for increased emissions; thus the preferred option is that with greatest – number. Management Option 2 is equivalent to that for the proposed MRF and bioreactor landfill in which anaerobic digestion produces methane (natural gas) for energy.
