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Comparing Costs and Recovery Rates for Single Stream and Two Stream Recycling Programs....the Debate Continues

Daniel Lantz, M.Sc., MBA, MCIWM, LEED AP
Metro Waste Paper Recovery Inc.

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Overview of Presentation

- ❖ Introduction
- ❖ Review of Program Costs
- ❖ Impact on Diversion Moving to Single Stream
- ❖ Single Stream Issues
- ❖ Optical Sorting for Fibres
- ❖ Conclusions



Introduction

- ❖ Ongoing debate about whether or not to move to single stream recycling
 - Most larger programs now single stream
 - Mid-sized programs split
- ❖ Key issues with single stream
 - Concerns from end markets on product quality
 - Increased quantities of residues
 - Higher capital costs; higher labour costs; higher processing costs



Review of Program Costs

- ❖ Single stream and two stream programs for 2003 and 2008 were compared
- ❖ All programs were two stream in 2003; three moved to single stream
 - 2008 represents a minimum of three full years of operating as a single stream program



Review of Program Costs – 2003

Municipality	2003			
	Quantity	\$/Tonne	Households	\$/HH
	Tonnes	Net		Net
Single Stream Programs (Two Stream in 2003)				
Program 1	82,231	\$ 147.66	331,000	\$ 36.68
Program 2	148,798	\$ 126.46	959,000	\$ 19.62
Program 3	43,516	\$ 141.59	253,700	\$ 24.29
Average		\$ 135.21		\$ 24.05

Two Stream Programs				
Program 4	30,780	\$ 162.53	194,200	\$ 25.76
Program 5	26,977	\$ 91.57	170,500	\$ 14.49
Program 6	66,798	\$ 138.74	321,700	\$ 28.81
Average		\$ 134.40		\$ 24.39

❖ **Costs almost identical in 2003**





Review of Program Costs – 2008

Municipality	2008			
	Quantity	\$/Tonne	Households	\$/HH
	Tonnes	Net		Net
Single Stream Programs				
Program 1	93,801	\$ 180.17	386,000	\$ 43.78
Program 2	186,678	\$ 145.64	996,890	\$ 27.27
Program 3	79,161	\$ 152.18	303,040	\$ 39.75
Average		\$ 156.09		\$ 33.30

Two Stream Programs				
Program 4	50,360	\$97.55	205,150	\$ 23.95
Program 5	38,106	\$159.48	163,950	\$ 37.07
Program 6	65,410	\$133.73	365,770	\$ 23.91
Average		\$ 128.27		\$ 26.86

❖ 2 Stream - \$28/te lower





Review of Program Costs

Single Stream Programs	\$/Tonne	\$/HH
2003 SS Average	\$ 135.21	\$ 24.05
2008 SS Average	\$ 156.09	\$ 33.30
Cost Increase 2003 to 2008 (1)	\$ 6.81	\$ 6.75
	4.7%	26.4%

Two Stream Programs	\$/Tonne	\$/HH
2003 2S Average	\$ 134.40	\$ 24.39
2008 2S Average	\$ 128.27	\$ 26.86
Cost Increase 2003 to 2008 (1)	\$ (20.12)	\$ (0.07)
	-13.8%	-0.3%

(1) Accounting for 2% inflation per year, compounded from 2003 to 2008.

2008 SS to 2S Difference	\$ (27.82)	\$ (6.44)
2S %'age less than SS	-17.8%	-19.3%



❖ **2 Stream - 18% lower \$/te; 19% lower \$/hh**





Review of Program Costs - Comparison

❖ Comparing results:

- Two large single stream programs receive fibre premium
 - Net decrease of \$6 - \$7 per tonne
- Economies of scale
 - Net decrease of \$5 - \$8.50 per tonne
- More maintenance required for large single stream programs – two shifts per day
 - Net increase of \$2.50 - \$3.50 per tonne



Review of Program Costs - Comparison

	Average	Net Cost (Average)	
	Quantity (te)	Low	High
Single Stream Program Costs (From Table 1)	119,880	\$ 156.09	\$ 156.09
Two Stream Program Costs (From Table 2)	51,292	\$ 128.27	\$ 128.27
Adjustment for Premium Fibre Revenues		-\$ 7.00	-\$ 6.00
Adjustment for Economies of Scale		-\$ 8.50	-\$ 5.00
Adjustment for Increased Maintenance		\$ 2.50	\$ 3.50
Adjusted Two Stream Program Costs		\$ 115.27	\$ 120.77
2008 1 Stream to 2 Stream Difference		-\$ 40.82	-\$ 35.32
2 Stream Percentage Less Than 1 Stream		-26.2%	-22.6%

- ❖ Net difference, accounting for differences:
 - Actual 22% - 26% lower cost for two stream recycling



Impact on Diversion Rates

- ❖ Typically all programs report an increase in the quantity received as a result of moving to single stream
- ❖ Results may not be due to single stream
 - Public education
 - A change reminds people about the program
 - Introduction of bag limits
 - Introduction of user pay



Impact on Diversion Rates

Municipality	Households		Quantity/HH		
	2003	2008	2003	2008	Increase/Decrease
Program 1	340,000	386,000	248.4	243.0	-2.2%
Program 2	980,200	996,890	155.2	187.3	20.7%
Program 3	264,400	303,040	171.5	261.2	52.3%
Weighted Avg			177.9	190.2	6.9%

Municipality	Households		Quantity/HH		
	2003	2008	2003	2008	Increase/Decrease
Program 4	194,200	205,150	207.9	245.5	18.1%
Program 5	170,500	163,950	158.5	232.4	46.6%
Program 6	321,700	365,770	207.6	178.8	-13.9%
Weighted Avg			195.5	209.4	7.1%

- ❖ Both program types increased about 7% over five years
- ❖ 2S programs recover approximately 10% more per household
- ❖ No apparent link between quantities recovered and single stream



Single Stream Issues

❖ Two key issues

- Downgrades of #8 ONP as a result of poor quality
- Revenue losses through inadvertent marketing of prohibitives in ONP bale



Fibre Quality

❖ Deinking mill concerns:

- Increased reject rates
- Increased costs of bleaching, biocides, labour, maintenance, landfill
- Reduced capacity and pulping rate

❖ Paper-making machine concerns:

- Increased stickies and machine downtime for cleanup
- Poor paper quality – spots and brightness

Fibre Quality



- ❖ 10-15% residue/yield rate losses
- ❖ Materials are not recovered for recycling
- ❖ Currently cost estimates of \$20+ per tonne to manage increased residues



Revenue and Long Term Implications

- ❖ Mills reducing revenues by \$10 per tonne for loads not meeting minimum of:
 - $\leq 2\%$ prohibitives
 - $\leq 10\%$ outthrows
- ❖ Implications across all programs in Ontario significant
 - More than 530,000 tonnes marketed x \$10 = **\$5.3 million**
- ❖ Poor quality and economy
 - Lost 1,200 tpd of capacity in the past three months
 - Down to one mill



Revenue Implications

- ❖ Containers inadvertently in the ONP bale
 - Containers end up at fibre mill instead of going to end market
 - Do receive “value” of ONP, but many are worth much more as individual commodities
 - Basket of goods worth about \$285 per tonne compared to \$120 per tonne for ONP



Revenue Implications

Material	Quantity (Tonnes)	Value Per Tonne (1)	Lost Revenue
Aluminum	45	\$ 1,904	\$ 85,680
PET	198	\$ 352	\$ 69,696
HDPE	126	\$ 573	\$ 72,198
Steel Cans	150	\$ 245	\$ 36,750
Clear Glass	78	\$ 27	\$ 2,106
Coloured Glass	77	\$ -	\$ -
3-Mix Glass	141	\$ (24)	\$ (3,384)
Tubs & Lids	56	\$ 204	\$ 11,424
Poly/Aseptic	11	\$ 75	\$ 825
Polystyrene	23	\$ 75	\$ 1,725
Plastic Film	76	\$ 35	\$ 2,660
Totals	981		\$ 279,680
Revenue from ONP	981	\$ 121	\$ 118,701
Net Loss			\$ 160,979

(1) Based on CSR Price Sheet Average 2008

- ❖ Across all of Ontario, the net loss would equate to more than \$4.0 million
- ❖ Also has implications on *real* recovery rates for municipalities





Possible Solutions – Single Stream in the Future

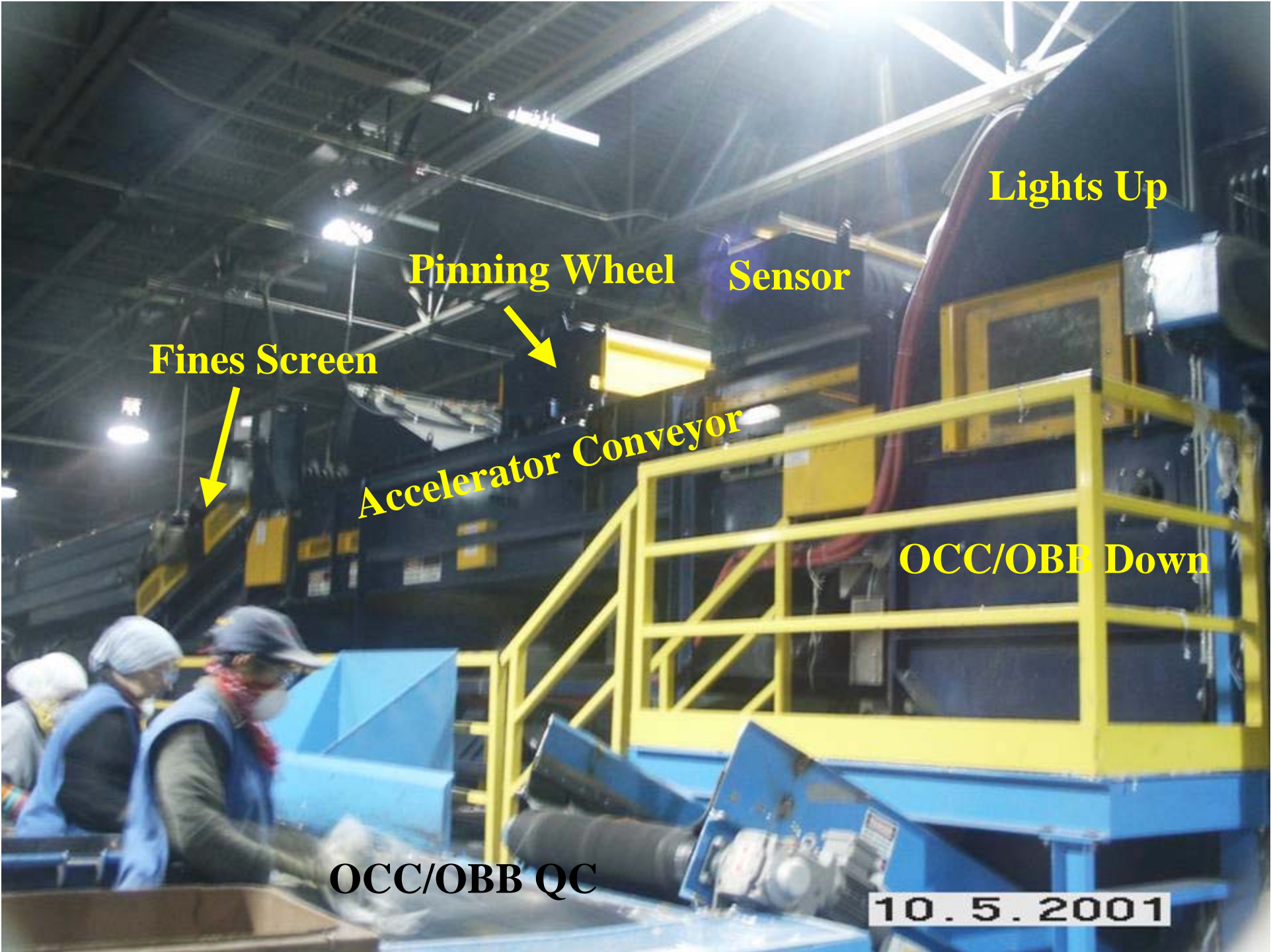
- ❖ Optical sorting for containers (PET, HDPE, Polycoat, Mixed Plastics) now “status quo” for all new programs over 30,000 tpy throughput
- ❖ Optical sorting for fibres from single stream now in number of operations
- ❖ More screening, more decks, more optical sorting machines, more capital
- ❖ Positively sort ONP?



Optical Sorting for Fibres – Toronto

- ❖ Toronto facility processes 120,000+ tpy of single stream material
 - Installed two MSS fibres sorting lines
 - Removes non-fibre materials (up); Removes browns (down)
- ❖ Capital of \$1.6 million; Sorting staff reduced
- ❖ Fibre quality improvements minimal
 - 45% reduction in prohibitives
 - Not effective at removing carrierboard/boxboard
- ❖ **Net impact – more costly than manual sorting**
 - **Was supposed to save \$3.60 per tonne**





Fines Screen

Pinning Wheel

Sensor

Lights Up

Accelerator Conveyor

OCC/OBB Down

OCC/OBB QC

10.5.2001



OCC/OBB Down

10.5.2001



Lights Up

ONP Through

10.5.2001



Ejection Air Jets

Sensor

10.5.2001

Lights Up



10.5.2001





Optical Sorting for Fibres – Calgary

- ❖ Calgary facility processes 65,000+ tpy of single stream material
 - Installed two MSS fibres sorting lines
 - MultiWave (ONP) and FiberSorts (RMP)
 - Removes non-fibre materials (up)
 - Removes browns/carrierboard/boxboard (down)
- ❖ 10 sorters for ONP; 4 for mixed paper
- ❖ Initially MultiWave (ONP) down ejects to OCC line
 - Too much lost ONP; now goes to mixed paper
- ❖ Fibre quality marginal
 - Change to setup means can increase aggressiveness of MultiWaves to improve ONP quality



Conclusions

- ❖ **Collection does not have to cost more**
 - Hard to replace “free” labour; alternating weeks
- ❖ **Costs and quantities recovered do not suggest single stream is more effective**
 - No quality control at the curb – give them a cart....they’ll fill it!
- ❖ **Single stream processing technologies evolving but...**
 - Separating fibres from containers still only has an efficiency of between 80 – 85%
 - A lot of additional equipment and staff necessary to overcome separation issues
- ❖ **Optical sorting for fibres evolving but still unproven**
 - Carrierboard, boxboard
- ❖ **Large tonnages needed – not viable for small programs**



Thank You For Your Time

- ❖ If you have any follow up questions or comments please me at your convenience:

**Daniel Lantz, M.Sc., MBA, MCIWM, LEED AP
Vice President, Operations**

Metro Waste Paper Recovery Inc.

45 Thornmount Drive

Scarborough, Ontario, Canada M1B 5P5

Telephone: 1-416-292-5149 x164

dlantz@metrowaste.com

**We care so much about paper and packaging;
when you're done with it we want it back!**

