

Minnesota Pollution Control Agency Packaging Reduction Study

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Prepared by OTEC Consultants for the Minnesota Pollution Control Agency
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Summary

The Minnesota Pollution Control Agency (MPCA), through a U.S. Environmental Protection Agency Region 5 grant, initiated a State of Minnesota (State) purchasing packaging reduction study in 2012. The study included a pilot test of plastic reusable corrugated boxes and blue plastic reusable totes to replace corrugated cardboard single use containers sent by Innovative Office/United Stationers for State office supply purchases. The pilot test ran from May 6, 2013 to July 03, 2013. The trial results show the use of plastic reusable packaging could reduce both GHG emissions and waste sent to landfill attributable to the State purchasing process.

Using national average recycling rates for packaging, the pilot results show that reusable packaging could reduce GHG emissions by 9.8 metric tons carbon dioxide equivalent (CO₂e) using totes and 9.9 metric tons CO₂e per year using plastic boxes over the use of corrugated cardboard packaging. Over the lifetime of the reusable containers (100 total estimated uses for both reusable container types) savings of GHG emissions is estimated to be 157 metric tons CO₂e using the totes and 159 metric tons CO₂e over the life of the plastic boxes. This reduction in GHG emissions represents a 95% reduction in GHG emissions per year versus the cardboard boxes if the blue tote was to be used, and a 99% reduction in GHG emissions per year if the plastic boxes were to be used.

Using the blue tote to replace corrugated cardboard packaging could reduce waste by 3.2 metric tons per year and 51 metric tons over the lifetime of the reusable tote, a total waste diversion of 94% over using cardboard. If the plastic box were used to replace cardboard, 3.3 metric tons per year of waste could be avoided and 53 metric tons avoided over the lifetime of the plastic boxes, a total waste diversion of over 98% versus using cardboard boxes. In addition, the use of either of the reusable boxes could reduce the weight of dunnage (plastic air pillow void fill material) to landfill by 0.3 metric tons or 328,622 air pillows over the life of the reusable box.

The pilot project tested the reusable blue plastic totes for shipments sent to the Minnesota Pollution Control Agency (MPCA) building and the white plastic boxes for shipments to the Department of Human Services (DHS). Based on the limited study results from the study, feedback from Innovative Office and United Stationers was that the plastic tote was easier to handle both on the distributing and receiving end than the plastic box. The MPCA staff noted that, because of their particular receiving system the tote did not need to be stored on site for later pick up during the study, but rather each tote was emptied and returned to the truck immediately. (DHS on the other hand did need to store emptied plastic boxes at the dock between deliveries. The tote was noted as appearing more durable and did not need to be folded or broken down after use, thus limiting the handling time for the tote.

Background

In 2012 the MPCA received a grant from U.S. EPA Region 5 to reduce the environmental impact of State contracts. A portion of that grant funded a study to reduce GHG emissions and waste from packaging sent to State agencies. The intent of the study was to determine if reusable packaging options were viable, to quantify the GHG reductions of switching to reusable packaging, and to use the results in future packaging reduction activities.

Planning Stage

In August 2012 the MPCA sent a Request for Information (RFI) to State vendors, notifying them of the packaging reduction study and a request to participate. Four vendors responded: Fastenal, Ecolab, Innovative Office (and their supplier United Stationers), and Barrett Moving. All four attended (either in person or remotely) the October 29th kickoff meeting at the MPCA St. Paul office. Each of these vendors expressed interest in working with the State and their consultant, OTEC LLC, to develop a packaging reduction opportunity that could be piloted in 2013.

The goal of the pilot was to identify and test packaging reduction options likely to reduce GHG emissions. Options considered included reduced packaging configurations, alternate packaging materials, and packaging material weight reductions. Below is a description of the vendors and their proposed packaging reduction projects:

Fastenal: Fastenal provides a number of products to the State, including fasteners, tools, personal protective equipment and supplies. Fastenal was already working with the State Department of Transportation (DOT) to utilize a vending machine that DOT employees could obtain commonly-used products from. When the vending machine was low on a product, the machine would notify Fastenal. Fastenal's analysis showed that this project did not reduce packaging, as the amount of packaging used in delivery was about the same as before the machines were put in place. Fastenal declined to participate further in the project due to lack of resources and their existing packaging reduction efforts.

Ecolab: Ecolab supplies cleaning products to the State. Ecolab has already made significant progress in reducing and streamlining their packaging. Ecolab shared data on three recent shipments to the State to identify the packaging types being used in typical shipments. The data detailed the type of products delivered and the amount of packaging used. Based on the shared data the only identified areas for reduction were in the form of buying larger pack sizes for some facilities, or changing to a new product that reduced the amount of total product needed. In the end the larger pack sizes were not acceptable due to limitations in storage and handling capacity at the State facilities. It was suggested by Ecolab that the State could change from using L2000 detergent to Navigator detergent. L2000 comes delivered in a 5 gallon plastic pail. Navigator is a more concentrated form of detergent and comes in a case of 4 plastic packages. Each plastic package is made from 40% recycled content and the corrugated case contains 25% recycled content. Approximately 20% fewer shipments could be made per year and less overall packaging would be used. The State would have to obtain new equipment made to use the Navigator product. This was not a good candidate for the current pilot, but is noted for future reference. Ecolab did not participate in the pilot.

Innovative Office: Innovative provides office furniture and supplies to State agencies through a warehouse owned by United Stationers. Innovative Office and United Stationers proposed to substitute the most common sized corrugated boxes sent to the State (C20, C25, and C30) with reusable and recyclable plastic boxes and totes. See table 1 for size descriptions. The pilot project was accepted and the State and OTEC LLC worked with Innovative Office to implement the pilot.

Barrett Moving: Barrett Moving provides moving services and delivery services to the State. Barrett Moving expressed an interest in the project but did not propose any projects, as they are not a manufacturer, but a transport company. Barrett made themselves available to the State for any questions or help they could offer. They are a contract deliverer, and do not set the size or type of packaging used.

The remainder of this report focuses on the pilot testing process and results from Innovative Office and United Stationer's Reusable Packaging project.

Pilot Trial

Innovative Office and United Stationers identified two types of alternative shipping packages to test: blue plastic totes made from high density polyethylene (HDPE), and plastic boxes made from polypropylene. The plastic boxes were manufactured by Technology Container Corp and are called "Techno Boxes." The blue tote, purchased from the Uline Catalogue is called out as S-9744BLU, 19.8 X 13.8 X 11.8" Blue Round Trip Totes. The plastic tote and box would directly replace corrugated boxes sizes B-20, C-20, C-25, C-35, and C-40 whenever possible.

Below are pictures of the reusable Plastic Box and Plastic Blue Tote that were used for this Packaging Reduction Project.

Figure 1. Reusable Packaging Types Used in Pilot

Dimensions: Blue Tote

19.8 x 13.8" x 11.8"

Weight Capacity: 70 lbs



Total weight of Blue tote: 6.5 (LBS)

Dimensions: White Plastic Box

18.25" X 12.25" X 11.625"

Weight Capacity: 40 (LBS)



Total weight of White Box: 2.0 (LBS)

The "Large Blue Bin" below was used by Innovative Office drivers to transport empty white plastic boxes from the Department of Human Services (DHS) back to United Stationers' warehouse.



Dimensions of large blue bin: 24" x 30" x 12"
 Total Weight of "Large" Blue Bin: 10.0 (LBS)

The plastic tote and box are reusable. According to a study performed by Mission Foods, the white plastic boxes could be reused up to 100 times.¹ This study involved the same size white plastic reusable boxes as were used in this pilot. For the pilot, it was assumed that the blue plastic totes also could be used 100 times. The reusability and end-of-life recycling potential of the plastic boxes and totes made them a prime choice to replace the corrugated boxes for this pilot study.

It was determined that a C25 size polypropylene plastic reusable box would be piloted with DHS for orders to their two St. Paul offices; these shipments currently use either a B-20 or C-20 through C40 size cardboard box. For PCA orders that would typically require C20 through C40 sized boxes, the blue high density polyethylene (HDPE) plastic totes would be used. United Stationers purchased a total of 50 white plastic boxes and 40 blue totes for use in the study.

Table 1 below lists the types, materials, and quantities of packaging types that were studied in the pilot. The quantity per year column is the estimated quantity of each corrugated box size shipped to all State agencies per year.

Table 1. Cardboard and Reusable Packaging Descriptions

Box	Material	Weight in lbs	# Of Uses	Quantity Shipped to the State in 2012
C20 Corrugated	Paperboard	0.95 (0.43 kg)	1	2,972
C25 Corrugated	Paperboard	1.15 (0.52 kg)	1	6,500
C25 Plastic	Polypropylene	2.00 (0.908 kg)	100 ²	Not Applicable ³
C35 Corrugated	Paperboard	1.15 (0.52 kg)	1	504
C40 Corrugated	Paperboard	1.35 (0.61 kg)	1	3,024
Plastic Tote	High Density Polyethylene (HDPE)	6.5 (2.95 kg)	100 ²	Not Applicable ³

¹ Sustainability and Cost Reduction Thru Reusable Packaging, Technology Container Corp and Mission Foods, Shrewsbury, MA, March, 2011

² Number of uses of the plastic boxes and totes was based on data from the Mission Foods case Study, and feedback from the pilot study.

³ Since the C25 plastic box and plastic tote are not currently used for normal shipments to the State, they are not applicable to include in this column.

The reusable boxes and totes required the following changes to United Stationers' and Innovative Office's shipping processes:

- The original process sent corrugated boxes through an assembly machine to make up the boxes. The new plastic boxes were built differently and could not be run through this assembly machine. Therefore the plastic boxes had to be assembled by hand and staged differently than the corrugated boxes.
- The plastic boxes and the plastic totes did not require the use of tape.
- United Stationers previously applied adhesive labels to each cardboard order box. The label however could not be peeled off the plastic boxes and totes without significant paper residue being left behind. At the time of this writing, United Stationers was investigating the use of a plastic sleeve to hold the labels usually applied to the cardboard boxes.
- No changes were required in the conveyor system. The plastic boxes and totes rode up and down the conveyor belt just fine with no slippage.
- Plastic boxes shipped to DHS from Innovative Office/United Stationers were dropped off at the loading dock, and then staged in a pick-up area for department pickup. Employees would pick up their boxes, empty them, and then return them to the loading dock. Boxes would be folded and placed into a holding bin to hold them for pick up by Innovative Office personnel. Prior to the pilot, cardboard boxes at both the MPCA and DHS were thrown in the trash or recycling, but were not returned to the loading dock. The use of plastic boxes requires an extra step of ensuring the boxes are returned to the loading dock.

Figure 2. Packaging to DHS/MPCA Pre-Pilot Flow Chart

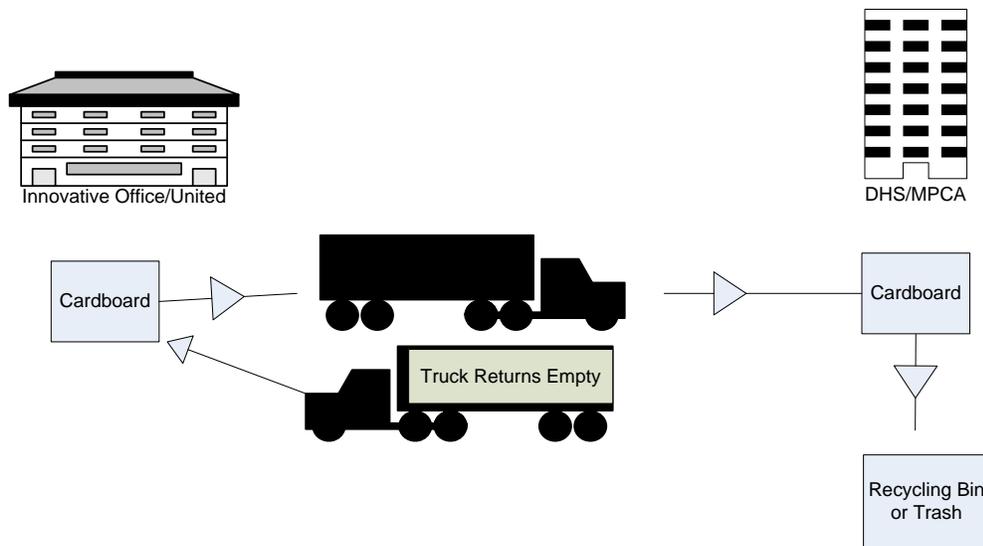
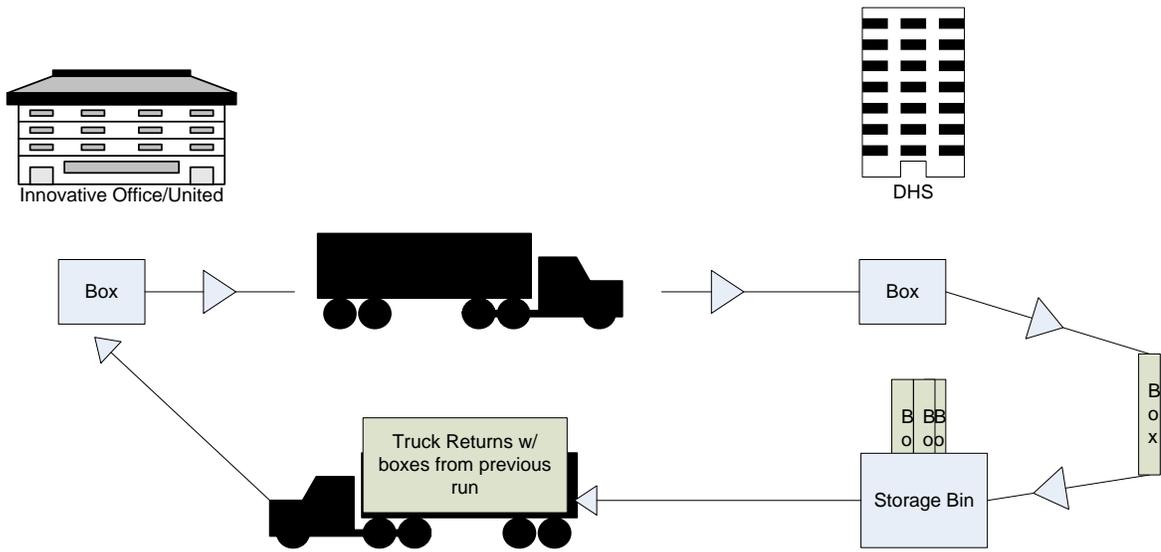
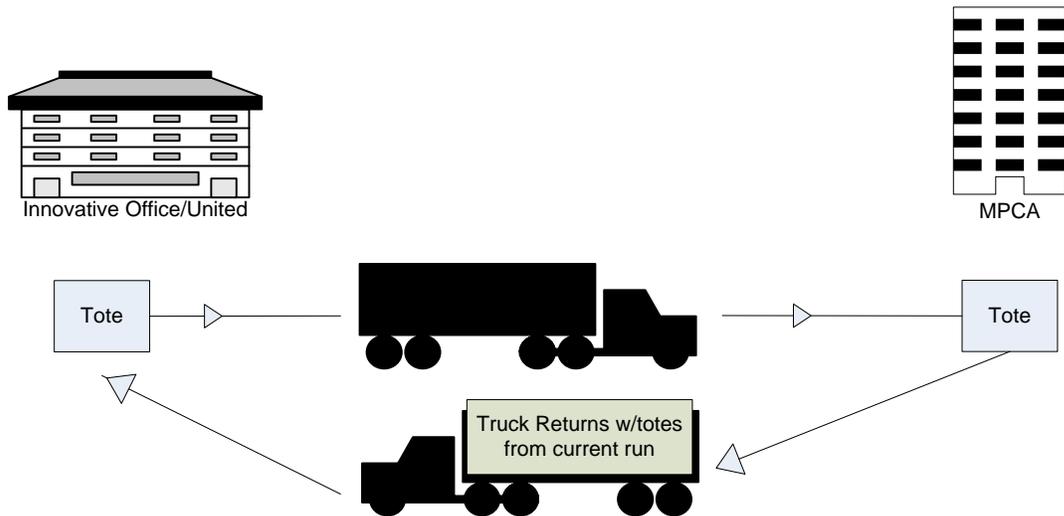


Figure 3. Packaging to DHS During Pilot Flow Chart



Plastic totes shipped to the MPCA were unloaded at the loading dock and immediately given back to the driver, empty. There was no tote storage at the MPCA. With both agencies, the reusable boxes and totes had to be returned to the warehouse for refilling.

Figure 4. Packaging to MPCA During Pilot Flow Chart



Results

Study Assumptions

The waste and GHG life cycle impacts study in this pilot required assumptions listed in table 2 below.

Table 2. Study Assumptions

Study Component	Assumption
Functional unit	One year of shipments from Innovative Office to the State of Minnesota
Reference flow to fulfill the functional unit	The total number of plastic containers needed to replace the corrugated containers in one year is equivalent to two months' worth of corrugated cardboard boxes. This quantity of reusable boxes was assumed to be enough to allow for a number of boxes that may not be returned immediately to the warehouse and to allow for a higher volume of shipments in some months. Based on the number of uses of the plastic boxes in this study, they could be used for up to 16 years before the 100 uses would be reached, depending on the volume of shipments each year. Reusable boxes: 2,167 Corrugated cardboard boxes: 12,996
Dunnage/packaging filler to fill voids in packaged cargo	Used with corrugated cardboard boxes; not used with reusable boxes.
Corrugated cardboard box disposal	Corrugated cardboard boxes are used once and then disposed and recycled at the US national average recycling rate for cardboard packaging (71%).
Reusable box manufacturing process	Extrusion processing for the plastic boxes and injection molding processing for the totes (based upon manufacturer information about the container production).
Reusable box lifespan	100 times before being recycled at the end of their lives.
Number of shipments per reusable box each year	Due to the shipping process, each plastic box or tote would be used approximately 6 times each per year (see figures 1 and 2 for a reusable packaging flow schematic). With a useful life of 100 uses, they can be expected to last 16 years before needing to be replaced.

The study did not analyze the life cycle GHG emissions of the large blue bin used to transport empty boxes was not assessed in this study. The bin holds 20 boxes. The delivery truck and the receiving dock each require one large blue bin to store folded boxes. Therefore every plastic box that moves through the facility will be stored in the blue bin and the bin will be used many times. With the large number of expected blue bin uses to transport empty reusable boxes, the contribution of the bin to an individual box was assumed to be negligible.

Environmental Life Cycle Impacts of Boxes

Table 3 below shows the GHG emissions of each box per use.

Table 3. GHG Emissions per Packaging Type per use

Box	Life cycle GHG Emissions per use ⁴	Kg CO ₂ e using US Average Recycling Rates
C20 Corrugated	0.51	0.60
C25 Corrugated	0.60	0.80
C25 Plastic	0.028	0.028 ⁵
C35 Corrugated	0.60	0.80
C40 Corrugated	0.73	0.87
Plastic Tote	0.106	0.107 ⁵

As seen in table 3, the plastic box's GHG emissions per use is significantly lower than that of the corrugated cardboard box when the plastic box lifespan of 100 uses is assumed. The per-use GHG emissions of one plastic box are divided by 100 uses to get the GHG results for each plastic box as shown above. The total GHG emissions of the C25 plastic box are 2.8 kg CO₂e for 100 uses (see table 4 below); when normalized the plastic box GHG emissions per use are 0.028 kg CO₂e (2.8 divided by 100 uses). The cardboard box emissions in table 3 are not normalized per use since each corrugated cardboard box is used only once. Results in table 3 assume the plastic boxes are recycled at the end of their lives.

Table 4 shows the total life cycle GHG emissions of each package type assuming a single use of both the plastic and corrugated cardboard boxes.

Table 4. Life Cycle GHG Emissions by Packaging Type

Box	Embodied Life Cycle GHG Emissions (not normalized by number of uses)	Break-Even Usage Point
C20 Corrugated	0.6	Not Applicable
C25 Corrugated	0.8	
C25 Plastic	2.8	3.5 Uses
C35 Corrugated	0.8	Not Applicable
C40 Corrugated	0.87	
Plastic Tote	10.7	14.5 Uses

The second column in table 4 shows the GHG emissions of each box assuming that all boxes are recycled at the end of life. This is a best case scenario; in reality, not all boxes will be recycled.

⁴ Results have been normalized to the functional unit of 1 year of box usage. Thus a cardboard box is used once and then disposed of, while a reusable box or tote can be used 100 times. The total GHG emissions of the plastic totes and boxes were divided by 100 to allocate the GHG emissions of the box over the total 100 uses. The table shows the GHG emissions of each packaging type on a per use basis.

⁵ Because plastics do not readily break down in a landfill in the first 100 years, the GHG emissions of landfilling a plastic box are nearly zero, while a commensurate size cardboard box will break down 100% within 100 years, thus releasing all of its embedded carbon into the atmosphere.

The average recycling rate scenario shown in the second column of results in table 4 assumes that the corrugated and plastic boxes are recycled at the US average recycling rates. The US municipal solid waste recycling rates, according to 2010 US EPA data (the latest available), show that 14% of US plastic packaging is recycled and 71% of corrugated cardboard packaging is recycled.

The break-even usage point in table 4 represents the number of times the reusable box would need to be used before the reusable box's GHG emissions are equal to the comparable corrugated cardboard box's GHG emissions. Beyond the break-even point, any additional uses of the plastic box results in GHG savings compared to the baseline cardboard box. The break-even point was determined in relation to the cardboard box of the same size. The break-even point was calculated by dividing the total GHG emissions of the plastic box and the total GHG emissions of the tote by the GHG emissions of the cardboard box. This means that in the case of the plastic box, with a break-even point of 3.5 uses, 1 plastic box has the same GHG emissions as 3.5 corrugated boxes. Once the reusable plastic box is used 4 times, it begins to show a savings in GHG emissions over using cardboard.

State Agency GHG Reduction Potential

Table 5 below shows the GHG emissions reduction potential from replacing one years' worth of corrugated boxes with plastic boxes. The plastic boxes data have been normalized in the "normalized" column due to the fact that only a portion of the total lifecycle impacts of the plastic boxes should be accounted for in the first year of their use.

Cardboard boxes are each used one time, so their resulting GHG emissions are accounted for in the year they are used. Because plastic boxes and totes can be used 100 times, only 2,167 total plastic boxes are needed to replace all 13,000 cardboard boxes used in one year (see table 1 for replacement assumptions). The GHG emissions of those 2,167 reusable boxes are calculated by multiplying the total by the GHG emissions per use (values from table 3) by the number of reusable box shipments year (the study assumes 6 uses per year; see table 2).

The table assumes that all plastic boxes are either the C25 plastic box or the blue tote.

An average of 1,083 cardboard boxes are shipped to State agencies each month; the results in table 5 assume all cardboard boxes could be replaced by either plastic boxes or plastic totes. In a year, that is nearly 13,000 boxes. The total quantity of plastic boxes or totes required to replace those cardboard boxes is estimated at 2,167.

Table 5. GHG Emissions from Packaging and Reduction Potential

Packaging Type	Quantity	GHG emissions (kg CO ₂ e for 1 year)	# Uses	Lifetime GHG Savings over 16 years (kg CO ₂ e)
C20 Cardboard	2,972	1,783	1	Not Applicable
C25 Cardboard	6,500	5,200	1	
C35 Cardboard	504	403	1	
C40 Cardboard	3,024	2,631	1	
Total Cardboard	13,000	10,017	1	Not Applicable
C25 Plastic Box	2,167	61	100	159,296
Plastic Tote	2,167	231	100	156,576

Replacing the single use cardboard boxes with reusable plastic boxes or totes yields significant yearly and lifetime savings of CO₂e.

Solid Waste Reduction from Reusable Packaging

In addition to reducing GHG emissions, plastic boxes and totes can reduce the amount of waste sent to the landfills and other waste management methods (including recycling). Table 6 below estimates the waste reduction potential of the reusable packaging.

Table 6. Packaging Waste and Reduction Potentials

Box	Quantity per year	Weight (kg)	Waste to Landfill 1 year (mt)	Waste to Recycling 1 year (mt)	Yearly Reduction of Total Waste (mt)	16 Year Lifetime Reduction of Total Waste (mt)
C20 Cardboard	2,972	0.43	0.19	0.45	Not Applicable	
C25 Cardboard	6,500	0.52	0.49	1.23		
C35 Cardboard	504	0.52	0.04	0.10		
C40 Cardboard	3,024	0.61	0.27	0.64		
Total Cardboard	13,000	Not Applicable	0.95	2.41		
C25 Plastic Box	2,167	0.91	0.05	0.01	3.3	53
Plastic Tote	2,167	2.95	0.17	0.03	3.2	51

Table 6 shows that if the corrugated cardboard boxes were replaced with C25 plastic reusable boxes, a total of 3.3 metric tons of waste could be prevented each year. Over the life of the reusable C25 plastic containers a total of 53 metric tons of waste could be reduced. If the reusable totes were used instead of the reusable plastic boxes, 3.2 metric tons of waste would be prevented each year and 51 metric tons of waste prevented over the lifetime of the totes. These estimates assume that the State is recycling the corrugated cardboard at the national average rate of 71%.

When corrugated cardboard boxes are shipped, void spaces are filled with “Air Pillows”. These plastic air pillows, made from low density polyethylene (LDPE) were eliminated in the plastic reusable packaging. United Stationers and Innovative Office did not include air pillows with the reusable boxes in the pilot test to determine if they were necessary. There was no negative feedback from the State pilot agencies to suggest that elimination of the pillows caused any problems. Figure 5 shows a picture of the air pillows which come in a large size and smaller size.

Figure 5. The Cardboard Packaging Air Pillows



United Stationers estimated the quantity of air pillows that had been saved by using the plastic box and blue tote. The quantity of air pillows per box varies based upon the packaging contents. During the pilot, 946 total air pillows were eliminated from the waste stream. Table 6 shows a potential yearly reduction of LDPE pillows through the use of reusable boxes and totes.

Table 6. Yearly Air Pillow Avoided Waste

Box Type	Number of box type used per year	Number of air pillows used by box	Total Number of air pillow needed	Weight of one air pillow (grams)	Air pillow waste sent to landfill per year (kg)	Yearly Waste Reduction Potential (kg)	16 Year Lifetime Waste Reduction Potential (kg)
C20 Cardboard	2,972	4	11,888	1.13	13.4	Not Applicable	
C25 Cardboard	6,500	6	39,000	1.7	66.3		
C35 Cardboard	504	4	2,016	1.1	2.2		
C40 Cardboard	3,024	6	18,144	1.7	30.8		
Total LDPE	NA	NA	71,048	NA	112.7⁶		
Reusable Plastic Box or Tote Alternative	2,167	0	0	0	0	112.7	1,803

⁶ The study assumed that the LDPE pillows are not recycled.

Using either the plastic totes or the plastic boxes could reduce LDPE waste to landfill by 320 kg over the lifetime of the boxes. This equates to a yearly reduction of 20,495 air pillows and a reduction over the lifetime of the reusable containers of 328,622 LDPE air pillows.

Recommendations

- Both the plastic totes and plastic boxes show a lifetime savings of waste and GHG emissions over using cardboard boxes. Vendor and staff feedback suggest that the totes are more user friendly and may last longer than the plastic boxes (see Appendices A and B for user feedback). Based on the results of the study, it is recommended that the State consider the use of reusable packaging.
- Prior to moving forward, discussions with United Stationers and Innovative Office should occur to determine feasibility. Specifically :
 - the cost implications should be investigated
 - United Stationers and Innovative Office should address methods of storing, loading and handling reusable boxes
 - A method to apply appropriate, and in some cases necessary labels should be addressed
 - Training of State Agency staff on appropriate handling of the reusable containers should be addressed to ensure all containers are returned.
- The reusable blue tote is recommended as the best of the tested reusable containers. The size of the tote allows orders of varying size to be shipped and requires less handling than the plastic box, it will likely show less visible signs of use, and is easier to handle.
 - It is likely that because the weight of the plastic reusable containers is greater than the cardboard boxes that transportation emissions associated with moving the boxes between facilities are greater. However, transportation emissions are small compared to the GHG emissions of manufacturing the boxes. GHG emissions related to shipping represent less than 1% of total GHG emissions for all box types. Therefore, the GHG emissions increase due to transportation using heavier reusable boxes will be small to negligible.
- It is recommended that United Stationers utilize multiple plastic sleeves attached to the reusable boxes to allow placement and easy removal of necessary shipping labels.
- It is recommended that an additional pilot study be conducted over a longer period of time, up to one year, to allow United Stationers and Innovative Office time to investigate the most efficient manner of handling the totes.
- Finally, it is recommended to reduce or eliminate the plastic pillow dunnage based on the results from the pilot trial.

Appendix A. Final Pilot Test Comments from Innovative Office and United Stationers

Appendix A includes United Stationers' and Innovative Office's final comments on the pilot process. A summary of the feedback follows:

From their perspectives the pilot went well for them and they have a few suggestions in areas where the reusable boxes made processing at their end challenging. In all, the challenges were small and could be overcome with a few changes in procedures.

The samples of the plastic box were white. If white boxes are used in the study, it is likely that they will show dirt and use quickly and become unattractive. This could be a potential downside to using the plastic boxes and alternate colors should be investigated that will not show dirt and wear easily.

Because the plastic boxes are new, assembly and disassembly instructions may be needed on the boxes so operators can properly assemble and break down the boxes without damaging them.

Six plastic boxes were lost during the pilot. This is concerning and shows that staff training necessary to ensure the boxes are returned to the correct location and that State employees understand the boxes need to be returned (i.e. they are not available for employees to take home with them). In addition, one or more plastic sleeves should be added to each box or tote to allow for proper labeling of the boxes for shipment.

Because the process of generating an order to be shipped in the reusable boxes was manual at the Innovative and United warehouse, there is concern about using this system moving forward. United feels that the system used is not adequate to handle the large amount of daily orders at this time. In addition, the boxes are assembled differently and cannot run on the conveyor line, the taping of the top and adding of the dunnage (filler material used to protect the cargo during transport) , typically performed on the conveyor line, will have to be performed differently. United was still investigating this at the time. United spent additional time manually building, labeling, and filling the boxes over and above what they would normally use for cardboard boxes that can be handled on the conveyor belts.

It is recommended that The State work with United and Innovative to determine if reusable boxes are a good long term solution for product delivery.

Pilot Results Report from Innovative Office Solutions and United Stationers

Project Launched at 2 State of Minnesota Agencies

Department of Human Services (DHS) and Pollution Control Agency (PCA)

Pilot test period: 8 weeks of running the pilot; 2-3 weeks of preparation

This Packaging Reduction Project between Innovative Office Solutions, United Stationers Eagan and MPCA was sought strictly for the purpose of gaining knowledge of packaging reduction, reuse, and redesign opportunities and overall reduce landfill waste and emissions into our environment. During this pilot we had a total of 50 white plastic boxes and 40 blue totes.

Table B1. Pilot Testing Packaging Quantities

Month	Number of Orders Shipped	Number of Reusable Packaging Boxes Shipped to DHS	Number of Reusable Totes Shipped to PCA
May	105	73	12
June	128	87	3
Total	233	160	15

Table B2. Pilot Testing Quantities and Cost Savings by Packaging Type

Month	B-20	C-10	C-15	C-20	C-25	C-35	C-40
May	5	6	18	15	27	3	15
June	18	7	15	13	36	4	14
Total	23	13	33	28	63	7	29
Cost Savings	\$2.07	\$2.99	\$9.24	\$11.76	\$63.57	\$3.78	\$29.71
Cost Savings Total for May and June	\$123.12						

An inventory audit was performed on July 3, 2013 for all 50 White Plastic Boxes and 40 Blue Totes used during the pilot.

Results:

White Plastic Boxes – United Eagan 17/ Innovative 17 – Short 6

Blue Totes – United Eagan 40 – All accounted for.

Pilot Project Feedback from United Stationers:

- This project wasn't consistent to normal operations; we would have seen impact on our overall efficiencies if it this pilot program was done at a larger scale.

- Had to create a separate truck code to separate the 2 State agencies from other IOS orders. Shipping needs to print an additional manifest nightly.
- United's current Warehouse Management System (WMS) unable to direct new totes to orders, manual process by outbound team.
- Couldn't use conveyor because of taper and logo printer located on shelf accumulation line; this was a manual process to bring all plastic boxes and blue totes to shipping.
- Unable to use hazmat labels (stickers) correctly with plastic boxes and blue totes. Labels should be on ends of carton per SOP and OSHA. Hazmat stickers don't come off easy; this was a manual process to peel them off by outbound team after each use.
- At times totes (white ones) were not coming back in a timely manner, had to use corrugated cartons.
- C25 white plastic box didn't fit all orders, had to repack out to larger corrugated carton, impact to LPH.
- Storage of addition plastic boxes and blue totes in an already full staging area.
- White Plastic Box feed-back;
 - The box is very sturdy and held up to all different weights.
 - White box showed dirt, easy to clean?
 - Safety concern, sharp edges.
 - Hard to handle and transport and stage on floor.
 - Not real user friendly.
 - Transporting back and forth, breaking them down or stack, may impact number of usages?
 - They are partially see-thru, possible risk of theft.
 - Life cycle?
- Blue Tote feed-back
 - Similar to our larger C40 carton, no repack of orders needed.
 - More durable than the collapsible white plastic carton
 - Hard plastic totes are stackable not broken down for more of a simplistic carton return, however stackable.
 - Easy to transport and stage in our shelf induction area
 - Life cycle?
 - Heavier than white plastic box

Things that went well or saving;

- Organized pilot by Innovative and United Eagan teams
- Support of United's outbound team
- It wasn't a huge inconvenience based on this pilot with (PCA) and (DHS).
- We would save taper time (and tape) not sending them through the taper.
- Labor saved not making boxes

"Thank you by the entire United Stationers Eagan Team"

Additional feedback from Innovative Office Solutions

First and foremost I would like to thank Bob and United for working so diligently on this program with Innovative Office Solutions to help this program run as smooth as possible.

What I have found out from our end users and also our drivers is that the plastic white corrugated boxes were NOT user friendly!

They were clunky, hard to break down, not easy to house and transport and very well could be a hazard due to the sharp edges and possible falling or tripping hazard while carting the bins back and forth. Also I do not see these being more cost effective due to purchasing of extra bins to house the totes.

Our costs for 1 bin to house the White Totes are \$41.00 per bin. I also have to have an extra one on the truck for our driver to switch out daily. Also we had to label each individual box with our Innovative Office Solutions logo and numbering to keep track of the totes. I do have the cost break down of this listed below.

As for the Blue Totes, Our end users and our drivers found to these to be more user friendly and easier to house and transport. They are easy to use and I do not see any possible hazards. I do understand the cost would be more, but in the end we would save money due to them being sturdier and less likely to break down due to high volume usage.

We had purchased 50 white totes and 40 Blue totes which Innovative Office Solutions had labeled all with logos on either side along with numbering. The cost for the logo's and numbers was \$396.84 that does not include labor.

Going forward... If our goal is to roll this program out to all of our State of MN customers we need to get an accurate box count. We are unable to do this with only doing a pilot with 2 agencies. The only way to have a true carton count would be for my transportation manager and myself to sit down and determine which accounts are the true State of MN customers, change the route codes on our end in order for United to track carton quantities and for all of us to understand the true carton count and to determine if it would be more cost effective. We also need to determine if it is worth the man hours and the manual process that has gone into this and will continue if we do move forward with this program.

Thank you!

Jeanne Thompson | **Innovative Office Solutions** | Customer Care
Tel: 952.808.9900 Ext 201 | Fax: 952.894.7153

Appendix B. PCA and DHS Staff Feedback

PCA Feedback

Verbal feedback from the PCA staff person who handles deliveries was that the staff was really happy with the blue totes. They developed a great system where they unpack the totes and return them to the driver immediately. These were small orders and thus easier to unpack immediately.

DHS Feedback

Overall comments from DHS staff were positive. The staff liked the plastic boxes. They mentioned that it would have been easier to return the boxes to the area where they pick up their packages rather than return the boxes to the loading dock. They also mentioned that they sometimes use the used cardboard boxes to mail out items. One commenter suggested that the plastic boxes were harder to open than the cardboard boxes.

An email was sent to DHS employees to gather their feedback on using the reusable packaging during the pilot process. Below are the received responses:

Response 1:

- 1) Approximately how many plastic boxes have you received each week? **one**
- 2) How has the delivery and collection process gone? **Fine, no complaints**
- 3) Do you have any other comments on the totes or the process? **Seems to be working well**

Response 2: Please allow us to return the empty containers to the service centers where are items are delivered, rather than having to take them to the dock area.

Response 3: I second that request! (referencing response 2)

Response 4: Right now we are missing a blue tote. I'm interested in hearing how many reusable boxes are missing too?

Response 5: Although I don't mind going down to the loading dock, but Sara's request would have to be my only set back so far as well.

Response 6: I myself love the boxes! They are easy to open, easy to carry and I LOVE the reusable cartons...

Response 7: Never got the recyclable totes just the paper boxes

Response 8: I've only had one delivery since the project began.....and the delivery process wasn't any different from before/went smoothly and the totes worked fine for me.

Response 9: I don't believe it's that much of a hardship to have to take the empty containers down to the loading dock.

Response 10: So far everything I have received goes smoothly and the boxes seem to work fine. From the meeting I do remember it was decided that we take the boxes down to Larry to avoid having people think they could take them home.

Response 11: I have not received any containers, so cannot answer this question. I guess it would be difficult for Larry to run around and pick up containers from everyone, though it would be nice not having to take them down to the loading dock.

Response 12: I have had no problems with using the plastic tote.

Response 13:

- 1) Approximately how many plastic boxes have you received each week? 2-3
- 2) How has the delivery and collection process gone? **It has gone fine but unfortunately I was in a car accident and hurt my left hand so opening these boxes have not been too easy for me. I think the worst part is the taking them down when I drop them off in the bin – a few times Larry has had to help me – love that guy. J**
- 3) Do you have any other comments on the totes or the process? **No, kind of miss the cardboard boxes as we used them sometimes to mail other stuff out – of well, I'll learn to live with it as being green is good!**

Response 14: I've only received one delivery since that pilot started. It's no problem for me to deliver the box down to the dock. But whatever is decided, I'm fine with it.

Response 15: I have received 3 orders from Innovative Office Supplies. I like the plastic boxes. I don't order that much, so I can't give you a weekly count. The return process works well for those who want to bring the boxes downstairs. But that doesn't happen to often for the Aging side, so I bring them downstairs to be picked up.

Response 16: I think that it is working great! Way less cardboard to recycle. Each supply order I get on the average of 2 to 3 boxes each time which is good. I don't mind taking them down to the dock area here at the Andersen.

Response 17: I like the plastic bins but I, too, wish we could just put them back by our mail stop...