

May 14, 2010

Mr. Ted Rattray
President
Belcorp Environmental Services, Inc.
Suite 900
1508 West Broadway
Vancouver, BC V6J 1W8



Dear Mr. Rattray:

As you requested, I have prepared the attached scientific feedback to Metro Vancouver's interpretation and response to Sound Resource Management Group's research findings.

Respectfully Submitted,

Jeffrey Morris, Ph.D. – Economics
Sound Resource Management Group, Inc.
2217 60th Lane NW
Olympia, WA 98502

360-867-1033
www.zerowaste.com

Metro Vancouver interpretation and response (May 7, 2010) to SRMG research findings, and subsequent SRMG scientific feedback (May 14, 2010)

TOPIC	METRO VANCOUVER (MAY 7, 2010)		SOUND RESOURCE MANAGEMENT GROUP (MAY 14, 2010)
	<i>interpretation</i>	<i>response/comments</i>	<i>scientific feedback to Metro Vancouver's comments</i>
1. Biogenic Carbon Storage in Landfills	Includes carbon storage; this suggests that some biogenic carbon 'never' decomposes.	United Nations IPCC position is to <u>not</u> include storage of biogenic carbon and report only as an information item. ¹ Neither ICLEI ² nor the California Air Resources Board ³ includes carbon storage in landfills.	<p><u>Fact:</u> Metro Vancouver's comment is only partially correct.</p> <p>SRMG's report does not have a "forever" time frame; thus it does not suggest that some biogenic carbon "never" decomposes. SRMG's report does take into account the storage of biogenic carbon in products manufactured from forestry resources and other biogenic wastes such as yard debris. For example, when trees are harvested to manufacture paper and paperboard, dimensional lumber, engineered wood, and other wood products, these products provide ongoing storage for a significant portion of the carbon that was sequestered during growth of the harvested trees.</p> <p>The Intergovernmental Panel on Climate Change (IPCC) includes landfill carbon storage as a carbon sink: "<i>Because landfills function as relatively inefficient anaerobic digesters, significant long-term carbon storage occurs in landfills, which is addressed in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.</i>"⁴</p> <p>The IPCC goes on to say: "<i>Since lignin is recalcitrant and cellulosic fractions decompose slowly, a minimum of 50% of the organic carbon landfilled is not typically converted to biogas carbon but remains in the landfill... Carbon storage makes landfilling a more competitive alternative from a climate change perspective, especially where landfill gas recovery is combined with energy use.</i>"⁵</p> <p>Thus, in an LCA comparing MSW landfills and WTE facilities, it is necessary to account for the continued long-term storage of this biogenic carbon in landfills. Ignoring carbon storage would bias the life cycle analysis by not accounting for the substantial biogenic carbon that is released to the atmosphere when wood products and other cellulosic containing products are combusted in a WTE facility versus being stored in a landfill. Ignoring the storage of biogenic carbon in a landfill would be a critical climate accounting error of the type described recently in an article in Science.⁶ Furthermore, EPA gives credit for storage of biogenic carbon in landfills.⁷</p>

TOPIC	METRO VANCOUVER (MAY 7, 2010)		SOUND RESOURCE MANAGEMENT GROUP (MAY 14, 2010)
	<i>interpretation</i>	<i>response/comments</i>	<i>scientific feedback to Metro Vancouver's comments</i>
2. Fossil Carbon Storage in Landfills	Landfills given credit for storage of fossil carbon (e.g. plastics); suggests storing plastics results in net reduction of lifecycle GHG emissions.	US EPA does not give credit for storing fossil carbon in landfills. Plastic in a landfill represents simply a transfer from one carbon stock to another carbon stock. ⁸	<p><i>Fact: Metro Vancouver's comment is not correct. SRMG's report did not give landfills credit for storage of fossil carbon.</i></p> <p>SRMG's report did take into account the greenhouse gas emissions when waste materials containing fossil carbon are burned in a waste-to-energy (WTE) facility. The accepted and conventional methodology for accounting for the carbon dioxide (CO2) emissions from combustion of fossil-based materials is to count those CO2 emissions as greenhouse gases (GHGs). Thus, for fossil-based materials in Metro Vancouver's municipal solid waste (MSW) disposal stream, SRMG counted the CO2 emissions from burning these fossil-based wastes as GHG emissions from a WTE facility.</p>
3. Emissions from New WTE Facilities	All emissions were based on existing emission levels.	Metro Vancouver is committed to using state-of-the-art technology in all new facilities. Emissions are based on existing, modern reference facilities.	<p><i>Fact: Metro Vancouver's comment is not correct. SRMG's report used emissions for a new WTE facility that are substantially lower than emissions from the existing Burnaby WTE facility.</i></p> <p>Existing stack emission levels for the Burnaby WTEF are exhibited in the column labeled Metro Vancouver WTEF in Table 4-1 on page 28 in the final report <i>Environmental Life Cycle Assessment of Solid Waste Management: Evaluation of Two Waste Disposal Scenarios for the Metro Vancouver Region</i> prepared in 2008 for Metro Vancouver by The Sheltair Group.</p> <p>SRMG's report used the stack emissions per ton of MSW combusted in a new WTE that are exhibited in that same Table 4-1. Thus, the SRMG report had SO2 emissions 61% lower than existing emission levels per tonne combusted; HCL emissions 80% lower; and NOx emissions 81% lower than existing.</p> <p>Furthermore, SRMG's February 18 letter report⁹ to Belkorp comparing performance criteria for waste management facilities is based on WTE stack emissions estimates listed in Table 10 of Appendix A in AECOM Canada's report <i>Management of Municipal Solid Waste in Metro Vancouver – A Comparative Analysis of Options for Management of Waste After Recycling</i> prepared for Metro Vancouver in 2009.</p> <p>Those stack emissions for SOx, NOx, PM₁₀ and CO, appropriately scaled to the annual combustion tonnage, are also lower than existing emissions levels. Emissions of mercury and dioxins/furans are higher than Burnaby WTE emissions exhibited in Table 4-1 of the Sheltair report.</p>

TOPIC	METRO VANCOUVER (MAY 7, 2010)		SOUND RESOURCE MANAGEMENT GROUP (MAY 14, 2010)
	<i>interpretation</i>	<i>response/comments</i>	<i>scientific feedback to Metro Vancouver's comments</i>
4. Steam/Heat Generated and Sold by WTE	Very low estimates- only about 1.8 times existing WTE facility output.	Any new local facility will include combined heat and power production optimized for district heating. A new facility would generate about 4.5 times the steam sales of the existing WTE facility ¹⁰ (note steam sales only represent about ¼ of total steam generated).	<p><u>Fact:</u> Metro Vancouver's comment is only partially correct.</p> <p>SRMG assumed in its report and letter that sales of steam/heat at a new WTE would be at the same rate per tonne as existing Burnaby WTE sales. For a 500,000 tonne per year new WTE this would amount to sales 1.8 times higher because the new facility would combust 1.8 times more MSW.</p> <p>Thus, steam/heat sales from a new WTE sized to combust 500,000 tonnes annually, along with steam/heat sales from the existing Burnaby facility, would be nearly triple current sales. Energy markets would need to substantially expand beyond their current level at the Burnaby WTE facility in order for this steep increase in steam/heat sales to actually be achieved. Inasmuch as Metro Vancouver has not indicated site or sites for a new WTE facility or facilities, nor has Metro Vancouver identified where new energy markets might be located and what their size is, even this steep increase is highly speculative.</p>
District Energy Markets	Suggests district energy markets would be limited to existing level at the Burnaby WTE facility.	District energy systems are common as demonstrated by 2,500 systems in the U.S. alone, operating over 100 years and serving more than 4.3 billion sq.ft. of building space. On average about 40 million sq ft of new customer space has been added per year over the past five years in the U.S., including 38 new downtown systems. "Achieving 80 or 90 percent fuel efficiency and cutting greenhouse gas emissions is neither a technology problem nor a capital problem." ¹¹	
5. Metal Recovery from WTE	Not accounted for.	Recovery of metals avoids significant GHG emissions associated with mining and manufacturing of new metal. Metal recovery is common practice in most WTE facilities, including the existing facility in Burnaby.	<p><u>Fact:</u> Metro Vancouver's comment is not correct. SRMG's report included the life cycle benefits from recovery and recycling of 70% of ferrous metals in MSW combusted in a WTE facility.</p>

TOPIC	METRO VANCOUVER (MAY 7, 2010)		SOUND RESOURCE MANAGEMENT GROUP (MAY 14, 2010)
	<i>interpretation</i>	<i>response/comments</i>	<i>scientific feedback to Metro Vancouver's comments</i>
6. Future Energy Offsets	Assumed energy offsets based on natural gas through 2014 and renewable after 2014.	Future energy is likely to continue to be a mix of natural gas for heating, and increasingly clean electricity from renewable sources. By incorrectly assuming no future natural gas offsets, energy recovery would yield no avoided emissions.	<u>Fact:</u> Metro Vancouver's comment is only partially correct. SRMG's report assumed steam and hot water sold by existing and new WTE facilities would displace natural gas used in boilers and furnaces for current and future years included in the SRMG report time period. Metro Vancouver is correct that SRMG's report assumed electricity sold by existing and new WTE facilities would offset electricity provided by natural gas fueled power generation facilities through the middle of the current decade, and renewable electricity after that. This assumption regarding electricity offsets is consistent with BC Hydro's plan to be carbon neutral in its energy generation by the middle of the current decade.
7. Landfill Gas converted to LNG	Assumed landfill gas generated by 500,000 tonnes of MSW would be converted into LNG.	In the absence of a proposal from Belcorp, feasibility and cost are unknown. According to the US EPA, LNG is an emerging technology with only three projects listed as operational in the U.S. as of October 2008. ¹²	<u>Fact:</u> Metro Vancouver's comment is correct. SRMG's report does assume that methane in landfill gas (LFG) captured from MSW sent to an out-of-region landfill will be converted to LNG beginning in 2014.

¹ IPCC. "2006 IPCC Guidelines for National Greenhouse Gas Inventories". 2006. Available at: www.ipcc-nggip.iges.or.jp/public/2006gl/vol5.html

² ICLEI. "Local Government Greenhouse Gas Emissions Analysis Protocol". 2009. Available at: www.iclei.org/index.php?id=ghgprotocol

³ California Air Resources Board. "Local Government Operations Protocol: For the quantification and reporting of greenhouse gas emissions inventories". 2008. Available at: www.arb.ca.gov/cc/protocols/protocols.htm

⁴ Intergovernmental Panel on Climate Change, *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, New York, 2007, page 589. See Box 10.1 on pages 591-592 for estimates of landfill carbon storage in the various regions of the world.

⁵ *Ibid*, page 601.

⁶ Timothy D. Searchinger, *et al*, Climate Change: Fixing a Critical Climate Accounting Error, *Science* 23 October 2009: Vol. 326. no. 5952, pp. 527 - 528.

⁷ US EPA, "Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks," 3rd ed., 2006, pages 79-86, especially Exhibits 6-2 and 6-4.

⁸ US EPA. "Solid Waste Management And Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks." 3rd ed., 2006.

Available at: <http://epa.gov/climatechange/wycd/waste/SWMGHGreport.html>

⁹ This letter is reproduced along with SRMG's report below Metro Vancouver's comments on these documents on the Metro Vancouver website at:

www.metrovancouver.org/services/solidwaste/planning/ContraryOpinions/SoundResourceManagementReportandResponse.pdf

¹⁰ AECOM. "Management of Municipal Solid Waste in Metro Vancouver – A Comparative Analysis of Options for Management of Waste After Recycling". 2009.

Available at: www.metrovancouver.org/services/solidwaste/planning/Pages/default.aspx

¹¹ International District Energy Association. "Copenhagen's District Heating System – Recovered Waste Heat Cuts Carbon Emissions and Delivers Energy Security", 2009.

Available at: www.districtenergy.org/assets/pdfs/Copenhagen-Clean-District-Heating-final-Web2.pdf

¹² US EPA. "An Overview of Landfill Gas Energy in the United States". Presentation, June 2009. Available at: www.epa.gov/lmop/documents/pdfs/overview.pdf