

E&E Project Evaluation Form

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Project Name/Number/Priority area: E & E Project #162 - Dufferin MRF Optical Sorting of Plastics

Lead Sponsor/completed by/date: Draft Report by November 16, 2005

Project Duration: 7 months (September 2005 - March 2006)

Total project value: \$25,000 (plus GST) **E&E funding amount:** \$25,000 (plus GST)

Section 1 –To be completed by Project Applicant

1) What were the Project Goals and Objectives (as per the E&E Application and/or Contract)?

- 1) To conduct a business case analysis of the feasibility of installing equipment for the optical sorting of plastics (PET and HDPE) at the City of Toronto's Dufferin MRF.
- 2) To examine the footprint impacts of using optical sorting equipment for separating fibres at the Dufferin MRF.

Project tasks included visiting the Dufferin MRF; contacting the five major suppliers of optical sorting equipment and requesting product information, drawings, specifications and installation references; and evaluating the equipment produced by each supplier and its suitability for the Dufferin MRF. The project deliverables included CAD drawings for two of the preferred equipment installations and an analysis of the business case for installing the equipment produced by the preferred equipment suppliers.

2) Were the goals and objectives met? (and if not why not?)

The goals and the objectives of the project were met.

3) Summary of Project Accomplishments (i.e. what did the project do/achieve?)

Information on the optical sorting equipment produced by the five major equipment suppliers was summarized in a comparison table included in the final report. The table listed equipment attributes such as cost, capacity, sensor specifications and products sorted. Possible equipment layouts were developed for two of the preferred equipment manufacturers. An analysis of the business case for installing optical sorting equipment for HDPE and PET was carried out.

It was concluded that if the installation of optical sorting equipment displaced three manual sorters, and had no net effect on sorted product hit rate and purity, a payback period of 5-6 years could be expected. The analysis was based on the labour rates and hours provided by the City (2 shifts of sorters working 40 hours/week, 52 weeks/year). An increase in operating hours at the facility would require more labour, and would thus shorten the payback period for the optical sorting equipment. Hit rate and purity were assumed to remain constant because the existing conditions were not known. Also, the hit rate and purity for the optical sorting equipment was reported to be anywhere between 90% and 98% depending on which manufacturer or reference facility we contacted. It was not possible to estimate with certainty the effect that the optical sorting equipment would have on hit rate or purity.

It was determined that due to the high fibre throughput and constrained conditions at the Dufferin MRF, using optical sorting technology on the fibre line would not be feasible without a major and costly overhaul of the facility's equipment.

4) Summary of Project Limitations (*e.g. is there anything that should have been done differently?*)

In order to avoid misunderstandings relating to the project's expectations, it would have been useful to have all project stakeholders involved with the project from the outset.

5) What do you consider to have been the key “lessons learned” from this project? Does your project/activity represent a “best practice”?

The key lesson learned in this feasibility study is that a business case can be made for the installation of optical sorting equipment for plastics if 1) the installation is in a high throughput facility; 2) the equipment is used to displace manual sorters on labour-intensive, high volume, high value materials; 3) the material presented to the optical sorter is well spaced out on the belt, with minimal contamination.

It was also confirmed that optical sorting equipment for the fibre lines would not be suitable for the Dufferin MRF - a facility with a very high fibre throughput and constrained conditions.

The comparison of the optical sorting equipment produced by the five major equipment manufacturers and the background information on optical sorting will be of use to the City and other municipalities.

6) Do you think there are opportunities to share/replicate the successful elements of this project with other Ontario programs? If yes, how and where?

The information in the report on optical sorting technology and the five major equipment suppliers would be a good source of information for other municipalities in the early stages of contemplating optical sorting. While the business case analysis is specific to the Dufferin MRF, some elements of the costing methodology would be of use to other municipalities.

7) Did this project result in either reduced costs per tonne of Blue Box waste recycled and/or increased Blue Box tonnes diverted? (Please explain)

Since this project is only a feasibility study, there has been no impact on the blue box waste.

Section 2 –To be completed by Stewardship Ontario (and reviewed by applicant)

8) Did this project do what it set out to do? If not, what were the reasons/ barriers?

As per the original contract agreement, the tasks for this project were as follows:

- Contact the 5 major equipment suppliers to obtain relevant technical information – short-list two to three as qualified
- Prepare AutoCAD sketches (plans/elevations showing the proposed installation(s))
- Develop capital & operating cost(s)
- Develop the business case and make recommendation(s) for moving forward
- Prepare draft & final report

9) What are the key learnings from this project? Are there any next steps? What is being done to share the results?

The study highlights the fact that although optical sorting equipment displaces manual sorters, some of these are still required for Quality Assurance and Control. Of the six manual sorters currently sorting HDPE and PET at Toronto's Dufferin facility, the installation of an optical sorting system would make three of these redundant (i.e., no longer required) and would necessitate the reassignment of the remaining three.

While the consultant estimates the payback period for an optical sorting system that displaces three HDPE and PET manual sorters will be between 5 and 6 years, Stewardship Ontario and the City of Toronto estimate that the expected payback period is approximately 3.8 years depending on the future hours of operation and annual throughput.

As a next step, the City of Toronto is preparing an application to the E&E Fund for Optical Sorting Equipment for Toronto's Dufferin MRF (PN 210). Toronto is requesting \$700,000 (50% funding) for engineering support and to purchase, install, operate and monitor plastics optical sorting equipment on the container line at the Dufferin MRF to pull off HDPE and PET.

10) Was the project good value for the money (e.g. were there measureable program or system cost reduction benefits, cost effective tonnage increases, etc?)

Many recycling facilities in the US and Europe are making extensive use of optical sorting equipment to reduce labour costs. To date there is no municipally owned MRF that has yet installed this equipment in Ontario. The project will be closely monitored for its impact on labour savings and marketed plastics contamination levels/potential improvements.

11) Does this project represent "best practices"? If yes, explain.

While it is too soon to tell whether optical sorting constitutes a Best Practices, interest for this kind of automated technology is growing among a number of large programs. The actual operating data from this project will be useful to MIPC and Ontario recycling program operators to determine the opportunity for increased automation in Ontario MRFs.

12) Tonnage and Financial Summary

Total project cost – \$25,000

E&E contribution – \$25,000

Other Cash/in-kind contributions – Toronto Solid Waste Management Services technical staff