



Our mission is to reduce waste today through innovative resource management and to reach a waste-free tomorrow by demonstrating that waste is preventable, not inevitable.

February 17, 2009

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Public Works, Environment, & Transportation Commission:
City of Roseville
2660 Civic Center Drive
Roseville, MN 55113-1899

Dear Commissioners:

Eureka Recycling is pleased to present the 2008 report on Roseville's recycling program. As a nonprofit organization with a mission to demonstrate that waste is preventable, not inevitable, we value our partnership with The City of Roseville and are proud to be part of The City's efforts to continually improve its recycling program.

In 2008, Roseville and Eureka Recycling worked with recyclers to increase their knowledge about what is and is not recyclable and continued to promote the addition of milk cartons and juice boxes to the program. Eureka Recycling also focused on growing the multifamily building (apartment) recycling program. This work resulted in an increase in the number of residents participating in Roseville's recycling program and a significant revenue share back to The City.

Here are the highlights of 2008's accomplishments:

Increase in Participation

In 2008, the number of residents participating in both the curbside and multifamily recycling programs increased. **Participation in the curbside program was 82%**, representing an amazing 7% increase.

By including the number of apartment units with access to the multi-family, program participation is up 8%.

2828 Kennedy Street NE \ Minneapolis, MN 55413 \ (651) 222-7678 \ Fax (612) 623-3277 \ www.eurekarecycling.org

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Increased Revenue Share

In 2008, Roseville saw a substantial increase in its revenue share for recycled material, with **\$134,348.87 going back to the city this year!** In the first three quarters of 2008, market values soared to new and unfortunately unsustainable heights. These high market values allowed Roseville to benefit from increased revenue share in 2008. However, in the fourth quarter of 2008, the markets began a rather steep correction with the prices paid for recycled material dropping significantly.

Even in the current economy there is a bright spot for Roseville's recycling program. Because of the quality of material generated in Roseville's dual-stream collection program, while even at these low prices other programs are having trouble finding any buyers to take their material and are warehousing it, Roseville's material continues to find buyers.

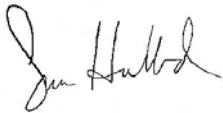
Because of the quality of our material and the deep relationships we have nurtured with our end markets, Eureka Recycling is still able to find buyers for materials collected in Roseville and our other partner cities. This assures that **even in a time of recession in the broader economy, Roseville's material continues to be recycled to the highest and best use possible.**

In addition to these key highlights, Eureka Recycling continues to provide The City of Roseville with detailed tracking and reporting to help The City meet the goals of its recycling program. This data allows us to measure progress as we move forward and identify the areas to prioritize as part of our annual work plan.

From our close interaction with city staff, attendance at neighborhood events, and hundreds of conversations with Roseville residents, we can see that Roseville is strongly committed to increasing the environmental benefits of their recycling program. We believe The City is well positioned to implement our recommendations for the 2009 work plan in an effort to further increase its recycling rate in 2009.

We look forward to working together with Roseville as we work toward a waste-free tomorrow. If you have any questions, please contact us at (651) 222-7678.

Sincerely,



Susan Hubbard
CEO and Co-President



Tim Brownell
COO and Co-President

CC: Tim Pratt, Communications Specialist
Duane Schwartz, Public Works Director

City of Roseville

Year-End Recycling Report 2008

Overview

This report includes some highlights from Roseville's recycling program in 2008. Roseville continues to be a strong recycling community. In 2008, Roseville's decisions to protect the quality of their recycling materials, to add new materials to its program, and continue to educate recyclers about the environmental and economic benefits of recycling have paid off. Just like many industries, the recycling industry has been hit hard by the slumping global economy, making the markets for recyclable more competitive. In these times, markets are looking to Eureka Recycling's high quality materials to make new, albeit fewer, products.

Furthermore, despite what's happening in the recycling industry, the movement of recycling remains strong, especially in Roseville. More people are recycling than ever before. The environmental, economic, and social benefits of recycling have never been more in demand.

Tonnage Summary

Despite a downturn in the state and national economies the amount of materials recycled in Roseville in 2008 is holding relatively steady. With purchasing going down in most or all sectors of the economy the tons recycled in 2008 was up just over 3% over the amount recycled in 2006 and down just over just over 3% from the boom consumer buying year of 2007.

Route	2006 Total Tons	2007 Total Tons	2008 Total Tons
Monday	852	893	832
Tuesday	464	500	467
Wednesday	454	457	461
Thursday	706	736	719
Friday	482	507	465
Curbside Total	2,958	3,094	2,944
Multifamily Total	483	587	612
Roseville Total	3,441	3,681	3,556

Roseville's steady rate suggests that residents understand the importance of recycling both for the environment and the economy. This can be attributed to the continued commitment of the city to educate and inform its residents about recycling and waste reduction issues.

Multifamily Building Recycling

The multifamily recycling program in Roseville continues to grow, showing that Roseville continues to play a role in the metropolitan area as a leader in establishing multi-family recycling programs for its residents. The number of tons recycled by multifamily residents is up and the number of multifamily units with access to Roseville's recycling program increased by 8%.

Annual Participation and Set-Out Rate Studies

More people than ever before are recycling in Roseville. The number of residents who participate in Roseville's recycling program is an impressive 82%. Because of an increase in the number of people recycling in Roseville, the overall amount of material recycled in Roseville has remained relatively steady over the last two years despite the fact that the overall economy and purchasing habits of consumers has declined.

	2006	2007	2008
Set Out Rate	60%	50%	58%
Participation Rate	74%	75%	82%

Eureka Recycling conducted the annual participation and set-out rate study from October 20 to November 14, 2008. (See Appendix C for the definitions and methodologies of the participation and set-out rate studies.)

Roseville's participation rate can be attributed to the consistent and high quality education and information that Roseville provides to its residents. This information both informs them of new materials such as milk cartons, juice boxes, clothes, and linens, but also inspires them with information about the economic and environmental benefits of recycling. This information gives the residents the tools they need to participate and the motivation to take the steps in their own households to help reduce waste.

Annual Composition Study

In this year's composition analysis, conducted in February of 2008, Eureka Recycling collected 84,050 pounds of material. This material was run through Eureka Recycling's sorting facility separate from all other materials to breakdown Roseville's recycling into different types (see chart below).

Type of Material	2006 % of Total Tonnage	2007 % of Total Tonnage	2008 % of Total Tonnage
Total Annual Tons	3441	3681	3556
Paper & Cardboard (papers)			
News Mix	63.98%	56.46%	66.00%
Cardboard	6.71%	13.23%	4.5%
Boxboard	2.37%	7.60%	2.6%
Pop & Beer Boxes (carrier stock wetstrength)	0.36%	0.10%	.50%
Phone Books	1.33%	0.11%	.1%
Milk Cartons & Juice Boxes	Not collected	Negligible	Negligible
Clothes & Linens (Textiles)	0.40%	Negligible	Negligible
Residual	0.24%	0.11%	.5%
TOTAL	75.4%	76.6%	74.2%
Bottles & Cans (containers)			
Total Glass	14.89%	15.15%	16.7%
<i>Brown (Amber) Glass</i>	<i>2.01%</i>	<i>1.46%</i>	<i>2.6%</i>
<i>Clear (Flint) Glass</i>	<i>3.32%</i>	<i>3.84%</i>	<i>4.5%</i>
<i>Green Glass</i>	<i>2.74%</i>	<i>3.59%</i>	<i>2.9%</i>
<i>Mix Glass</i>	<i>6.82%</i>	<i>6.26%</i>	<i>6.7%</i>
Steel Cans	2.64%	2.00%	2.4%
Aluminum Cans	1.48%	1.10%	1.4%
Total Plastic Bottles	4.70%	4.01%	4.6%
<i>#1 PET Bottles</i>	<i>2.34%</i>	<i>2.05%</i>	<i>2.6%</i>
<i>#2 HDPE-NATURAL Bottles</i>	<i>1.11%</i>	<i>0.98%</i>	<i>1.1%</i>
<i>#2 HDPE-COLORED Bottles</i>	<i>1.25%</i>	<i>0.98%</i>	<i>.9%</i>
Residual	0.89%	0.15%	.7%
TOTAL	24.6%	22.4%	25.8%
Total Residual	1.13%	0.26%	1.2%

Eureka Recycling conducted the annual composition study in February 2008. For more information on the methodology of the composition analysis see Appendix B.

There are several important and interesting things to note about this year's composition as compared to previous years.

- **The percentage of paper and cardboard (papers) compared to bottles and cans (containers) has shifted.** Closer examination of this shows that cardboard as a percentage of the paper stream is significantly down (nearly 10%). In a slower economy it is typical to see less cardboard. Cardboard recycling in a household is

generally a result of large purchases of durable goods or electronics. As the sale of these items dropped in 2008 so to did the resulting tons of cardboard being recycled.

Conversely, as more people stayed home rather than dining out the percentage of food and beverage containers showed an increase. Along with that the paper packaging for these items also increased significantly as you can see in the category of pop and beer boxes.

- **New materials make a difference.** Roseville is one of the few communities to ensure the pop & beer boxes collected in its curbside recycling program are actually recycled. At Eureka Recycling's facility, pop and beer boxes are separated from all other papers and sold to mills that can use the material to make new products. Pop and beer boxes contain an additive called wetstrength, which make them incompatible with other types of paper (like cardboard, newsprint or office paper) in the pulping process. By collecting and separating out these boxes, nearly 18 tons of material that was recycled in this community would have been wasted in other cities.

Milk cartons and juice boxes and cloths and linens are the newest materials to be added to the recycling program in Roseville. These materials did not register in a sample study and is negligible on the composition chart above because the percentage of this material is small compared to well-established items that people have been recycling for decades.

Just like it took years to establish paper, bottles, and cans in recycling programs in the 1980s, it takes many years to fully communicate a new material as recyclable in a community. Overall, Eureka Recycling and it partner cities together have made strides to increase this material. In 2008, Eureka Recycling collected and recycled 59 tons of Milk Cartons and Juice Boxes and 100 tons of Clothes and Linens all of which would have been unnecessarily wasted in most other cities.

Revenue Share Summary and Markets Update

The amount of revenue that the City of Roseville received in 2008 was significantly higher than in 2007 and over 35% higher than in 2006. The total amount of revenue in 2008 was much higher than projected at the onset of the contract with Eureka Recycling. When Roseville entered into a recycling service contract with Eureka Recycling in 2006, the city began receiving revenue share from the sale of the materials collected in their recycling program for the first time. Since 2006, Roseville has received \$336,358.15 in revenue from recycling to continue to invest in the city's recycling or other environmental programs.

	2006 Rev	2007 Rev	2008 Rev
1st Quarter	\$21,165.32	\$22,749.81	\$33,159.16
2nd Quarter	\$23,403.59	\$27,992.48	\$39,090.85
3rd Quarter	\$19,483.86	\$30,002.00	\$47,928.25
4th Quarter	\$22,661.14	\$34,551.08	\$14,170.61
Total	\$86,713.91	\$115,295.37	\$134,348.87

2008 Market Review

The values of recyclable materials were at historic highs for the first three quarters of 2008. However, significant changes to the global economy took effect in the last quarter of 2008. Beginning in October 2008 and continuing through the beginning of 2009, Eureka Recycling began to see the impact the troubled economy was having on the prices being paid for recycled material. Worldwide demand for recycled commodities has decreased by at least one-third and the value of recycled commodities has decreased by about two-thirds across the board. A convergence of weak economies, damaged financial institutions, and an expected market correction led to the price downturn in the last quarter of 2008 which continues in 2009.

When and to what extent the recycling markets will recover is difficult to predict. Industry experts do expect that the recovery will be slow as it mirrors the economy. Furthermore, commodities are not expected to rebound to as high as levels reached in October 2008 because recycling commodity prices were at unsustainable highs at that time and were already trending downward to more sustainable levels.

The current state of recycling is not an issue about the viability of recycling.

It is a much bigger issue about the economy. The current recycling economic downturn parallels those of nearly every other industry worldwide including auto manufacturing, housing, construction, publishing, and consumer products.

In the late 1980s and again in the 1990s the recycling industry suffered a different kind of economic downturn that lasted a year or less and market demand rebounded. These previous downturns were caused more because the recycling industry had not grown to the point where it was fully integrated into the larger manufacturing market. In those cases, gluts in the amount of material waiting to be recycled caused sharp and sudden price drops

even though the overall economy was stable. Since that time we have all done work together to build recycling into a massive grassroots movement, particularly here in Minnesota where over 75% of the people participate. Manufacturers are also much more on board and recognize the benefits of using recycled material in their process.

What we are experiencing in 2008 and early 2009 is an across the board, massive global slowdown in manufacturing and consumption which is temporarily driving down the demand for the recyclable materials collected right along with all other materials and products throughout the economy. Rather than rising and falling on a separate trend from the rest of the economy, recycling is now a full participant in the global economic market. This actually strengthens the recycling industry as it shows this industry is now depended on by other larger manufacturing bases.

Roseville's quality materials make a big difference in this economy.

The challenge for recyclers in this economy is to continue to move materials to market. There are still plenty of markets out there that need quality material—i.e. mills that make the newspaper and magazines you still buy, mills that make the cereal box you used this morning, and aluminum plants that are producing the soda can that sits on your table. These mills want to keep the supply system viable. Although the prices currently being paid for recycled material during the global economic downturn are lower, recycling in Minnesota is still a \$3.48 billion dollar industry that creates over 20,000 green collar jobs.

It is a fact that companies still need our recyclables and there is still a tremendous environmental impact from our efforts. Eureka Recycling and the City of Roseville have carefully and thoughtfully designed the recycling program to share the risk and help weather these storms. Eureka Recycling has built strong partnerships with the end markets where all of the recyclable commodities are sold for manufacture into new products. During these economic times, these markets have acknowledged the superior quality of materials collected in Roseville and other Eureka Recycling partner cities, and have rewarded this continued commitment to quality that is a hallmark of Roseville's recycling program. Because the materials are of the highest quality available, Eureka Recycling is able to continue selling these materials to be recycled for their highest and best use. As partners dedicated to eliminating waste, the City of Roseville and Eureka Recycling can guarantee that the positive environmental and economic impacts of recycling will continue.

For years, there has been a profit to be made from the materials we sell to recycling markets. If there is not a financial profit to be made from recycling, or even if we must start to pay a little to recycle, recycling is still cheaper than disposal and the environmental benefits are extraordinary. Recycling is one of the easiest, cheapest, and quickest ways to reduce our energy use. For example, making a new aluminum can from old cans results in 90-97% energy savings compared to making a new can from bauxite and other raw materials. The recycling industry also contributes in important ways to the economy and is already a leader in the national movement to create new green jobs.

Economic Benefits of Recycling

According to the National Recycling Coalition, the largest national nonprofit organization with members that span all aspects of waste reduction, reuse and recycling in North America, recycling in the U.S. is a \$236 billion a year industry. More than 56,000 recycling and reuse enterprises employ 1.1 million workers nationwide. In Minnesota alone, the Minnesota Pollution Control Agency reports that the recycling industry creates 8,700 jobs directly but it is also responsible indirectly (as the "ripple effect") for an additional 19,000 jobs. The industry brings in \$93 million in state tax revenue and creates \$3.48 billion in gross estimated economic activity every year!

The recycling industry provides green jobs which stimulate economic growth while caring for the environment. Eureka Recycling has created over 100 quality green collar jobs in the Twin Cities. Every employee of Eureka Recycling earns a living wage while making it possible for all of us to live a greener lifestyle in our community. As a Twin Cities company, Eureka Recycling reinvests all of its proceeds back into the local economy of this community. Since 2001, we have given nearly five million dollars to the communities we serve and continue to set the standard in Minnesota for giving back revenue from the sale of recyclable materials.

The Environmental Benefits of Roseville's Recycling Program in 2008

There are many ways to calculate the benefits of recycling. To better explain these benefits in commonly understood terms, government agencies, research scientists and economists have created several "calculators" to translate the amounts of recycled materials collected and processed into equivalent positive societal and environmental benefits.

Most recently, it has become imperative to measure waste reduction (and all our activities) in terms of its impact on climate change. This allows us to speak in a common language, understand the impact of our choices, and help us prioritize the personal and policy actions that we take. Many cities around the country work with the International Council for Local Environmental Initiatives (ICLEI) to quantify and now register the climate change impacts of their city. It is also important to calculate the carbon impact of waste reduction as the global effort continues to enact a carbon "cap and trade" system.

In addition to climate change mitigation, there are other environmental benefits to recycling, including saving energy and protecting air quality, water quality, natural resources, natural beauty, habitat and human health. Some of these human health benefits are quantified in the Jeffrey Morris Calculator below.

The benefits of recycling and composting

In 2008, Eureka Recycling completed the report *Recycling, Composting and Greenhouse Gas Reductions in Minnesota* to calculate and explain the significant reductions in greenhouse gases through a zero waste approach. (See Appendix F)

"Recycling, composting, and producer responsibility are powerful tools to reduce waste and therefore, our greenhouse gas emissions. Specifically in Minnesota, reducing our waste has a greenhouse gas reduction impact equivalent to shutting down 20% of our

state's coal power plants, or reducing every car usage in the state by two-thirds, or using 75% less electricity in our own homes.” Page 2.

These calculations were added to the Minnesota Energy Challenge, a website designed for people to calculate their carbon footprint and learn how to save money and energy at home. Now, residents can calculate and see just how beneficial their household waste reduction activities are in addressing climate change. These same calculations can be applied to Roseville's citywide program to demonstrate the programs benefits to the environment in terms of climate change.

The Environmental Protection Agency (EPA) WARM Calculator

The equations used in environmental calculations try to take into account the “full life cycle” of each material... everything from off-setting the demand for more virgin materials (tree harvesting, mining, etc.) to preventing the pollution that would have occurred if that material were disposed of (burned or buried). Different calculators may include some or all of the many factors that contribute to the “full life cycle,” so results from calculator to calculator will vary.

While there are many models emerging to calculate greenhouse gas reductions, the most recognized and standard model is the U.S. Environmental Protection Agency's WARM model. The Waste Reduction Model (WARM) was designed to help solid waste planners and organizations track and voluntarily report greenhouse gas emissions reductions from several different waste management practices. The WARM model was last updated in August of 2008 and recognizes 34 material types.

Roseville	Total Recycling	Carbon Equivalent Reduction	Carbon Dioxide Equivalent Reduction
2006	3,441 tons	2,328.0 metric tons (MTCE★)	8,537.0 metric tons (MTCO2E)
2007	3,682 tons	2,460.0 metric tons (MTCE★)	9,018.0 metric tons (MTCO2E)
2008	3,556 tons	2,383 metric tons (MTCE★)	8,736 metric tons (MTCO2E)

*MTCE (Metric tons of carbon equivalent), MTCO2E (Metric tons of carbon dioxide emissions) are figures commonly used when discussing greenhouse gas emissions.

What do these numbers mean?

The numbers above help municipalities calculate and track their environmental footprint. For more information about the process of measuring the environmental benefits of waste reduction, visit: <http://epa.gov/climatechange/wycd/waste/measureghg.html#click>.

These numbers, however, do not make much sense to the average person. To help recyclers understand the significance of their actions, the EPA has also developed tools to translate these numbers into equivalent examples that people can more easily understand.

- For example, using the figures above, the EPA estimates that Roseville would have had to remove a total of 1600 cars from the road for one year to have had the same environmental impact in 2008 as they did recycling. To achieve this, approximately 11% of Roseville's households would have had to give up one car for a year.

- Another example of how these efforts can be translated into energy savings can be found in the EPA calculator. It shows that the energy saving gained by the recycling efforts of Roseville's residents in 2008 could power the homes of just over 528 of their neighbors for one year.

Although WARM is the most widely peer-reviewed and accepted model, it is considered to have several flaws. Many believe the use of this calculator is conservative and understates the real impact of waste reduction efforts. However, despite these flaws, WARM is a well-recognized, published calculator. Until a better calculator is peer reviewed and accepted, WARM gives us a conservative starting place to measure these impacts and work towards our goals. Even with WARM, as you will see, the impacts are quite significant.

(http://epa.gov/climatechange/wycd/waste/calculators/Warm_Form.html)

Jeffrey Morris Calculator

Jeffrey Morris, Ph.D. Economist at Sound Resource Management in Seattle has developed a calculator that begins with the EPA's WARM calculator and expounds upon it to gather information on not just Carbon and CO2 but also several other important environmental and human health indicators. Although new and not yet widely-used, this calculator shows the significant benefits that WARM does not consider.

ROSEVILLE	2006	2007	2008
Total Recycling	3,441 tons	3,682 tons	3556 tons
Carbon Dioxide Equivalent Reduction (MTCO2E)	9,437.3 metric tons	9,619.0 metric tons	9,683.5 metric tons
Human Health – Non-Carcinogen Toxins Reduction	4609.7 tons	5,253.0 tons	4,665.7 tons
Human Health – Acidification (SO2) Reduction	26.9 tons	27.0 tons	27.3 tons
Human Health – Particulates Reduction	4.4 metric tons	6.6 metric tons	4.2 metric tons
Human Health – Carcinogens Reduction	1.9 metric tons	1.9 metric tons	1.9 metric tons

For more information about the process of measuring the environmental benefits of waste reduction, visit <http://epa.gov/climatechange/wycd/waste/measureghg.html#click>

Use of Biodiesel in Recycling Trucks in Roseville

In addition to the figures noted above, Eureka Recycling continues to run the entire collection fleet on a 20% biodiesel blend. None of the calculators above account for the additional reduction in greenhouse gases that result from the use of biodiesel. For more information, see the enclosed "Benefiting From Biodiesel" Fact Sheet (Appendix D).



Outreach and Education Summary 2008

In 2008, Eureka Recycling and Roseville focused curbside education efforts on communicating with current recyclers about their recycling program. This included the continued promotion of the addition of milk cartons and juice boxes to Roseville's program as well as information on the economic, social and environmental benefits of recycling.

Recycling Hotline

In 2008, Eureka Recycling's hotline staff had over 540 conversations with residents about the curbside recycling program and answered more than 78 calls about multifamily recycling in Roseville.

This year even greater numbers of Roseville's residents are familiar with the curbside program and Eureka Recycling as their recycling partner. As in 2007, the addition of milk carton and juice boxes generated some calls and presented opportunities to explain the environmental benefits of recycling and how new materials can be added to a recycling program.

	2006	2007	2008
Hotline Calls			
Curbside Calls	1000	425	540
Multifamily Calls	60	49	78
Total Calls	1060	474	618
Requests for Printed Materials			
Curbside	290	41	74

In 2008 the hotline staff also answered 78 calls from building contacts and residents participating in the multifamily recycling program that were calling with standard service questions. Eureka worked with these callers to help them manage their multifamily recycling set-ups, add carts or pick-ups, provide them with education material for their residents, and to work in many other ways to help improve their service.

Throughout the year Eureka Recycling mailed specific curbside recycling schedules and sorting information to 74 Roseville residents in response to their questions and calls. The increase from 41 requests in 2007 can be attributed to a significant increase in the number of residents participating in Roseville's recycling program. The number of participants was up 7%. That is an estimate of over 650 new recyclers in Roseville.

Curbside

Guide to Recycling

All Roseville residents in the curbside recycling program received the 2008 Guide to Recycling through direct mail. In addition to the basic instructions for how recycling should be set out, the guide included information about the economic, social and environmental benefits of recycling.

Requests for Printed Education Materials

Throughout the year, we mailed specific recycling schedules and sorting information to over 70 Roseville residents in response to questions and special requests.

Direct Education

	2006	2007	2008
Driver Tags	9,540	10,156	7,367
Postcards	650	822	451
Personalized Letters	30	51	0

Eureka Recycling drivers educate residents at the curb using educational tags for specific problems. In 2008 drivers left approximately 7,367 educational tags in recycler's bins. When there were no bins available to leave a tag, drivers reported any issues on a separate form, and in order to communicate with these recyclers directly, we sent out 451 educational postcards. Personalized letters with detailed information and instructions to residents about setting out recycling are used when the usual tags and postcards have not been successful in correcting repeated problems. As with the number of tags and postcards, the number of personalized letters was up in 2007 primarily as a result of confusion residents had with the switch to weekly collection. In 2008, the level of understanding Roseville's residents had about their recycling showed great improvement resulting in zero personalized letters being needed.

As in previous years, the most common issues for residents that required direct education were confusion about plastics (what types of plastic are recyclable), proper sorting.



Special Pickup Addresses

To ensure that every resident has the opportunity to recycle, Eureka Recycling offers to collect recycling from locations other than the curb for residents who request special pickup service due to short- or long-term physical limitations. This service is provided free of charge. Currently, this service is extended to almost 82 Roseville residents.

Multifamily

The City of Roseville has a very organized multifamily recycling program. This year one more building was brought on to the city program once their old service contracts expired and are now serviced by Eureka Recycling. The building was visited by Eureka Recycling staff to determine the proper setup and distribute educational materials to help the management ensure participation in the program. We have now a total of 81 multifamily complexes, 161 residential buildings, 12 city buildings, and 5,781 residential units being serviced on Roseville's program.



In February of 2008 Eureka Recycling contacted 163 building managers and had in-depth phone conversations discussing with them some updates in their collection schedule and to touch base about service levels, their recycling rates and their experience participating in Roseville's program.

In March 2008 Eureka Recycling mailed reports to all of Roseville's multi-family building managers providing them with the data on the tonnage recycled for their buildings and the environmental benefits of that effort. This communication provides the building managers with a concrete tool to work with their residents to get them inspired and motivated to increase their recycling.

Multifamily Education Materials and Customer Service

Overall, from 2008 to 2009 the number of units recycling in Roseville's multifamily program increased by 8% with tonnage increasing by over 4%.

Eureka Recycling continues to monitor the performance at each account on an ongoing basis in order to improve participation. Our drivers track issues and staff are able to follow up immediately by offering suggestions that address the specific needs of the building and providing more education materials for residents. Eureka Recycling provided almost 650 pieces of recycling education (instructional posters and brochures) to the building management and residents of the newly established and existing multifamily accounts in 2008.

Eureka Recycling continues to monitor the performance and service issues at each account in order to adjust service levels on an ongoing basis. Capacity for storage is an issue that gets addressed through our attentive drivers and involved on-site contacts so that more carts get added as residents recycle more. In 2008 an additional 60 carts were added to buildings where increased recycling capacity was necessary to service the increased recycling needs of the residents.

Special Education and Outreach

Special Events

On April 19, 2008, Eureka Recycling participated in the city of Roseville's Earth Day event at Harriet Alexander Nature Center. Approximately 300 Roseville residents enjoyed getting up close to Rosie, the award-winning recycling collection vehicle that was named in Roseville. Eureka Recycling staff had many conversations with residents about the recycling program. Eureka Recycling staff also enjoyed educating children on recycling through a recycling game that teaches them the sorting of bean-bag "recyclables" and tossing them into the trough of a wooden mini recycling truck.

In Addition to attending the Earth Day event, Eureka Recycling has worked in partnership with city staff to support efforts to make many city events zero-waste. Eureka Recycling has provided containers and material processing for several city events including; the Run for the Roses, Roseville's Wild Rice Festival and several summertime city staff picnics.

Milk Cartons and Juice Boxes

In 2007 Eureka Recycling entered into a new partnership with Tetra Pak to make it possible for residents to recycle their juice boxes and milk, soy, and broth cartons at the curb. Tetra Pak received a grant from the Minnesota Pollution Control Agency in 2006 to ensure their packaging gets recycled in Minnesota. Tetra Pak partnered with Eureka Recycling to collect this material from its curbside programs in Lauderdale, Maplewood, Roseville, Arden Hills, St Louis Park and Saint Paul and to process those materials at its facility. Please see Appendix E for more information on the milk carton and juice box recycling education efforts in 2008 and the impact they are having on the amount of this material that is being recycled.

Appendix A



Multifamily Recycling Report by Building 2008

Property Name	Primary Address	# Units	2006 Total lbs	2007 Total Lbs	2008 Total Lbs
1144 Dionne Street	Dionne Street, 1144	23	7,150	8,457	5,961
1363 County Road B	County Road B, 1363	11	1,892	1,910	2,744
161 McCarrons Street	McCarrons Street, 161	11	439	198	-
161 Minnesota Avenue	Minnesota Avenue, 161	6	148	678	423
1610 County Road B	County Road B, 1610	11	2,266	2,324	1,967
1614 Eldridge Avenue	Eldridge Avenue, 1614	11	1,424	1,280	2,651
1615 Eldridge Avenue	Eldridge Avenue, 1615	11	1,809	1,091	1,721
1624 Eldridge Avenue	Eldridge Avenue, 1624	11	2,541	2,029	1,996
1629-1635 Skillman Avenue	Skillman Avenue, 1629-1635	14	2,505	3,002	2,951
1635 Eldridge Avenue	Eldridge Avenue, 1635	11	3,284	1,702	1,650
1705 Marion Street	Marion Street, 1705	3	1,437	1,578	224
1750 Marion Street	Marion Street, 1750	24	3,511	3,576	4,317
2125 Pascal	Pascal Street, 2125-2133	22	2,514	3,184	5,239
2180 Haddington Road	Haddington Road, 2180	5	964	1,285	737
2275 Rice Street	Rice Street, 2275	8	1,924	2,830	2,852
2447 County Road B	County Road B, 2447	17	2,584	2,867	3,143
2610 Snelling Curve	Snelling Curve, 2610	17	2,929	2,696	3,164
2900 Highcrest Road	Highcrest Road, 2900	11	4,581	4,436	2,715
2950 Highcrest Road	Highcrest Road, 2950	12	2,980	2,295	2,486
Applewood Pointe	Applewood Court, 1480	94	47,799	58,215	46,499
Aquarius Apartments	County Road C2, 2425	99	-	-	15,391
Bonaventure	Lexington Avenue North, 3090	30	7,490	8,105	7,033
Centennial Gardens East & West	Centennial Drive, 1400-1420	190	26,759	21,852	22,677
Coventry Seniors Apartments	Snelling Avenue, 2820	149	19,939	19,110	22,729
Dale Terrace Apartments	County Road B, 720	42	9,360	7,793	12,033
Dellwood Condominiums	Dellwood Street, 1725	12	1,226	1,923	2,650
Eagle Crest	Lincoln Drive, 2925	216	13,892	60,799	56,057
Executive Manor Condos	Old Highway 8, 3153-3155	72	12,385	14,530	17,674
Garley Apartments	County Road B, 1634	11	2,153	1,161	1,415
Greenhouse Village	Larpenteur Avenue, 1021	102	19,032	37,098	28,751
Hamline House Condos	Hamline Avenue, 2800	150	34,102	33,973	32,182
Hamline Terrace	Terrace Drive, 1360-1410	102	12,817	12,230	17,366
Har Mar Apartments	Snelling Avenue, 2225	120	9,199	9,683	9,659
Heritage Place	County Road B West, 563	50	21,892	23,110	17,258
Hillsborough Manor	Woodbridge Street, 2335-2345	120	16,298	17,775	28,418
Karie Dale Apartments	Dale Street North, 2355-2393	44	6,691	7,455	9,794
Lake Josephine Condominiums	Lexington Avenue North, 3076	23	9,411	8,313	7,040
Lar Dale Apartments	Larpenteur Avenue West, 655	17	2,068	2,189	2,348
Lexington Court	Lexington Avenue, 2192-2206	52	3,390	2,970	4,293
Lexington Twin Apartments	Lexington Avenue, 1890	22	5,674	5,519	5,456
Lexlawn/Roselawn Apartments	Lexington Avenue, 1943	34	3,142	2,888	3,774
Marion Street/ Brittany Apartments	Larpenteur Avenue, 175	277	11,980	16,150	17,191
McCarrons Apartments	McCarrons Boulevard North, 166-204	67	5,092	4,919	5,543
Midland Grove Condos	Midland Grove Road, 2200-2250	174	48,162	60,937	50,758

Northwestern College Apartments	Lydia Avenue, 1610	40	6,061	7,839	4,941
Northwestern College/Snelling Terrace	Snelling Drive East, 2906	48	7,386	16,027	12,542
Palisades	Sandhurst Drive West, 535-570	330	40,078	41,635	55,306
Parkview Estate	Oxford Street, 2670-2680	204	28,447	29,206	30,816
Parkview Manor	Dale Street North, 2202-2210	34	4,931	4,553	5,085
Parkview Terrace	Oxford Street, 2690-2700	105	3,960	33,244	28,285
Ramsey Square Condos	Dale Street North, 2700-2730	192		35,796	34,991
Riviera Apartments	Highway 36 West, 925 & 965	64	12,473	13,597	19,108
Rose Hill Estates	County Road B, 591	51	4,341	4,904	5,880
Rose Mall Apartments	Albert Street, 2201-2221	54	37,328	41,412	43,984
Rose Park Apartments	Fry Street, 2128-2136	22	4,757	5,426	6,065
Rose Vista Apartments	Rose Vista Court, 1222-1238	154	19,697	18,366	24,634
Rosedale Estates North	Rice Street, 2835 & 2855	180	21,885	24,253	33,475
Rosedale Estates South	Rice Street, 2735	180	20,750	23,864	26,581
Roselawn Village	Roselawn Avenue, 1074	22	5,576	5,950	5,616
Rosepointe	Hamline Avenue, 2545 & 2555	190	32,650	29,485	33,312
Roseridge Estates	Samuel Street, 2086-2090	12	2,653	3,099	3,829
Rosetree Apartments	Highway 36, 655	48	12,251	12,394	12,654
Roseville Apartments, LLC	Eldridge Avenue, 1625	11	2,037	2,546	1,833
Roseville Arms Condos (Hilltop Apartments)	Elmer Street, 160-170	34	789	1,565	3,269
Roseville Commons	County Road C2 West, 2496	30	8,332	7,515	8,281
Roseville Estates	Lexington Avenue, 2599	107	5,593	9,842	12,312
Roseville Seniors	Larpenteur Avenue, 1045	127	25,581	33,600	30,521
Roseville Terrace	Dunlap Street, 1759	36	5,363	4,785	5,032
Roseville Townhomes	Old Highway 8, 3085	40		13,423	20,619
Rosewood Estates (Roseville)	Victoria Street, 2750	106	20,205	22,122	23,413
Rosewood Village	Highway 36 West, 1630	201	44,374	41,062	34,271
South Oaks Apartments	County Road D West, 1080	25	4,067	5,951	6,751
Sun Place Apartments	Marion Street, 1721	30	5,169	4,093	4,926
Sunrise Assisted Living	Snelling Avenue North, 2555	77	17,031	16,647	15,869
Talia Place	Old Highway 8, 3020	11	2,790	1,683	1,761
Terrace Park	Terrace Drive, 1420	36	12,784	13,045	9,853
The Lexington (Roseville)	Lexington Avenue North, 2755	150	37,081	30,796	35,417
The Riviera 2	Highway 36 West, 885	32	6,562	6,602	8,968
Valley 8 Apartments	Old Highway 8, 3050	85	11,085	9,910	12,626
Victoria Place	Victoria Street North, 2250	58		14,911	16,130
Villa Park Community Condominiums	County Road B, 500	95	15,890	14,276	18,589
Villas at Midland Hills	Fulham Street, 2001	32	2,873	11,653	12,600
TOTAL Residential	2008 2007 2006	5,781 5,662 5,367	889,918	1,103,190	1,162,779

Municipal Building	Address		2006	2007	2008
City Hall (Roseville)	Civic Center Drive, 2660		28,244	28,474	24,682
Evergreen Park Ballfield	County Road B West, 1810		497	515	456
Fire Station 1 Roseville	Lexington Avenue, 2701		3,226	3,630	2,134
Fire Station 3 Roseville	Dale Street North, 2335		1,564	2,786	3,604
Golf Course (Roseville)	Hamline Avenue, 2395		2,729	2,654	2,080
License Center	Lexington Avenue, 2737		79	178	10
Owasso Ballfields	Victoria Avenue, 2659		120	36	400
Public Works Garage (Roseville)	Woodhill Drive, 1140		8,341	12,089	13,916
Roseville (Fairview) Ballfields	Prior Avenue North, 2060		-	-	35
Skating Center	Civic Center Drive, 2661		4,877	5,038	5,244
Wildlife Rehabilitation Center	Dale Street North, 2530		14,607	13,948	12,726
Roseville CTV	Woodhill Drive West, 934			1,277	1,683
TOTAL CITY BUILDINGS			64,283	70,624	66,935
OVERALL TOTAL			954,201	1,173,813	1,229,714

Eureka Recycling Composition Analysis Methodology

Eureka Recycling collects materials in two streams: a “papers” stream consisting of various grades of paper (including cardboard), and a “containers” stream consisting of food and beverage containers (including glass, plastic bottles, and metal cans). As outlined in our contract, Eureka Recycling conducts an annual composition study of the two streams to create a basis on which the percent of each commodity collected in the two-stream commingled program can be estimated based upon total weight collected in the truck.

Composition by Stream

During the composition study, Eureka Recycling weighs each truck before and after tipping the papers to determine the weight of the papers and containers streams. Each truck has a stored tare weight that is updated regularly for accuracy. This weighing process allows us to determine what percentage of the total recycling collected makes up the papers stream, and what percentage makes up the containers stream.

Composition by Commodity of Each Recycling Stream



The composition study starts with Eureka Recycling storing all of the materials collected in the city in the containers stream during a one-week period in a separate bunker from all other materials at the facility. Eureka Recycling sorts these containers by material separately from all other containers at the facility using the sort line.

The sorted materials are then baled or put into a hopper and transported with a forklift to the truck scale to be weighed. Finally, Eureka Recycling weighs the total amount of each sorted material grade (including residual) to establish a percentage of composition each grade represents within the containers stream.

The entire process is then repeated with the papers stream to establish a composition percentage of each grade of paper within the stream.

(651) 222-SORT (7678)

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Eureka Recycling Participation Analysis Methodology

Eureka Recycling conducts an annual participation study in which both set-out and participation rates are analyzed and documented.

The **set-out rate** is the average number of households that set materials out for recycling collection on a given day. For example, every Monday for one month, collection drivers count the number of households that set out recycling on that day. Then the four numbers are averaged to determine the average number of households who set out recycling on a given Monday.

The **participation rate** is the number of households who set materials out for recycling collection at least once over a period of one month. The participation rate is a better indication of overall recycling participation because it includes households that recycle at least once a month, recognizing that some households may not set out recycling every week. It more accurately indicates how many households are participating in the recycling program *overall*, as opposed to the number of participants on a specific day.



Summary of Process

The study spans one month of collections. Eureka Recycling selects random sections to study for each daily recycling route, each section being comprised of about 200 households per day, for a total study of over 1,000 households. These same sections will be studied every year for consistency. Over a four-week period, Eureka Recycling tallies the exact number of households that set out recycling for collection in the morning of their collection day, before the driver services the section. The four-week study tracks recycling set-outs over the five days of collections during the week, totaling 20 days of set-out tracking.

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Benefiting from Biodiesel

Eureka Recycling's trucks are green in more ways than one! Since our trucks spend much of their time driving through metro area neighborhoods, we chose a 20 percent biodiesel blend to fuel our trucks. Biodiesel is a cleaner fuel made from soybeans that produces much less pollution than regular diesel fuel, which is better for the health of our employees and the families we serve. Even though it's more expensive (by only half of a cent per household per month), we are able to fund this initiative through the proceeds from the community's recycling program.

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Biodiesel burns cleaner than petroleum-based fuels.

According to the U.S. Environmental Protection Agency, a B20 blend:

- cuts emission of particulate matter—a contributor to respiratory disease—by 10%
- cuts carbon monoxide emissions by 11%
- cuts emissions of hydrocarbons—contributors to ozone and smog—by 21%

Biodiesel reduces contributions to the greenhouse effect.

- According to the U.S. Department of Energy, biodiesel produces 78% less carbon dioxide, a greenhouse gas, than petroleum-based diesel over its entire life cycle.
- Soybeans absorb carbon dioxide from the air when they grow, which offsets the carbon dioxide produced when the fuel burns.

Biodiesel supports Minnesota's agriculture economy.

- Eureka Recycling's use of biodiesel annually replaces 24,000 gallons of petroleum-based fuel with 432 acres of soybeans annually.

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2008 Curbside Campaign for New Materials

Background on Our Partnerships

In 2007, Eureka Recycling entered into a new partnership with Tetra Pak to make it possible for residents to recycle their juice boxes and milk, soy, and broth cartons at the curb. Tetra Pak received a grant from the Minnesota Pollution Control Agency in 2006 to ensure their packaging gets recycled in Minnesota. Tetra Pak partnered with Eureka Recycling to collect this material from its curbside programs in Lauderdale, Maplewood, Roseville, and Saint Paul and to process those materials at its facility.

In 2001, Eureka Recycling entered into a similar partnership with U'SAgain, a textile recycling company. Eureka Recycling sells the clothing to U'SAgain. According to the most recent numbers from the US Environmental Protection Agency (2005), more than 9 million tons of usable clothing is discarded each year. That's more than 70 pounds each year from every person in the United States! By adding them to the curbside recycling program, Eureka Recycling has made it possible for residents to help reduce the amount of usable clothing that is thrown in the trash.

In 2008, Eureka Recycling, with our partners Tetra Pak and U'SAgain, continued to work closely on market development and education.



Summary of 2007 Campaign

The 2007 campaign launch for Milk Cartons & Juice Boxes and Clothes & Linens included a press conference, education tags, ads in community newspapers, notices in grocery stores, an email alert, and the distribution of brochures to libraries, coffee shops, etc. This campaign proved effective at introducing people to these new materials. When residents received education, they recycled more.

- In every case when outreach was applied, there were clear increases in the amount of materials collected at the curb.
- As with any new materials, the amount of material collected grows steadily over time. It takes years of sustained education to reach mature levels of collection for new materials.

2008 Education

Eureka Recycling, Tetra Pak and U'SAgain continued an education campaign in 2008 that built on the momentum of the 2007 campaign and the success of the 2008 Guide to

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Recycling, which highlighted milk cartons and juice boxes with clothes and linens, and resulted in another increase in the recycling of this material.

Summary of 2008 Campaign

In the 2008 Guide to Recycling, Eureka Recycling combined two unusual items to highlight the unique nature of the recycling program. Eureka Recycling has collected clothes and linens for nearly 10 years, but it is still a new and unique material for many residents. By combining these unusual items in a humorous way, we accomplished three important goals.

- **Highlight the Uniqueness of the Entire Recycling Program:** When highlighting new materials (like milk cartons and juice boxes or clothes and linens) it is important to link the items to the whole recycling program. Historically, recycling education campaigns that promote the entire program—not just one item at a time—have proven to be more effective at increasing the amount of targeted materials and recycling overall. A key message of this campaign was to promote the overall recycling program.
- **Grab People’s Attention:** We worked to reach two audiences with this message: to grab the attention of current recyclers to recycle more and create intrigue about the program for new recyclers.
- **Avoid the Look of Advertising:** A campaign that highlights specific materials must avoid looking like advertising for the product or it does not have the desired affect: recycling in the bin. An unusual approach, connected to recycling, was designed to make people look twice.

Recommended Strategies

In addition to the Guide to Recycling, Eureka Recycling carefully chose education methods to meet these additional goals:

- **Reach every resident, not just those who are currently recycling.** The 2007 campaign was geared toward the recyclers and the general public. The 2008 campaign was targeted toward people who are not recycling these materials.
- **Effective at increasing recycling.** These methods are heavily weighted toward direct contact and people to people interaction, which are more effective than passive media coverage.
- **Provide the opportunity for Tetra Park product distribution.** One goal of this campaign was to promote the recyclability of Tetra Pak’s products.
- **Create more “hype” and repetition around the campaign.** We know people need the repetition of seeing a postcard in their mailbox, an education tag in their recycling bin, an ad in the paper, and in-depth information about the recycling program. Education must be diverse and constant.

Expansion to new cities

In 2008, Eureka Recycling began curbside collection services in The City of Arden Hills in March and The City of Saint Louis Park in October. Also, through a partnership with the cities of Lakeland and Lakeland Shores and a local hauler, Eureka Recycling began processing materials and providing direct education to these new cities in July 2007, while the hauler collected the materials at the curb. In a similar arrangement with The City of White Bear Lake and another hauler, Eureka Recycling began processing materials from

The City of White Bear Lake in September 2008 and will begin educating these residents in 2009. The 2008 campaign worked to bring initial education about recycling Milk Cartons & Juice Boxes, as well as Clothes & Linens to these communities.

Summary of Specific Strategies

1. Direct mail postcards

Direct mail is the most efficient, cost-effective way to reach every household, not just residents who are recycling. We created a direct mail postcard that:

- was printed on 100% postconsumer recycled content paper processed without the use of chlorine to minimize the amount of paper and environmental impact, and
- was mailed after Labor Day, when people return from summer vacations and when families return to school routines, and
- contained an attention grabbing message that distinguished it from generic public information and advertising.



2. Articles and website

Eureka Recycling wrote newsletter articles for the communities we serve about milk cartons and juice boxes as well as clothes and linens. These were released for newsletter and website distribution. This information provides the critical background and information that recyclers request on a daily basis via our hotline.

Date	Article	Publication
03/08	"Arden Hills Welcomes Eureka Recycling"	Arden Hills City News
03/08	"Lauderdale Recycling Challenge"	Lauderdale City News
03/08	"Maplewood Recycling Challenge"	Maplewood City News
04/08	"Now You Can Recycle More"	Arden Hills City News
05/08	"Make a New Addition to an Old Habit"	Lauderdale City News
05/08	"Make a New Addition to an Old Habit"	Maplewood City News
05/08	"Make a New Addition to an Old Habit"	Roseville City News
09/08	"St. Louis Park Welcomes Eureka Recycling"	St. Louis Park Perspective

Eureka Recycling updated its recycling pages on our website to include information about milk cartons and juice boxes and clothes and linens:

http://www.eurekarecycling.org/new_materials.cfm.

3. Translations

Eureka Recycling serves a diverse community. Other than English, the three most-spoken languages in our region are Spanish, Hmong and Somali. To reach a broader audience, Eureka Recycling commissioned accurate translations of information about how to recycle milk cartons and juice boxes. This information was highlighted in recycling fliers in Spanish, Hmong and Somali that are posted on the website, mailed to people who call our hotline requesting this information, and are used during outreach.

<http://www.eurekarecycling.org/pdfs/Spanishcurbside.pdf>

http://www.eurekarecycling.org/pdfs/Hmong_curbside.pdf

http://www.eurekarecycling.org/pdfs/Hmong_curbside.pdf

4. Door-to-door Outreach

Door-to-door canvassing, with bin delivery, has the most impact in engaging new recyclers. It provides an opportunity to reach every resident by either having a one-on-one interaction with them about the recycling program or leaving information behind on a door-hanger. It was also very convenient for residents because the bin is delivered directly to their home. This method had an added benefit for Tetra Pak, because sample products were distributed with the recycling bins, creating a direct and powerful image about the recyclability of their products. Tetra Pak provided sample products for outreach and events.



Eureka Recycling used its door-to-door training program to teach community group leaders and volunteers how to implement door-to-door recycling outreach. This model program not only engages residents, but empowers community and youth groups to become environmental educators in their own neighborhoods. This outreach method is time-consuming, so it was targeted at communities with lower participation.

From June to November 2008, Eureka Recycling focused an education campaign in the neighborhoods identified in Saint Paul Mayor Coleman's *Invest Saint Paul* initiative. *Invest Saint Paul* is a collaborative effort to address the full quality of life in Saint Paul neighborhoods that have been challenged by recent economic and social downturns and persistent disinvestment. These neighborhoods include Saint Paul's Dayton's Bluff, Eastside, Frogtown, and North End. Eureka Recycling provided recruitment, training, and one-site supervision for volunteers to distribute bins, sample Tetra Pak products, and printed materials including translations in Spanish, Hmong and Somali.

5. Events

Eureka Recycling is frequently asked by communities to participate in summer community festivals and annual National Night Out gatherings in August. Eureka Recycling targeted events to maximize exposure and to support door-to-door outreach.



Throughout the summer, Eureka Recycling attended nine events for this outreach effort, including gatherings held in each of the *Invest Saint Paul* neighborhoods, to promote recycling, distribute bins and Tetra Pak products, answer questions and encourage recycling. Eureka Recycling provided staffing at the events to distribute recycling bins, sample products, and printed materials including translations in Spanish, Hmong and Somali. Tetra Pak provided sample products for outreach and events.

Eureka Recycling worked with several volunteer groups to assist with the door-to-door outreach. The events were staffed by Eureka Recycling trained customer relations staff and interns. These included teenage volunteers from YouthCARE, the YMCA and college-aged groups from Macalester College. Eureka Recycling has worked with several of these organizations in the past on door-to-door outreach. The Minnesota Conservation Corps and Arts-Us volunteers also assisted with outreach efforts.

Schedule of door-to-door and event outreach

Door-to-Door Outreach	
July 8, 2008	YouthCARE volunteers in Rondo neighborhood of Saint Paul (480 households)
July 15, 2008	YouthCARE volunteers in Rondo neighborhood of Saint Paul (260 households)
July 21, 2008	YouthCARE volunteers in Rondo neighborhood of Saint Paul (571 households)
July 24, 2008	YMCA volunteers in Payne-Phalen neighborhood of Saint Paul (115 households)
July 18, 2008	Outreach with Arts-Us students in the Rondo Neighborhood of Saint Paul (130 households)
July 30, 2008	YMCA volunteers in North End neighborhood of Saint Paul (231 households)
August 5, 2008	Maplewood National Night Out (950 households)
August 26, 2008	Outreach with Macalester College students in Thomas-Dale neighborhood of Saint Paul (710 households)
October 2, 2008	Minnesota Conservation Corps volunteers (119 households)
October 9, 2008	Minnesota Conservation Corps volunteers (148 households)
Neighborhood Events	
June 25, 2008	Ice Cream Social 965 Payne Ave Payne-Phalen Neighborhood, Saint Paul

	(attendance: 200)
July 26, 2008	Rice Street Festival/Art Fair/Family Fest Lawson Ave at Kent St North End Neighborhood, Saint Paul (attendance: 200)
August 16, 2008	Lauderdale parade (attendance: 500)
August 23, 2008	Frogtown Health Fair & Football Tournament West Minnehaha Recreation Center Thomas-Dale Neighborhood, Saint Paul (attendance: 200)
September 10, 2008	Dayton's Bluff Neighborhood, Saint Paul Fire Station 4 505 Payne Avenue East, Saint Paul (attendance: 200)
September 13, 2008	Dayton's Bluff neighborhood cleanup (attendance: 300)
September 13, 2008	North End and Thomas-Dale neighborhood cleanup (attendance: 300)
October 18, 2008	Payne-Phalen neighborhood cleanup (attendance: 250)

Evaluation & Documentation

Eureka Recycling tracked the following evaluation measures:

- 1. Tonnage** The following are the total post consumer bales of Milk Cartons & Juice Boxes and Clothes & Linens, and the corresponding outreach.

New Materials: Recycling by Month			
Month	Education/Outreach Activity	Total Bales	
		Milk Cartons & Juice Boxes (post consumer)	Clothes & Linens
2007			
January	2007 Guide to Recycling	0	12
February		2	7
March		4	6
April		2	9
May		3	10
June	Launch Press Conference	5	8
July		2	5
August		3	10
September	"Start Seeing Recycling" Campaign	5	6
October	"Start Seeing Recycling" Campaign	4	8
November		0	8
December		5	7
2007 Total		35	96
2008			
January	2008 Guide to Recycling with feature panel of new materials	7	8
February		7	6
March	March newsletter articles	3	6
April	April/May newsletter articles	6	9
May	May/June newsletter articles	0	8
June		5	11
July	Door to Door Outreach/Events	4	7
August	Door to Door Outreach/Events	5	7
September	Door to Door Outreach/Events Direct Mail Postcard September newsletter articles	6	10
October	Door to Door Outreach	0	12
November		7	9
December	2009 Guide to Recycling	9	7
2008 Total		59	100
2009			
January		10	8

Households served via curbside recycling

City	Approximate Households
St. Paul	84,800
Lauderdale	600
Maplewood	10,500
Roseville	9,500
Lakeland/Lakeland Shore (July 2007)	900
Arden Hills (March 2008)	2,500
St. Louis Park (October 2008)	12,165
Total	120,965

**The City of White Bear Lake (approximately 10,000 households) will be added in 2009.*

2. Results from Outreach

Through door-to-door outreach and events, Eureka Recycling reached 4,489 households. 2,533 households were included in door-to-door outreach and 1,956 individual residents were reached through community events. Eureka Recycling distributed a total of 1,050 recycling bins and 2,743 Guides to Recycling, with special focus on recycling milk cartons and juice boxes and clothes and linens. We also distributed translated materials in Spanish (22), Hmong (44) and Somali (2) and our entire stock of Tetra Pak product (1,800 juice boxes).

3. Set-out and Participation Data

To examine the results of our door-to-door efforts, we collected data from 1,696 households in four neighborhood sections. Staff visited each neighborhood on their recycling day to record households that were participating in recycling that day. Data was gathered over a month period. We then calculated the set-out rate for each week and the participation rate for each neighborhood. We compared set-out rates before outreach occurred, after outreach occurred, and after recycling bins were delivered. We identified a control neighborhood where no outreach occurred. This neighborhood was adjacent to a neighborhood where outreach occurred to control for demographics. We compared set-out rates and participation rates of the neighborhoods that received outreach with the neighborhood that did not receive any door-to-door outreach.

Set-out rate results: The set-out rate is the average number of households that set out materials for recycling collection on a given day.

- The set-out rate increased significantly in all neighborhoods after outreach occurred and bins were delivered. This increase ranged from a 36% to 47% in number of set-outs.
- The set-out rate did not increase in the control neighborhood for the same period of time. It remained essentially the same.

Set-out rate by neighborhood	# of households	Set out rate before outreach	Set out rate after outreach	After bin delivery	% increase in set-out
Neighborhood #1	162	19%	20%	28%	47%
Neighborhood #2	825	19%	21%	26%	36%
Neighborhood #3	294	17%	24%	24%	41%
Control: Neighborhood #4 (no outreach)	415	17%	17% (no outreach)	15% (no bin delivery)	- 11%

Neighborhood #3 and #4 are adjacent and have the same demographics.

Participation rate results: The participation rate is the number of households who set out materials for recycling collection at least once over a period of time, in this case one month. The participation rate was higher in the neighborhoods that received outreach versus the control neighborhood that did not receive outreach.

Participation rate by neighborhood	Participation rate
Neighborhood #1	43%
Neighborhood #2	44%
Neighborhood #3	45%
Control: Neighborhood #4 (no outreach)	36%

Neighborhood #3 and #4 are adjacent and have the same demographics.

New Materials Education Recommendations for 2009

For decades, the aluminum, steel, newspaper, and plastics industries heavily supported recycling education efforts. Today, paper, bottles and cans are considered “traditional” recycling items by every recycler and are the most common items you will find in recycling bins across the county. These industries laid the foundation for recycling in the 1980s and 1990s. Now, with a commitment to education, new materials can be added to well-established recycling programs.

Any new product or material that is added to a recycling program must play catch-up in order for recyclers to understand what to recycle, how to recycle it, and to incorporate this “new” material into their typical recycling routine. A long-term investment in education is required to build the knowledge that a new material can be recycled.

Tetra Pak has shown a commitment in two major areas that are essential for building milk carton and juice box recycling: *market development* to ensure their product can be used by paper mills to make new products and *education* to ensure recyclers put these materials at the curb. Over the past two years, Tetra Pak has begun the essential and necessary education that will be needed to make milk cartons and juice boxes common items to recycle. Eureka Recycling has identified areas where Tetra Pak can focus its future education efforts to most efficiently and cost-effectively increase milk carton and juice box recycling.

U'SAgain has also shown a commitment to continue to educate residents about the availability of weekly curbside recycling of clothes and linens. They have supported efforts to keep residents informed about how the materials are distributed, reused and recycled. The option of recycling clothes and linens is not something that is new to most residents. However, the availability of curbside collection of these materials as part of their regular recycling program is something that many residents are not yet aware of.

1. Increase previous education efforts.

In every case where education was applied, there was an increase in either recycling milk cartons and juice boxes, clothes and linens, or recycling as a whole; however, we know there are even more materials to capture at the curb. But in order to sustain current levels and ensure steady growth, more of the same education is needed: direct mail reminders, inclusion of new materials in all recycling education material, newsletter features, reminders in recycling bins, advertisements, etc. In 2008, we took to the streets to provide one-on-one education via door-to-door outreach and attendance at events. The results were impressive and substantial. In the future, it is clear that taking this effort to every street, every block, in every community (or at least choose more neighborhoods to target with this effective education strategy) would prove successful.

2. Provide education to new communities.

While education has been ongoing in Saint Paul, Roseville, Maplewood, and Lauderdale, many communities Eureka Recycling serves through its curbside program have only received one or two pieces of education about recycling milk cartons and juice boxes and clothes and linens. As we continue to add new cities, education to new households must be introduced and sustained. The proven education strategies and messages are the same, but more of it is required.

Eureka Recycling also works with third-party haulers who collect materials in other cities and would be able to offer collection of milk cartons and juice boxes, as well as clothes and linens to their customers. They need support to conduct initial and ongoing education that is necessary to inform their residents about the new materials. With support, Eureka Recycling can provide these haulers with the education materials and strategies they need to successfully communicate with their customers so they can recycle more.

3. Add milk cartons and juice boxes to recycling programs beyond the curb.

To date, Eureka Recycling, Tetra Pak and U'SAgain have focused on curbside recycling; however, there are other places that recycling is collected. Just like curbside recycling programs, other recycling programs require comprehensive education plans to incorporate new materials. For example, while curbside programs reach a large portion of the residential recyclers, many people live in apartment buildings, condominiums and town-homes. Eureka Recycling serves over 50,000 households through its apartment recycling programs.

Recycling milk cartons and juice boxes can also be incorporated in restaurant and other commercial recycling programs as well as emerging public space recycling programs designed to capture beverage containers that people want to recycle on-the-go.



Recycling, Composting and Greenhouse Gas Reductions in Minnesota

1. Introduction: What is Waste?

In 2006 in Minnesota, 3.6 million tons of municipal solid waste (the trash we generate every day) were buried in landfills or burned in incinerators, while 2.5 million tons of our discards were captured for recycling. That means Minnesota has achieved a 41% recycling rate, an impressive rate that is matched by only a handful of states and just 20 years ago was thought impossible. Our recycling efforts prevent nearly half of the products and packaging we use from being wasted. However, most of what is still being wasted every day in Minnesota can be recycled and composted with just a little improvement to our current systems.

Over 50% of what we still throw in the garbage can be recycled through curbside collection. An additional 25% of our trash is comprised of food wastes and other materials that could be composted. The little bit of garbage that remains after we recycle and compost can be thoughtfully addressed through a zero-waste approach (which includes extended producer responsibility) to prevent waste altogether. In other words, there really is no waste.

Waste, and our choice to reduce waste, has a significant impact on the environment. The U.S. Environmental Protection Agency (EPA) reports that the greenhouse gas emissions emitted directly from our waste being burned in an incinerator or buried in a landfill account for about 3% of the total greenhouse gas emitted in the U.S. each year. (2005 report) (Platt et al., 2008. pg 24). While 3% alone is a significant number, the impact of trashing these materials instead of recycling or composting them is actually much greater. *Citation for Image – (Coordinating Board (SWMCB). 2000).*



When you take into account the full lifecycle of the products we use every day and the increased energy needed to make replacement products from virgin, raw materials, the actual impact of all this waste grows significantly. Accounting for the connections between waste in many sectors, including mining, deforestation, industrial agriculture, manufacturing, transportation, and electricity, our wasting actually represents 36.7% of all U.S. greenhouse gas emissions (Platt et al., 2008. pg 24).

Recycling, composting, and producer responsibility are powerful tools to reduce waste and therefore, our greenhouse gas emissions. Specifically in Minnesota, reducing our waste has a greenhouse gas reduction impact equivalent to shutting down 20% of our state's coal power plants, or reducing every car usage in the state by two-thirds, or using 75% less electricity in our own homes. Through a zero-waste approach across our whole country, we could achieve reductions in greenhouse gas emissions equivalent to closing 21% of all U.S. coal-fired power plants (Platt et al., 2008. pg 50).

2. Climate Change Impacts of Waste



Waste in incinerators and landfills create greenhouse gas emissions.

When trash is burned, incinerators emit carbon dioxide (CO_2) and nitrous oxide (N_2O), a greenhouse gas 310 times more powerful in atmospheric warming than carbon dioxide. On average in the U.S., incinerators emit more carbon dioxide per megawatt-hour than coal-fired, natural-gas fired, or oil-fired power plants (Hartwell, 2007).

Many people believe that throwing food scraps and paper products into a landfill is harmless because they biodegrade. However, most people are surprised to learn that when these materials break down in a landfill, they become powerful contributors to greenhouse gas emissions. Compostable materials such as food waste and

paper decompose anaerobically (without oxygen) in a landfill, producing methane (CH_4) which has 23-71 times greater heat trapping capabilities than carbon dioxide. Landfills are the single largest direct human source of methane (Platt et al., 2008. pg 7).

Creating energy from waste

Methane from landfills and the BTUs generated from incinerators are sometimes captured and converted into energy. However, energy from waste is inefficient and does not eliminate the pollution created by landfills and incinerators, including the emissions of greenhouse gases. Even when a landfill is capturing some methane gas for energy production, many studies have shown that most of the methane gas is released before landfills even begin to capture it. This fact results in landfill capture rates being overstated, in some models dramatically (Anderson, 2006).

Calculating Methane Recovery from Landfills

For landfills capturing methane for energy, the EPA assumes a 75% methane instantaneous capture rate for the year in which the calculation is made. The conversion of methane's impact to carbon's impact (calculated by the EPA to be 21 times the impact of carbon) is based on a 100 year time frame (U.S. EPA Warm Model, November 2008) For our calculations, we reluctantly used the WARM model's default landfill capture rates based on the proportions of landfills with landfill gas control in 2004, because they are widely accepted. Using this national average, the result is a 44% capture rate as a national average based on EPA calculations.

However, several people have pointed out significant problems with these calculations. First, the landfill gas capture rate should be calculated over a period of time, not an instantaneous rate. Over a realistic time frame based on the life of a landfill, the methane captured may be as low as 20%, not the 75% as stated in the assumptions used by WARM (U.S. EPA, 2008) (Anderson, 2006). This means that more methane gas is released from landfills, which are already the largest source of methane from humans even by conservative calculations, than is reported in WARM. Secondly, there is an urgency to reduce our greenhouse gas emissions that is not reflected in the EPA's choice to use a 100-year time frame. Over a 20-year time frame, methane is 71 times as potent as carbon as a green house gas, not 21 times as stated in WARM assumptions.



Because methane only stays in the atmosphere for around 12 years, its impacts are far greater in the short term. Over a 100-year time frame, methane is 25 times more potent than CO₂. However, methane is 72 times more potent than CO₂ over 20 years. The Intergovernmental Panel on Climate Change assesses greenhouse gas emission over three time frames—20, 100, and 500 years. The choice of which time frame to use is a policy-based decision, not one based on science (Platt et al., 2008. pg 7).

Calculating methane emissions over 20-years instead of 100-years

There is a general consensus among scientists that if we do not reduce the amount of carbon dioxide in our atmosphere to below 350 parts per million by 2012, we may never be able to reverse the impacts of global warming (350.org, About Us/Science Page). In other words, there is an urgency of action required to fight the effects of global warming. A 20-year time frame for measuring the impact of methane illustrates the short-term effect of methane on the environment, which, when acknowledged highlights the urgent need—and the potential—to reduce methane emission.

Dr. Ed J. Dlugokencky, a global methane expert at the NOAA Earth System Research Laboratory, emphasizes the benefits of reducing emissions.

Added benefits of reducing methane emission are that many reductions come with little or no cost, reductions lower ozone concentrations near Earth's surface, and methane emissions can be reduced immediately while it will take time before the world's carbon-based energy infrastructure can make meaningful reductions in net carbon emissions (Platt et al., 2008. pg7).

Regardless of how much methane is captured from a landfill or how many BTUs are generated from an incinerator, waste does not generate nearly as much energy as recycling conserves. Overall, recycling produces a net reduction in energy 3.6 times larger than the amount of energy generated by incineration and 11 times larger than the energy generated by methane recovery at a landfill (Choate, 2005). You simply cannot capture enough energy from landfills or incinerators to offset the energy required to make new products from natural resources to replace those we waste.

3. A Better Choice: Climate Change Benefits of Recycling & Composting

Recycling is an effective way to reduce greenhouse gases.

When we recycle, we avoid the greenhouse gas emissions from landfills and incinerators. We also reduce the need to extract new resources from the earth and replace logging, drilling, and mining of virgin materials with recycled materials that we no longer want. This greatly reduces the energy it takes to process and manufacture new goods.



About 94% of the materials extracted for use in manufacturing durable products become waste before the product is manufactured...80% of what we make is thrown away within six months of production. For every rubbish bag placed at the curb, the equivalent of 71 rubbish bags worth of waste is created in mining, logging, agriculture, oil and gas exploration, and the industrial processes used to convert raw materials into finished products and packaging. This doesn't even include the extra energy usage and climate change impacts resulting from resource extraction and processing (Hawken, A. Lovins, L.H. Lovins, 1999).



Every product we use has embedded energy, which is the energy it took to extract, transport, and transform the materials needed to produce the product. Every single item we recycle results in significant energy savings because recycling takes advantage of this embedded energy. For some items, like an aluminum can, the energy savings are tremendous. Making a new aluminum can from old cans results in 90-97% energy savings compared to making a new can from bauxite and other raw materials, according to (Choate, 2005). Similarly, it takes 30% less energy to make a glass bottle from recycled glass than from silica, sand, soda ash, limestone, and feldspar. Recycling paper results in a 44% energy savings (Choate, 2005). Virtually every recycled material uses less energy than its virgin component.

Composting is an effective way to reduce greenhouse gases.

A compost process is either aerobic or anaerobic. Anaerobic composting is when organic materials—or compostables—break down by bacteria without the presence of oxygen. This process, which happens in landfills, produces methane, carbon dioxide, and trace amounts of other gases. Aerobic composting is when organic material breaks down by bacteria in the presence of oxygen. The end byproducts in aerobic composting are mainly carbon dioxide and water, and nutrient-packed soil of finished compost. By composting these materials, the generation of greenhouse gases, particularly methane, is avoided. Backyard composting and well-run industrial compost operations will produce negligible greenhouse gas emissions (mostly from the operation of tractors and other equipment).

Composting also has “upstream” benefits, which further conserve our resources and reduce greenhouse gas emissions.

When this compost is used on fields it displaces synthetic chemical fertilizers. Fertilizer production requires intensive fossil fuel energy and seriously impacts human and environmental health (Pimental, et al., 2005). By using compost:

- The greenhouse gas emissions related to fertilizer production are avoided
- There is significant reduction in the use of pesticides (avoiding emissions associated with their production)
- Improves health and workability of soils, resulting in less fuel consumption to till the soil
- Helps soils hold or sequester carbon dioxide



In addition to these emission reductions, compost replenishes and revitalizes exhausted farm soils by replacing trace minerals and organic material, reduces soil erosion and helps prevent storm water runoff.

In fact, a single 40-pound bag contains the equivalent of 2.5 gallons of gasoline. In addition to their oil base, synthetic fertilizers are spiked with concentrated forms of nitrogen and phosphorus, which are harder for plants to absorb than their naturally occurring counterparts. The excess phosphorus and nitrogen, not absorbed by plants, runs off into storm drains that feed into rivers and streams, contributing to algae blooms that deprive waterways of oxygen and kill off aquatic life (National Geographic Society, 2008).

What about the environmental costs to collect and process recycling and composting?



Recycling and composting do require transportation and processing. The environmental costs from trucks and equipment to process the materials are real; however they are small compared to the energy savings and environmental benefits from recycling and composting materials. For instance,

in Saint Paul, the greenhouse gas reductions achieved from recycling are over 100 times greater than the greenhouse gas emission caused by collection. Managing trash has similar transportation and processing requirements; however, trash provides little benefit and wastes the embedded energy in materials, contributes to greenhouse gas emissions, and pollutes the environment.

4. Measuring our impact in Minnesota

To quantify our climate impact from wasting in Minnesota, we need to have an in-depth understanding of what we currently discard and what we do with those discards. Using two studies, outlined below, we are able to compile an accurate picture of Minnesota's total waste stream. Dividing the total waste stream by our population, we can understand our individual impact.

What do Minnesotans Currently Waste and Recycle?

Since 1990, the State of Minnesota has produced a *SCORE Report*, an annual report on recycling and waste management programs in Minnesota. The report is currently compiled by the Minnesota Pollution Control Agency (MPCA):

SCORE is an annual examination of Minnesota programs and data. The figures are gathered through a formal survey of county solid waste officers. Analysis and evaluation of this data helps the MPCA report on:

- ★ Statewide recycling rates.
- ★ Waste reduction efforts.
- ★ Waste generation figures.
- ★ Waste processing and disposal.
- ★ SCORE finance and administration (MPCA, 2008).

Table 1 shows the total amount of reported municipal solid waste (MSW) for the year 2006 (most recent available data) and the amount of reported recycling. Currently, Minnesota reports about a 41% diversion rate. MSW estimates how much waste residents generate throughout their daily routines. It includes waste generated in their homes as well as waste generated at work places and commercial locations, such as restaurants, retail stores, and other businesses. It does not include industrial, hazardous, or construction waste.

Table 1: Municipal Solid Waste (SCORE Reports 2006)		Tons	% of MSW
Disposal			
Total Incinerated		1,200,000	19.7%
Total Landfilled		2,200,000	36.1%
Other (onsite disposal, etc.)		200,000	3.3%
Total Disposed		3,600,000	59%
Total Recycled		2,500,000	41%
Total MSW		6,100,000	

Using US Census data, Table 2 shows us our individual impact.

Table 2: Per Capita Calculations of Waste (US Census 2006 and SCORE 2006)	
Population for Minnesota	5,200,000 people
Total amount of discards recycled or disposed of annually	6,100,000 tons
Discard generation/person/year	2346.15 pounds
Discards/person/day	6.43 pounds

Table 3 shows a further breakdown of recycling by type, as reported in the SCORE data. Eureka Recycling created six main diversion categories (described in the Calculating Diversion section) which are used in to calculate the state-wide potential for recycling and composting (in Table 5).

Table 3: Recycling by Type (2006 SCORE)	% of Total	Tons	Diversion Category
Banned			
Antifreeze	0.06%	1,406	avoided
Electronics	0.41%	10,386	computers
Fluorescent & HID lamps	0.02%	510	avoided
HHW	0.03%	812	avoided
Latex paint	0.08%	2,011	avoided
Major appliances	1.59%	40,193	scrap metal
Used oil	0.40%	10,125	avoided
Used oil filters	0.11%	2,688	avoided
Vehicle batteries	1.34%	33,792	avoided
Waste tires	0.74%	18,646	tires
Glass			
Food & beverage	3.16%	79,772	glass
Other glass	1.68%	42,502	avoided
Metal			
Aluminum	1.33%	33,564	aluminum
Co-mingled alum/steel/tin			
<i>Estimated aluminum</i>	0.58%	14,968	aluminum
<i>Estimated tin/steel</i>	1.00%	25,659	tin
Other ferrous & non-ferrous	14.50%	365,977	scrap metal
Steel/tin cans	0.98%	24,778	tin
Organic			
Food to livestock	6.62%	166,966	compost food
Food to people	0.18%	4,427	compost food
Source-separated organics	0.30%	7,650	compost food
Other			
Mattresses & box springs	0.01%	267	wood
	0.01%	267	scrap metal
Pallets	4.11%	103,837	wood
Unspecified or Other	21.22%	535,626	avoided
Paper			
Computer paper	0.06%	1,600	mix
Corrugated	14.32%	361,375	cardboard
Magazine/catalog	1.44%	36,375	news
Mixed paper	10.03%	253,186	mix
Newsprint	7.08%	178,625	news
Office paper	2.83%	71,399	mix
Other paper	1.13%	28,480	mix
Phone book	0.06%	1,462	mix

Plastic			
Film plastic	0.17%	4,227	ldpe
HDPE	0.13%	3,311	hdpe
Mixed plastic	1.37%		
<i>Estimated HDPE</i>	<i>43.48%</i>	15067	hdpe
<i>Estimated PET</i>	<i>56.52%</i>	19586	pet
Other plastic	0.07%	1,688	other plastic
PET	0.14%	3,605	pet
Polystyrene	0.01%	361	avoided
Textiles			
Carpet	0.01%	216	carpet
Textiles	0.64%	16,244	textiles
Minnesota Total	100%	2,523,636	

What is in our waste?

The 2006 SCORE data shows that after recycling, there are still 3,600,000 tons of discards being disposed of annually. To understand what is in this waste, we can look to a study by the State of Minnesota in 2000 on the composition of our waste.

The Statewide MSW Composition Study (March 2000) is a detailed examination of what Minnesotans throw away as garbage. By sorting waste samples at eight locations around the state, the study offers a comprehensive look at the materials that are going to landfills, MSW composting operations, and incinerators. The study has also worked to differentiate between waste from residential and commercial/industrial sources (Solid Waste Management Coordinating Board, 2000).

Table 4 shows the percentage results from the 2000 composition study applied to the 2006 SCORE numbers to estimate what is being disposed off in detail by material. These discards are currently either buried in landfills or incinerated. To determine how much can be diverted from the trash, we applied the composition study numbers to the most current trash weights from 2006. Again, Eureka Recycling created six main diversion categories (described in the Calculating Diversion section) which are used in to calculate the state-wide potential for recycling and composting (in Table 5).

Table 4: Composition of Minnesota's MSW (MPCA 2000)		% Composition	Tons Disposed 2006	Diversion Category
Recyclable PAPER				
	news (ONP)	4.10%	147600	news
	high grade office	3.10%	111600	mix
	mag/cat	2.50%	90000	news
	OCC recyclable	6.20%	223200	cardboard
	coated OCC	0.20%	7200	cardboard
	boxboard	2.50%	90000	cardboard
	mix paper recyclable	6.00%	216000	news
Compostable Paper				
	OCC nonrecyclable	0.50%	18000	compost paper
	mix paper nonrecyclable	9.20%	331200	compost paper
PLASTICS				
	PET Bottles	0.60%	21600	pet
	Other PET	0.10%	3600	pet
	HDPE Nat	0.30%	10800	hdpe
	HDPE col	0.20%	7200	hdpe

	PVC	0.10%	3600	trash
	Ploystyrene	0.80%	28800	trash
	Film-transport packaging	0.30%	10800	ldpe
	other film	3.50%	126000	ldpe
	other containers	0.50%	18000	other plastics
	other non-containers	4.90%	176400	trash
METALS				
	aluminum cans	0.70%	25200	aluminum
	other aluminum	0.50%	18000	aluminum
	ferrous containers	0.90%	32400	tin
	other ferrous	2.90%	104400	tin
	other non-ferous	0.10%	3600	scrap metal
GLASS				
	Clear Containers	1.30%	46800	glass
	Green Containers	0.30%	10800	glass
	Brown Containers	0.40%	14400	glass
	Other Glass	0.70%	25200	avoided
ORGANIC MATERIALS				
	Yard Waste- grass/leaves	2.10%	75600	compost yard
	yard waste	0.20%	7200	compost yard
	food waste	12.40%	446400	compost food
	wood pallets	2.60%	93600	wood
	treated wood	3.00%	108000	avoided
	untreated wood	1.90%	68400	wood
	daipers	2.10%	75600	trash
	other organic material	1.40%	50400	compost food
PROBLEM MATERIAL				
	computer equipment/perihperals	0.20%	7200	computers
	electric and electronic products	1.60%	57600	computers
	batteries	0.10%	3600	avoided
	hhw/HW	0.60%	21600	avoided
other waste				
	Textiles	2.70%	97200	textiles
	Carpet	2.40%	86400	carpet
	Sharps and Infectious Waste	0.10%	3600	trash
	Rubber	0.80%	28800	tires
	Construction and Demo	2.80%	100800	trash
	Bulky Items	3.40%	122400	trash
	Empty HHW/HW containers	0.40%	14400	trash
	Misc	5.80%	208800	trash
	total MSW (disposed)	100%	3,600,000	

Calculating Diversion

To calculate the maximum state-wide diversion potential, we can use the amount of materials that are currently recycled (Table 3) combined with the amount of materials in the trash that we can divert (Table 4). By combining SCORE report and MPCA's composition study categories into six main categories we created to simplify this report, we can calculate the state-wide potential for recycling and composting. The six categories are:

1. **Curbside recyclables.** This category includes the typical papers, bottles, and cans that most people in the state can recycle at the curb.
2. **Drop off recyclables.** This category includes recyclables that currently have drop-off options in Minnesota such as carpet, textiles, and plastic bags.
3. **Compostables.** This category includes food scraps, yard waste that is currently in the MSW stream, and non-recyclable paper. These numbers do not include the yard waste currently being handled as compost as these numbers are not currently tracked by these state reports.
4. **Wood/Tires/Electronics.** This includes any wood waste currently in the MSW. Electronics includes computers, peripherals and other items labeled "electronics." Tires include used tires and items labeled "rubber."

5. ***Avoided Disposal.*** This category includes items that are currently diverted from the waste stream, but do not currently have quantified upstream benefits. There certainly is an environmental benefit to handling these materials properly, but many of these benefits are associated with toxics reductions and less directly related to climate change. These items include batteries, household hazardous waste and other “banned” items such as oils and paint. This category also includes “other glass” since glass not going back into glass bottles does not result in the same upstream benefits.
6. ***Extended Producer Responsibility.*** This category includes the remaining waste that is not currently recyclable or compostable in Minnesota and could be addressed through Extended Producer Responsibility (EPR) and other prevention design and management strategies. For instance, in the European Union, producers are required to either use packaging that fits into a current recovery option (recycling or composting) or provide a mechanism to take the product packaging back at their cost.

Table 5: By combining SCORE report and composition study categories into six main categories, Eureka Recycling calculated the state-wide potential for recycling and composting.

Table 5: Maximum Diversion Potential	Currently Recycled & Composted	Recyclables & Compost in Trash	Total Potential	% of Total
1. Curbside Recycling				
news	215,000	453,600	668,600	10.9%
mixed paper	356,127	111,600	467,727	7.6%
cardboard	361,375	320,400	681,775	11.1%
PET containers	23,191	25,200	48,391	0.8%
HDPE containers	18,378	18,000	36,378	0.6%
other plastic containers	1,688	18,000	19,688	0.3%
Aluminum	48532	43,200	91,732	1.5%
Tin	50437	136,800	187,237	3.1%
Other Scrap Metal	406437	3,600	410,037	6.7%
Glass	79772	72,000	151,772	2.5%
Subtotal:	1,560,937	1,202,400	2,763,337	45.1%
2. Drop Off Recycling				
Plastic Film/Bags	4,227	136,800	141,027	2.3%
textiles	16,244	97,200	113,444	1.9%
carpet	216	86,400	86,616	1.4%
Subtotal:	20,687	320,400	341,087	5.6%
3. Compost				
Food scraps	179,043	496,800	675,843	11.0%
yard waste	0	82,800	82,800	1.4%
non recyclable paper	0	349,200	349,200	5.7%
Subtotal:	179,043	928800	110,7843	18.1%
4. Wood/Tires/Electronics				
Wood	104,104	162,000	266,104	4.3%
Tires	18,646	28,800	47,446	0.8%
Electronics	10,386	64,800	75,186	1.2%
Subtotal:	133,136	255,600	388,736	6.3%
5. Avoided Disposal	629,833	158,400	788,233	12.9%
6. Extended Producer Responsibility	3,600,000	734,400	734,400	12.0%
TOTAL	6,123,636	3,600,000	6,123,636	100.0%
% of waste diversion	41%	80%	88%	

Calculating scenarios for diversion

For ease of comparison and understanding, we have chosen to evaluate the impacts of three scenarios over the same baseline.

Baseline: The baseline reflects no recycling or composting. We used the state's average of 35% waste-to-energy incineration and 65% landfill as the potential energy generation from waste. We used the national averages for distance to landfill and national average landfill gas capture rates of 44%, which are increasingly questioned as the rate is predicted to be much too high.

Current Average Scenario (using 2006 data): The current average scenario uses the charts and reports from SCORE to give a snap shot of the greenhouse gas reductions achieved by participating in recycling and composting at the average Minnesota level:

- 41% recycling and 3% composting

MCCAG 2012 Goal Scenario (future): For a mid-range scenario we used the State of Minnesota goals for recovery efforts. The Minnesota Climate Change Advisory Group (MCCAG), a governor appointed body of public, private, and nonprofit groups, convened in 2007 with the purpose of presenting a climate change mitigation plan to the legislature. They looked at issues across all sectors including waste. The goals they set for waste reduction are:

- 50% recycling and 10% composting by 2012
- 60% recycling and 15% composting by 2025.

The middle scenario uses the 2012 goals of achieving a 50% recycling rate and 10% composting rate. To calculate the additional diversion needed to reach these goals, start with the average scenario (what is currently being done, 41% recycling and 3% composting) and add tonnage based upon what is left in the garbage. It will require capturing 40% of the additional recyclables in the garbage to meet the 50% overall recycling goal and 50% of the compostables in the garbage to meet the 10% composting goal.

Zero-Waste Scenario (maximum): The zero-waste scenario measures the impact of capturing virtually everything currently recyclable or compostable. Using the current diversion numbers and adding in all the potential recycling and composting identified through the 2000 waste composition study:

- 100% recycling and 100% composting

This result is approximately an overall 88% diversion rate (see Total Potential column in Table 5). The remaining 12% of the waste stream is currently not recyclable or compostable. In a true zero-waste model, this 12% would be source reduced or redesigned to be recyclable or compostable.

5. Calculating the greenhouse gas impact of waste reduction efforts in Minnesota

Carbon Equivalents

The final step in quantifying Minnesota's climate impact of waste is to convert the tons of waste diversion into a measurement that shows its impact on global warming. The most common way to do this is to state the impact in carbon equivalents. Since waste reduction results in the reduction of several types of greenhouse gases, the conversion to a standard carbon equivalent (CO₂ E) measurement allows for a total quantification of the impact. It also provides a standard language for people to compare these actions to other's such as transportation and energy conservation efforts. A carbon equivalent (CO₂ E) is simply the amount of CO₂ that would have the same global warming potential as the waste reduction impacts, when measured over a specified timescale. The international reporting standard for CO₂ emissions is in metric tons, so you will often see carbon dioxide amounts reported as MTCO₂ E, which stands for metric tons of carbon equivalent.

Conversion Models

While there are many models emerging to calculate greenhouse gas reductions, the most recognized and standard model is the EPA's WARM model. Produced by the EPA, the Waste Reduction Model (WARM) was designed to help solid waste planners and organizations track and voluntarily report greenhouse gas emissions reductions from several different waste management practices. The WARM model was last updated in August of 2008 and recognizes 34 material types (U.S. EPA, 2008).

Credibility of WARM

WARM has been in development for over 10 years and relies on information from leading scientists and technical experts. The methodology and data has been peer reviewed at several stages; including a lengthy review process that included public comments and responses (U.S. EPA, 2008).

The field of life-cycle analysis has expanded dramatically since WARM was originally developed and interest in life cycle studies and supply chain impacts is at an all-time high. For that reason, EPA is in the process of updating many of the emission factors and assumptions embedded in WARM. As new updates and improvements become available, EPA will post new versions of the model and explanations of revisions. To learn more about the data sources and methodology employed in WARM, consult the latest edition of EPA's research report: *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sink*, online at <http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html>.

Although WARM is the most widely peer-reviewed and accepted model, it is considered to have several flaws. Because of these flaws, the results from WARM are conservative, meaning the environmental benefit of recycling and composting are in fact understated. That said, the good news is that we know now that we can achieve reductions in greenhouse gas emissions that are equivalent to closing many more than 21% of all U.S. coal-fired power plants in the U.S. by recycling and composting.

- WARM overstates the landfill capture rate at 44%, but it actually may be closer to 20% (Anderson, 2006).
- It does not include the upside of composting (replacing petroleum based fertilizers and pesticides). Other models consider these impacts, but are not as widely-used or accepted as the WARM model.
- It does not include all the materials we would like to see in the calculations.
- There have been questions raised, about the politically-based decision to measure methane emissions over a 100-year life span. If you measure the emissions over a 20-year life span instead of a 100-year life span (which is scientifically valid), methane has 70 times the impact of carbon dioxide, not 23 times as is calculated in WARM (Platt, et al., 2008. pg 7).

We believe the use of this calculator is conservative and understates the real impact of waste reduction efforts. However, despite these flaws, the WARM model is a well-recognized, published calculator. Until a better calculator is peer reviewed and accepted, WARM gives us a conservative starting place to measure these impacts and work towards our goals. Even with WARM, as you will see, the impacts are quite significant.

Protocols for climate change calculations

Many cities around the country, including Minneapolis and Saint Paul, work with the International Council for Local Environmental Initiatives (ICLEI) to quantify the climate change impacts of their city. ICLEI has developed protocols for calculating the carbon footprint consistent with the Climate Registry. To ensure our protocol matches with the work currently being done, we researched how our quantification fits in with current protocols.

A new set of protocols for measuring greenhouse gases for cities was recently released in a report by ICLEI.

Many local governments have actively engaged in a variety of programs and activities to reduce waste going to landfills, mainly through recycling and composting activities. While it is outside of the scope of this Protocol to provide quantification methodologies to estimate the GHG reductions or benefits associated with these waste-reducing activities, we do plan to explore developing such methodologies as part of the community-level protocol process. Information about your local recycling and composting activities can be reported optionally (ICLEI, 2008, pg 85).

While the community-level protocol process has not happened yet, California Air and Resources recently conducted a white paper on quantifying greenhouse reductions from recycling and composting. This white paper states that WARM is the best practice to use right now and that it is a conservative approach. It states that it does not quantify the full upstream benefits of composting. It stated that they were working on an update to this, but had limited resources (Moore and Edgar, 2008). We were unable to locate anything more recent.

Results

Table 6 is a summary of the total MTCO₂E achieved for each scenario over our baseline (35% incineration/65% landfill) by item and category.

Table 6: WARM greenhouse gas reductions in MTCO₂E (gain compared to disposal)			
Category Break Down	Current Average Scenario	MCCAG 2012 Goal Scenario	Zero-Waste Scenario (Maximum)
1. Curbside Recycling:			
news	-420,503	-775,369	-1,307,668
mixed paper	-1,239,984	-1,395,414	-1,628,559
cardboard	-1,119,062	-1,515,933	-2,111,239
PET containers	-4,5234	-64,895	-94,387
HDPE containers	-3,2080	-44,648	-63,501
other plastic containers	-3,189	-16,790	-37,192
Aluminum	-665,727	-902,761	-1,258,313
Tin	-64,748	-134,994	-240,364
Other Scrap Metal	-1,994,738	-2,001,806	-2,012,407
Glass	-25,665	-34,931	-48,829
Subtotal:	-5,610,930	-6,887,542	-8,802,459
2. Drop Off Recyclables			
Plastic Film/Bags	-8,666	-120,856	-289,141
carpet and textiles	-121,613	-664,219	-1,478,128
Subtotal:	-130,279	-785,075	-1,767,269
3. Compost			
Food scraps	-103,388	-105,851	-109,545
yard waste	0	538	1,345
non recyclable paper	0	-31,446	-78,615
Subtotal:	-103,388	-136,759	-186,815
4. Wood/tires/computers			
Wood	-191,567	-310,809	-489,671
computers	-41,523	-62,995	-95,204
tires	-19,358	-77,079	-163,660
Subtotal:	-252,448	-450,883	-748,535
5. Avoided Disposal	-122,082	-134,363	-152,785
6. Extended Producer Responsibility	N/A	N/A	N/A
TOTAL greenhouse gas reductions from waste diversion Efforts (in MTCO₂E)	(6,219,127)	(8,394,621)	(11,657,863)

Tables 7 and 8 summarize these numbers by category and calculate the per capita impact. Table 7 calculates recycling efforts. Table 8 calculates composting efforts. The per capita impact is per person, so if there are three people in a household, the family's impact is three times greater. Also, note that a negative number means a reduction in carbon emissions.

Table 7: Scenario Comparison of GHG Reductions from RECYCLING efforts	Current Average Scenario	MCCAG 2012 Goal Scenario	Zero-Waste Scenario (Maximum)
1. Curbside Recycling (tons)	1,560,937	2,041,897	2,763,337
2. Drop off Recycling (tons)	20,687	148,847	341,087
3. Compost (tons)	N/A	N/A	N/A
4. Wood/computers/tires (tons)	133,136	235,376	388,736
5. Avoided Disposal (tons)	629,833	693,193	788,233
6. Extended Producer Responsibility	N/A	N/A	N/A
Total Recycling (tons)	2,344,593	3,119,313	4,281,393
% Diversion from Recycling (of total waste)	38%	51%	70%
Total GHG reductions from RECYCLING efforts (tons CO₂E)	(6,115,739.00)	(8,257,862.60)	(11,471,048.00)
GHG Reductions per person per year from RECYCLING efforts (pounds CO₂E)	(2,352.21)	(3,176.10)	(4,411.94)

Table 8: Scenario Comparison of GHG Reductions from COMPOSTING efforts	Current Average Scenario	MCCAG 2012 Goal Scenario	Zero-Waste Scenario (Maximum)
3. Composting (tons)	179,043	643,443	1,107,843
% Diversion from Composting (of total waste)	3%	11%	18%
Total GHG reductions from COMPOSTING efforts (tons CO₂E)	(103,388.00)	(161,786.90)	(186,815.00)
GHG reductions per person per year from COMPOSTING efforts (pounds CO₂E)	(39.76)	(62.23)	(71.85)

6. Why measure waste reduction in terms of climate change?

Efforts are needed across all the sectors of our lives to reduce greenhouse gas emission. Leading scientists have indicated that 350 parts per million (ppm) of carbon dioxide is the upper limit for us to continue life on this planet as we know it (350.org. About Us/Science page. December 2008). We're currently at 385 ppm (and just 200 years ago we were at 275 ppm). As we work to lower to 350 ppm as soon as possible, we need to employ every strategy we can—including waste reduction strategies—to reduce our emissions. While many strategies require large purchases (i.e. new heaters, coolers, cars, etc.) recycling and composting require little or no investment and in most cases some systems are already in place. What are needed are requirements and incentives for manufacturers to use recycled content and to design for recycling and composting.

Measuring the climate change impact of waste reduction actions allows us to speak in a common language, understand the impact of our choices, and help us prioritize the personal and policy actions that we take. Consider these facts:

- Recycling and composting all our municipal solid waste in Minnesota would have the same impact as shutting down 19.2% of all the coal-fired power plants in Minnesota (American Coal Foundation, 2007).
- Recycling and composting all are municipal solid waste would have the same impact as removing 2,135,140 passenger vehicles from the road. That is equal to over two-thirds of all the cars on the road today in Minnesota (Vennewitz, 1998).
- Recycling and composting all of our municipal solid waste would reduce carbon emissions enough to equal the carbon emissions from 1,544,088 households every year. That's almost 75% of the total in Minnesota (Minnesota Population Estimates December (website) 11/2008).

While actions such as shutting down 20% of our coal power plants, or reducing our car usage by two-thirds, or using 75% less electricity in our own homes may seem daunting, recycling and composting are accessible and easy actions we can do right now, every day, to make a difference. Translating recycling and composting into climate change impact reminds us that these actions are not trivial or passé. They are a powerful and significant part of the solution:

Indeed, a zero waste approach would achieve 7% of the cuts in U.S. emission needed to put us on the path to climate stability by 2050 (Platt, et al., 2008. pg 6).

It is also important to calculate the carbon impact of waste reduction as the global effort continues to enact a carbon "cap and trade" system. This system would create financial incentives to reduce green gas emissions, incentives that could benefit new recycling and composting efforts to expand our current infrastructure. We must weigh this against any further subsidies for landfilling and incineration as supposed "renewable" technologies.

7. Can we really recycle and compost this much?

For over 150 years, our worldwide manufacturing, distribution, and disposal systems have developed under the illusion that our natural resources are manageable and expendable and that any amount of pollution can be absorbed or diluted by the land and water. Today, we know this is not true: the cost of maintaining and expanding landfills continues to rise, incinerators have been proven to decrease our air quality and impact our health, and our once “endless” natural resources are showing obvious signs of depletion. Our waste is in fact very valuable, despite the current paradigm that tells us that it is no so.

We have the technology, and we can have the foresight to cost-effectively adapt this old system of using and disposing to a new system of conserving, reusing, recycling, and composting our resources. This will allow us to reinvest more of the “output” of our waste stream, rather than burying it in a landfill or burning it in an incinerator. Not only will our environment and our health improve, but so will our economy.

On a per-ton basis, sorting and processing recyclables alone sustains ten times more jobs than landfilling or incineration. [...] Each recycling step a community takes locally means more jobs, more business expenditures on supplies and services, and more money circulating in the local economy through spending and tax payments (Platt and Seldman, 2000).

By adopting zero waste as our goal right now, we shift job creation to reuse, recycling, and composting industries that transform discarded materials into resources. Many people left out of the current economy will be able to find interesting and fulfilling work in these efficient and inventive businesses. We can change our economic measurements to support an abundant economy that rewards creativity, efficiency, community, healthy families and environmental protection.

Communities and businesses currently in the process of adopting zero-waste goals look to examples of ecological systems, where the output of one system becomes the input for another system, the way decomposition and decay form the basis of nourishment for new organisms. In nature, there is no waste, and we can mimic this as we interact with nature. Zero-waste initiatives are being adopted and implemented all over the globe, in big and small ways, including in Seattle, Washington; San Francisco and Del Norte, California; New Zealand; Canberra, Australia; Denmark; Edmonton, Alberta; Ottawa, Ontario; and Nova Scotia. Businesses like Hewlett Packard, the EPA green building program, and Mad River Brewing have achieved 95% and higher diversion rates. Zero Waste is being incorporated into the business functions of many organizations including Xerox, Sony, Mitsubishi, Interface Flooring Systems, The Beer Store, IBM, DuPont, Honda and Toyota, 3M, Anderson Windows, Aveda, and Pillsbury.

The Stop Trashing the Climate reports makes a case for a zero waste approach as one of the “fastest, cheapest, and most effective strategies for mitigating climate change in the short and long-term” and reports on several communities that are putting these zero waste strategies in place:

Zero waste goals or plans have now been adopted by dozens of communities and businesses in the U.S. and thereby the entire state of California. In addition, in 2005, mayors representing 103 cities worldwide signed onto the Urban

Environmental Accords, which call for sending zero waste to landfills and incinerators by the year 2040, and for reducing per capita solid waste disposal in landfills and incinerators by 20% within seven years (Platt, et al., 2008. pg 15).

In 2005, Eureka Recycling convened the Saint Paul Environmental Roundtable. The work of the Roundtable, made up of residents from throughout Saint Paul, culminated in the passage of a resolution to set Saint Paul's policy direction on six environmental issues: zero waste, food systems, cleaner energy, green building, open space and water stewardship. In 2006, as a result of the roundtable recommendations, the City of Saint Paul adopted the goal of being a zero waste city by 2020 (<http://www.eurekarecycling.org/environmentalroundtable/index.cfm>).

In 2008, the City of Burnsville (<http://www.ci.burnsville.mn.us>) began working with a consortium of nonprofits and businesses to create the first ever full municipal sustainability plan in Minnesota. Recognizing the need to provide all communities clear and concise examples for crafting zero-waste policies and strategic plans to achieve zero waste, Eureka Recycling compiled a Zero Waste Ordinance Resource Guide with nearly 70 examples from communities that are leading the way. This Resource Guide was first presented at the Alliance For Sustainability's "Local Government Sustainability Workshop – Using Model Sustainability Ordinances to Implement your City's Sustainability Goals" in Saint Paul, MN, in April 2008 (<http://www.stpaul.gov>).

In order to reach these goals, it will take an investment in our current recycling and composting infrastructure. If we continue to invest in wasting by putting the significant capital investments required to build incinerators and landfills, our zero-waste efforts will be bankrupt. Currently wasting competes for the dollars that could be used to preserve and expand recycling and composting efforts such as these:

- Invest in a composting infrastructure.
- Provide more drop-off opportunities for hard-to-recycle items.
- Maximize our curbside work by investing in education, adding new materials, and ensuring that the materials collected actually get recycled.
- Find solutions to deal with mixed plastics and additional metals, since they have a large carbon footprint and are under-recycled.
- Focus on eliminating a small percent of waste that is left using extended producer responsibility, reuse, and reduction strategies.

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10. Background on Organizations and Resources

Eureka Recycling

www.eurekarecycling.org

Composting website: www.makedirtnotwaste.org

A nonprofit that demonstrates that waste is preventable, not inevitable.

350.org

www.350.org

A nonprofit of youth from throughout the world, working with renowned author and environmentalist Bill McKibben, to build a movement to stop global warming.

Climate Registry

www.climateregistry.org

A nonprofit organization working that establishes consistent, transparent standards throughout North America for businesses and governments to calculate, verify and publicly report their carbon footprints in a single, unified registry

ICLEI - Local Governments for Sustainability

www.iclei.org

An international association of local governments as well as national and regional local government organizations that have made a commitment to sustainable development.

Minnesota Climate Change Advisory Group (MCCAG)

www.mnclimatechange.us

A advisory group convened in 2007 with the purpose of presenting a climate change mitigation plan to the legislature, including issues across all sectors including waste.

SCORE Report

<http://proteus.pca.state.mn.us/oea/lc/score.cfm>

An annual report on recycling and waste management programs in Minnesota. The report is currently compiled by the Minnesota Pollution Control Agency (MPCA).

Stop Trashing the Climate

www.stoptrashingthecclimate.org

A report by issued in June 2008 by the Institute for Local Self-Reliance, the Global Anti-Incineration Alliance and Eco-Cycle.