



EXTERNALITY COST ESTIMATE OF TRANSPORTING SOLID WASTE TO REMOTE LANDFILLS

September 8, 2006

1. INTRODUCTION

The Chittenden Solid Waste District is proposing to site a new long-term landfill in Williston, Vermont. The landfill is intended to replace the County's current solid waste disposal system which relies on two existing transfer stations, which are also located in Williston. This system consists of loading tractor trailers with refuse and transporting them to privately owned and operated landfills in Coventry and Moretown, Vermont. Once a local landfill is operational, the County will no longer haul its refuse over state and local roads to these landfills. In evaluating the impact of the proposed landfill, due consideration needs to be given to the environmental and societal impacts associated with the elimination of these tractor trailer trips.

The purpose of this analysis is to estimate the environmental and societal cost of the existing long-haul transportation system and the corresponding benefits that would result by their elimination. The impacts and costs reviewed in this document do not include the direct costs of the refuse transport that would be incurred, for example, by a trucking company hired to supply the transport service. This analysis focuses exclusively on indirect externality costs that would not be incurred by the trucking company but which are, nonetheless, costs to society as a whole.

This analysis relies heavily upon information contained in a report entitled, "An Analysis of Externality Costs of Freight Transportation in Vermont", prepared by Gleason, Bruno, Tantri and Tyree of Middlebury College (5/6/2005). This report estimated and compared the externality costs associated with the movement of freight by rail and truck along the Burlington to Middlebury transportation corridor. Since the truck costs were portrayed separately from the rail costs, it is possible to use the information to estimate the external impact of tractor trailers hauling refuse from Williston to remote landfills. The report's unit costs associated with the following items were used in this analysis: congestion, accidents, pollution, noise, infrastructure, enforcement and carbon dioxide abatement (Native Energy offset credits). In addition to these external costs, the analysis also estimates the following pollution loads whose costs have not been estimated: hydrocarbons, carbon monoxide and nitrogen oxides. Each of these compounds is a powerful greenhouse gas or pollutant, and while their environmental and societal costs have not been estimated, their generation rates have been estimated using the unit costs identified in the report.

This analysis looks exclusively at the externality costs associated with trucking waste from existing transfer stations to existing landfills. Its scope does not include estimating the externality costs associated with the operation of the transfer stations or landfills.

2. ASSUMPTIONS

In 2005, Chittenden County landfilled over 144,000 tons of waste. Historically, this number generally increases every year as the County's population and waste generation per capita continue to increase. Waste generation rates are also dependent upon the level of economic activity, especially as it pertains to the construction industry, and the region's waste reduction efforts, such as recycling. While CSWD has previously prepared long-term annual waste disposal estimates, for the purpose of simplicity, the analysis portrayed in this document

assumes that 144,000 tons per year are currently trucked to out-of-county landfills and that this trucking would be entirely eliminated once a local landfill becomes operation.

Currently, 69% of the County’s waste is trucked 73 miles from Williston to the Coventry landfill. The remaining waste is trucked 35 miles to the Moretown landfill. The Coventry landfill reportedly has ample capacity to continue its current level of landfilling for another 30 years. The Moretown landfill’s capacity is much more speculative and may not remain an available option for the County’s waste on a long-term basis. However, to be conservative, this report assumes that the current split between landfills continues into the future. There currently exists a small amount (less than 2%) of direct trucking that occurs to the Moretown landfill. These are refuse collection vehicles that do not go to a transfer station. This analysis assumes that that these trucks, which have much smaller loads, are instead redirected through the transfer station. The average weights of tractor trailers, both empty and loaded are the actual averages.

When the proposed landfill becomes operational, the waste currently being received at the two existing transfer stations will instead be hauled to the landfill. Given that one of the two Transfer Stations is adjacent to the proposed landfill and that the other is only a few miles away, it is assumed that there will be no change to the external costs of collecting and hauling wastes from the generator to the local disposal site, whether it is a local transfer station or local landfill.

3. CONCLUSIONS

Based on the above assumptions, a straightforward calculation has been made to determine the external costs and pollution loads associated with the transport of Chittenden County refuse to remote landfills.

Since the proposed landfill will eliminate these transportation needs, the following estimated annual savings would result from the opening of a local landfill:

- Truck trips/year avoided: 7,032
- Ton-miles/year avoided: 26,368,397
- Diesel fuel saved: 171,976 gallons

Item	Unit Cost (cents/ton-mile)	Annual Savings (\$/yr)
Congestion	0.80	\$210,947
Accidents	0.50	131,842
Pollution	0.89	234,679
Noise	0.04	10,547
Infrastructure	0.84	221,495
Enforcement	0.06	15,821
CO2 Abatement	0.23	60,647
Total		\$885,978

Item	Unit Load (lbs/ton-mile)	Annual Emissions (lbs/year)
Hydrocarbons	0.63	16,612,090
Carbon Monoxide	1.90	50,099,954
Nitrogen Oxides	10.17	268,166,596
Total		334,878,641

* Equivalent purchase of Native Energy carbon dioxide offsets

CHITTENDEN SOLID WASTE DISTRICT
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ASSUMPTIONS

	Coventry	Moretown	Total
Disposal Rate (tons/year)	99,111	45,509	144,620
% of Total Disposal	68.53%	31.47%	100%
Distance to landfill (miles)	73	35	
Round Trip Travel Time (hrs)	4	2	
Tractor & Trailer Fuel Usage (miles/gal)	5	5	
Truck & Trailer Weight (tons)	20.64	19.29	
Payload (tons)	20.49	20.73	
Gross Loaded Weight (tons)	41.13	40.02	

CALCULATIONS

	Coventry	Moretown	Total
Trips/Year	4,837	2,195	7,032
Avg. Trips/Day (Based on 5.5 days/wk & 52 wks/yr)	17	8	25
Ton-Miles/Year			
Waste	7,235,103	1,592,815	8,827,918
Tractor & Trailer	14,576,137	2,964,342	17,540,479
Total	21,811,240	4,557,157	26,368,397
Diesel Fuel Consumption (gal/yr)	141,242	30,734	171,976

EXTERNAL COST QUANTIFICATIONS

	Unit Costs Cents/Ton-Mile	Coventry \$/Year	Moretown \$/Year	Total \$/Year
Congestion	0.8	\$174,490	\$36,457	\$210,947
Accidents	0.5	\$109,056	\$22,786	\$131,842
Pollution	0.89	\$194,120	\$40,559	\$234,679
Noise	0.04	\$8,724	\$1,823	\$10,547
Infrastructure (pavement, etc..)	0.84	\$183,214	\$38,280	\$221,495
Enforcement	0.06	\$13,087	\$2,734	\$15,821
CO2 Abatement	0.23	\$50,166	\$10,481	\$60,647
Total		\$732,858	\$153,120	\$885,978

ADDITIONAL EXTERNAL NON-MONETARY COSTS

	Unit Costs Lbs/Ton-Mile	Coventry Lbs/Year	Moretown Lbs/Year	Total Lbs/Year
Pollutant Emissions				
Hydrocarbons	0.63	13,741,081	2,871,009	16,612,090
CO	1.9	41,441,356	8,658,598	50,099,954
NOx	10.17	221,820,313	46,346,283	268,166,596
Total		277,002,751	57,875,890	334,878,641



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Inter-Office Memo:

To: Tony Barbagallo, Facilities Manager, CCSWD
From: Scott Johnstone, Executive Director, CCMPO
Date: 9/29/06 3:57 PM
Subject: Externality Costs of Transporting Solid Waste

I have reviewed your analysis of September 8, 2006 titled “Externality Cost Estimate of Transporting Solid Waste to Remote Landfills” as requested. In this analysis, you apply the methodology developed by Gleason, Bruno, Tantri, and Tyree of Middlebury College (Middlebury) in their May 2005 paper titled “An Analysis of Externality Costs of Freight Transportation in Vermont” to your industry and situation.

The Middlebury methodology purports to estimate the costs associated with various environmental and societal issues of relevance. It is important to note that the Middlebury paper does not represent new, untried analytic concepts. This type of environmental and societal costing analysis is relied on by various industries around the globe and has been the subject of various papers, books and careers. The authors of the Middlebury paper reference a small sampling of this body of work that they deemed relevant to transportation freight issues.

In short, their methodology is well researched and thought out and is a reasonable guide for you to follow. In my review of your work applying this methodology, I believe you have consistently and reasonably applied the concepts and reach conclusions that fairly state the environmental and societal costs that could be saved by avoiding the trucking of solid waste out of our region.

A couple notes regarding the importance of your analysis for Vermont. First, the transportation perspective. In Vermont, our Agency of Transportation is struggling to fund necessary maintenance and congestion relief projects. As the cost of fuel rises, their primary revenue source, the gas tax, is yielding fewer dollars, while the maintenance and congestion problems remain. Removing trucks from our highways, in ways that do not impact our local economy is among the best strategies for resolving these fiscal challenges, since the impact of trucks on roads is so extreme. As an example, one truck generally has the same impact on the integrity of a road as do thousands of cars.

Secondly, you have not assigned costs to all of the greenhouse gases, likely due to the Middlebury report not containing information on these. However, it is important to note the importance of reducing the emission of these gases. In Vermont 46 percent of all emissions are generated by the transportation sector, by far our largest source of greenhouse gas emissions.

Inter-Office Memo:

Currently, Governor Douglas has convened a commission to study how Vermont can best act to reduce the emission of these gases in Vermont. Though that effort is early in its work, clearly most of the recommendations will be made regarding methods to reduce emissions from the transportation sector, particularly since these emissions have grown in Vermont by approximately two thirds since 1990. Identifying large opportunities to reduce emissions, such as is provided by the disposal of solid wastes in an appropriately designed, state of the art landfill will emerge as vital in developing a plan to curb our emissions.

Related to the climate change issue is the current status of air quality in Vermont. Vermont is currently right of the edge of compliance with the Clean Air Act for both ozone and particulate matter 2.5. From a practical perspective, staying in “attainment” with these standards is vital. Regions and states that fall out of attainment face serious consequences in developing their economy and considering solutions to remedy their congestion problems. In Vermont today, there is no room left for increased emissions if we are to stay in compliance. In order to assure future compliance it is imperative that we take steps to reduce emissions to provide a buffer from the standards. Any improvements we achieve will result in more than just compliance with the EPA rules - it means fewer cases of asthma, seniors breathing easier, and the preservation of our Vermont environment that we all cherish.

In conclusion, I believe the analysis you have performed to estimate the environmental and societal costs and greenhouse gas savings to be appropriately developed and executed. For this region, the savings of almost \$900,000 per year in externality costs is important as many of those costs show up in real and tangible ways. For our region and our state, the elimination of greenhouse gas emissions will be equally important as we begin the fight to check the impacts of global warming. Lastly, for both public health and economic development reasons it is vital to take actions to remain in “attainment” with our air quality standards. For all these reasons I appreciate the attention you have given to the broader impacts of a project such as your landfill initiative. It is a worthy project in its own right and becomes so much more important when considered in a broader context.

Please do let me know if I can provide you with additional information or if you have questions.