2015 Solid Waste Policy Report

Minnesota Pollution Control Agency

January 2016

Legislative charge

Minnesota Statute §115A.411 requires the Minnesota Pollution Control Agency to draft a solid waste policy report for the Legislature every four years. The report must contain information on the status of solid waste management in Minnesota and make recommendations for new or modified policies to advance the management of waste in the state.

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Contents

Executive summary

Minnesota's Waste Management Act has been in place since 1980 and establishes criteria for the management of three types of solid waste – mixed municipal solid waste (MMSW), construction and demolition wastes (C&D), and industrial solid waste (ISW).

The waste management hierarchy establishes preferred management methods based on environmental impact. Reduction and reuse of materials are at the top of the hierarchy, followed by recycling, composting and waste to energy, with the least preferable method land disposal.

The current management system focuses largely on discards and what to do with a material at the end of its life. However, the waste management system is evolving, and sustainable materials management (SMM) approaches are becoming more prevalent. SMM focuses on the best use and management of materials based on how they impact the environment throughout their life cycle.

As the population of Minnesota grows and the economy continues to improve, new and innovative ways of managing materials will be necessary. The Minnesota Pollution Control Agency (MPCA) should evaluate these methods based on SMM to determine how they fit into an integrated waste management system.

An effective SMM approach prioritizes management of materials based on highest and best use, while looking at all environmental impacts throughout that material's life cycle.

This Solid Waste Policy Report draws from foundational information from The Office of the Legislative Auditor's (OLA) 2014 Evaluation of Recycling and Waste Reduction, the Recycling and Solid Waste Infrastructure Evaluation conducted by the MPCA, and waste composition data.

Key issues addressed in this report include:

- Sustainable materials management
- The economics of waste
- Waste classification
- Recycling market development
- Organics management
- Product stewardship

All policy recommendations are summarized in Appendix A of this report.

Minnesota's current solid waste system and dynamics

The Minnesota Waste Management Act (WMA), adopted in 1980, established criteria for managing solid waste.

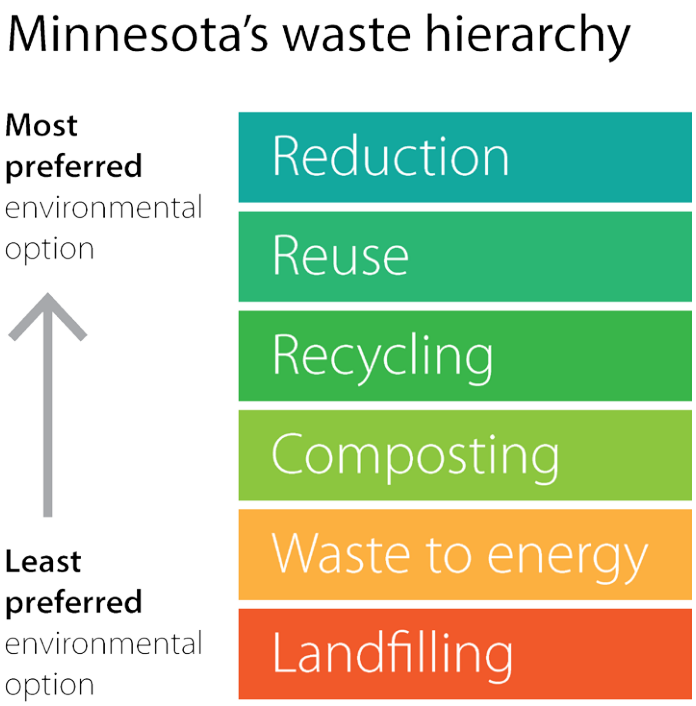
The goal of the act is to protect Minnesota's land, air, water, and other natural resources and public health by improving waste management in the state to:

- reduce the amount and toxicity of waste generated
- separate and recover materials and energy from waste
- reduce indiscriminate dependence on disposal of waste
- coordinate solid waste management among political subdivisions
- develop waste facilities in an orderly and deliberate way (including disposal facilities) and ensure their financial security

The waste management hierarchy

The waste management act defined in statute is designed to promote landfill abatement and encourage more environmentally favorable waste management methods in a manner appropriate to the characteristics of the waste stream. It prioritizes waste reduction, reuse, recycling, and organics recovery above methods that preclude further use of the materials, including waste-to-energy (burning refuse to recover fuel or energy) and land disposal. See Figure 1 below.

Figure 1. Waste management hierarchy



Roles and requirements

In Minnesota, the responsibility of managing solid waste is primarily delegated to the counties, while the state retains oversight authority and supports local efforts through permitting, planning, financial support, and technical assistance. Counties develop solid waste management plans that include how the county will ensure waste is managed properly, how it will meet the goals and objectives of the WMA, and all efforts that will be undertaken to manage waste in accordance with the hierarchy. These plans are submitted to the MPCA for approval.

The Twin Cities Metropolitan Area[1] and Greater Minnesota counties have different sets of requirements governing their solid waste planning, with the primary difference being Metropolitan County Solid Waste Master Plans must comply with the current Metropolitan Solid Waste Management Policy Plan (Metro Policy Plan), which is a 20-year plan updated every 6 years (Minnesota Statute § 473.149). Greater Minnesota County Solid Waste Plans must conform to Minn. Stat. § 115a.46 and Minnesota Rules Chapter 9215.

The current system — rules, laws, fees, and taxes — are aimed mostly at mixed municipal solid waste (MMSW) disposal. Although the WMA does address all types of solid waste and separate requirements exist for industrial (ISW) and construction and demolition C&D facilities, they currently receive less emphasis than MMSW. This needs to be rectified, and the focus of state and local programs in the future should be to ensure that all material — MMSW, ISW, and C&D — is managed to its highest and best use.

New and innovative approaches to using typically discarded materials as feedstocks for new products is one way reuse is being implemented by local Minnesota companies. Not only are these materials given a new life, the companies often recognize cost savings by eliminating the need to manufacture new materials. One example of these principles at work is Relan, who makes bags and computer cases out of vinyl banners and other discarded promotional items.

[1] The Twin Cities Metropolitan Area includes seven counties: Ramsey, Hennepin, Anoka, Washington, Carver, Scott, and Dakota.

Case study: Relan: environmental and fashion trendsetters

Relan is a small company with a big mission, located in Mendota Heights, Minnesota. It began in 1995 as a company that was trying to keep vinyl banners out of the landfill, but has evolved into so much more. Relan takes outdated materials such as t-shirts, construction materials, banners and finish line mesh from other companies and uses these materials as a feedstock for new products like tablet cases, purses and lunch bags, replacing the need for virgin materials such as cotton, and wool or synthetic fibers. Relan's business model is that the material is not processed from its original state through recycling or any other process but rather repurposed in its original state, with some alterations such as cleaning, cutting, and sewing. To date the company has kept over 300,000 square feet of material from being wasted.

By repurposing materials, Relan is:

- Moving waste up the hierarchy from disposal or even recycling to reuse
- Reducing the amount of material going to landfill
- Eliminating the manufacturing impact of new materials
- Reducing the transportation costs of importing new materials
- Supporting the U.S. economy by purchasing locally made products
- Avoiding disposal fees for these materials

The CEO, Della Simpson, believes that sustainable fashion can help support our economy, save valuable resources, and give old materials a new life. As companies increasingly report that they are worried about material scarcity for their products, Relan has made a great business out of using what would have been a waste as its main feedstock.

Funding

State funding is currently provided to counties and waste districts via revenue generated from the state Solid Waste Management Tax (SWMT). During the 1997 legislative session, two taxes related to solid waste were eliminated:

- The Select Committee On Recycling and the Environment (SCORE) sales tax on garbage collection services, which paid for waste reduction and recycling programs.
- The Solid Waste Generator Assessment (SWGA), which paid for cleaning up old landfill sites that are environmental hazards.

A substitute tax — the Solid Waste Management Tax (SWMT) — was put in place to pay for the programs currently funded by the two different state fees. This new tax system went into effect January 1, 1998. The SWMT is designed to raise the same amount of money for state programs but is more streamlined and efficient than the two separate fees in the old system. People who pay for garbage services in Minnesota now pay the solid waste management tax, with different rates applied to waste streams.

Seventy percent of the revenue from the SWMT goes to the Environmental Fund, which funds programs at the MPCA, including solid waste and landfill cleanup activities. The remaining 30% goes to the General Fund. Counties receive funding from the SWMT through the Environmental Fund, administered by the MPCA in the form of SCORE grants. Additional resources come from the competitive grant and loan programs and Capital Assistance Program (CAP) funding, which provides funding to local units of government for projects to promote landfill abatement. SCORE grants are distributed to all counties and waste districts with approved Solid Waste Management Plans. In 2014, the Legislature appropriated additional funds for SCORE. For many years, the SCORE allotment was $14.25 million per year. In 2014, the Legislature increased funding to $18.25 million for 2015 and $17.25 for 2016 and beyond. SCORE grants are based on a formula. A minimum amount is provided for each county, and then the balance of the appropriated funds is allocated based on population. The minimum payment is established by the Legislature.

Table 1: Solid Waste Management Tax rates

Waste type	Fee
MMSW – residential	9.75% of service fee
MMSW – commercial	17% of service fee
MMSW – self haul	17% of tip fee
Non-MMSW (industrial, demolition, medical)	$0.60 per cubic yard of container

Data and reports: A foundation for prioritizing solid waste initiatives and policy recommendations

Waste measurement and data

The MPCA conducted a waste characterization study in 2013 to determine the make-up of what is being disposed of in MMSW streams across the state (Figure 2). A similar study was conducted in 2000 and a

comparison of those results show the composition of mixed municipal solid waste is changing. The top three categories of MMSW — paper, plastics, and organics — remain the largest material types in the waste stream by weight; however, there was a reduction in the percentage of paper generated and increases in both plastics and organics (as a percentage of the total waste collected) from 2000 to 2013. Many of these materials could be recovered for reuse, recycling, or organics management. With aggressive goals for recycling in statute for the seven-county Metro Area (75% by 2030), it will be necessary to recover more and dispose of less to meet these goals.

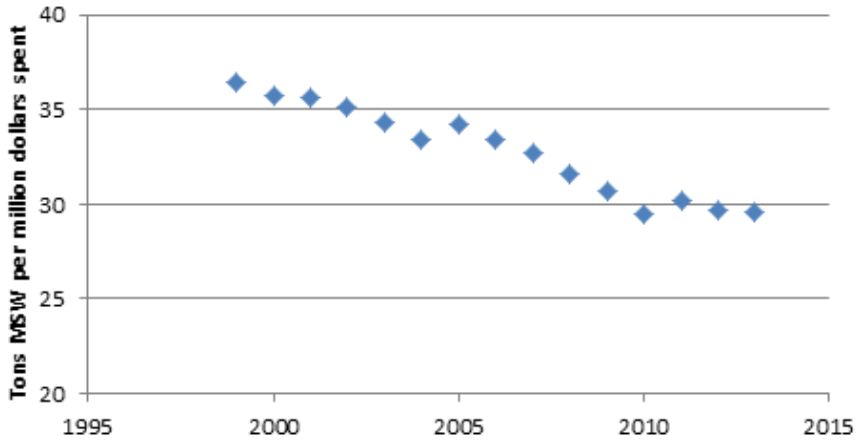
Figure 2. Composition of waste sent to disposal facilities

The 2013 SCORE report summarizes the current state of recycling and waste diversion of MMSW in Minnesota. The full report can be found at http://www.pca.state.mn.us/index.php/view-document.html?gid=22484. The 2013 report is the most recent complete summary of recycling rates and materials management rates for the state. The 2014 SCORE survey results provide summary information on recycling will be available on the SCORE Report webpage.

Minnesota continues to generate more total waste annually but is generating less waste per capita. After 4% and 5% declines in total MMSW generation during the economic recession years of 2008 and 2009, there has been a gradual uptick as the economy has recovered. Despite the increase, total generation in 2013 was 1.4% less than in 2005. Per capita, Minnesotans generated almost 7% less in 2013 than in 2005 (Figure 3).

Figure 3. Per capita MSW generation

Figure 4. Rate of waste generation in Minnesota



Minnesotans are also showing that increased consumer spending (on all goods and services) does not have to mean increased waste generation. It has long been observed that waste generation varies with economic activity. While population is also a driver of waste, variability in waste generation has, historically, been driven by consumer spending – indeed personal consumption expenditure (real PCE) explained over 96% of variability in waste nationally from 1960-1994. [2]

Applying methods outlined in EPA's National Source Reduction Characterization Report[3] (including use of Personal Consumption Expenditure[4] as tracked by the Bureau of Economic Analysis) to Minnesota, a trend emerged: expenditures have increased, while per capita MMSW generation has decreased (See Figure 4 above).

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[2] United States Environmental Protection Agency (1999). "National Source Reduction Characterization Report For Municipal Solid Waste in the United States" EPA530-R-99-034, http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=100015V9.PDF

[3] United States Environmental Protection Agency (1999). "National Source Reduction Characterization Report For Municipal Solid Waste in the United States" EPA530-R-99-034, http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=100015V9.PDF

[4] Bureau of Economic Analysis, Table 2.3.6:
http://www.bea.gov/iTable/iTable.cfm?reqid=9&step=1&acrdn=2#reqid=9&step=3&isuri=1&903=66

In 2005, Minnesotans generated 34.2 tons of MMSW for every million dollars spent. In 2013, they generated only 29.6 tons of MMSW per million dollars. So, even though an increase in personal spending is occurring, the per capita generation of waste is not increasing at the same rate, indicating the two do not have to be linearly related. This is important because it suggests that Minnesota can continue to put more money into the economy, but an increased rate of waste generation is not the inevitable result. Similar analysis has not been done with other waste streams like construction and demolition or industrial wastes.

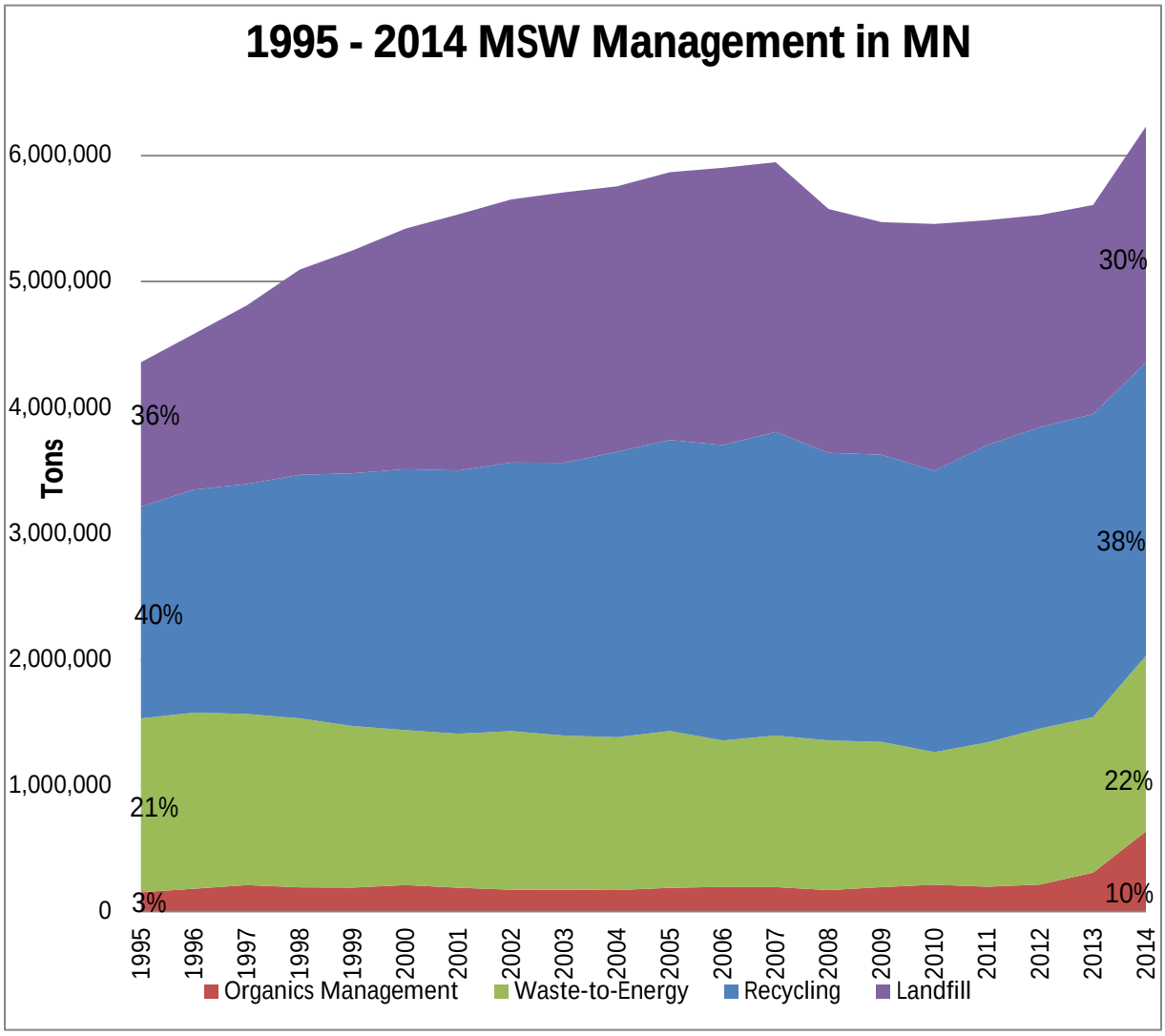
While they are good signs, the downward trend in the rate of waste generation per dollar spent does not mean that our waste problems are solved. Though the waste per dollar is declining, and waste per capita has slowed, there is still an overall trend of increasing waste tonnage in Minnesota. Even though individuals are generating less waste, because of the continued population growth, the total amount of waste disposed of each year by Minnesotans as a whole is increasing.

Due to changes in the way SCORE data was collected for 2014, some of the information was incomplete. Disposal information does not include out-of-state disposal for this single year due to reporting changes. Hauler reporting (which was passed in the 2015 legislative session) will help fill this temporary gap of information in future years. Therefore, we cannot calculate the precise recycling rate for 2014. Recycling and organics management methods were fully reported as can be observed in Table 2. This is a short-term issue as we transition to a new method of tracking this data.

Table 2. MMSW managed in Minnesota (as reported in SCORE)

Management method	2013		2014	
	Percent	Tons of material	Percent	Tons of material
Landfill	30%	1,658,834	30%	1,874,483
WTE (waste-to-energy)	22%	1,233,995	22%	1,394,414
Recycling (non-organic)	43%	2,405,002	38%	2,324,128
Organics	5%	309,618	10%	636,762
Total MMSW managed		5,607,448		6,229,787

Figure 5. MMSW managed in Minnesota (as reported in SCORE)



Prior to 2013, yard waste was not included as a measured portion of the organics stream; rather it was added to the recycling rate by 5% if county programs demonstrated certain activities. In 2013, the MPCA stopped using estimates, and allowed yard waste tonnage, if documented, to count toward the organics number. In 2014, organics increased by 48% over 2013. Statewide recycling tonnages were slightly down in 2014.

There are challenges with organics collection, but due to the infancy of organics recycling collection programs, it's easier to make substantial gains in that area than it is in traditional recycling, a well-developed program. Organics materials were defined as the largest portion of what Minnesotans continue to throw away in the 2013 Waste Characterization Study. This demonstrates there is a lot of potential material to remove from the disposal stream that can help advance the state toward the new goals established in the Metro Policy Plan and in state statute.

Despite large differences between Greater Minnesota and the Metro Area with regards to policies, the success of recycling is very similar between the two. The statewide recycling rate, including organics, is 48% (Table 3). The biggest difference in the data from these two regions of the state is the amount of waste being landfilled in Greater Minnesota. Both areas of the state face similar challenges of increasing

organics diversion as the new frontier and continuing to reduce the amount of MMSW going to disposal and waste to energy (WTE). An additional challenge for Greater Minnesota is ensuring there is sufficient processing capacity for recycling, organics, and WTE.

Table 3. MMSW managed in Metro Area and Greater Minnesota (as reported in SCORE)

2014	Recycling		Organics		Waste to energy		Landfill	
	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons
Metro	38%	1,313,603	8%	275,574	30%	1,026,758	24%	806,528
Greater Minnesota	36%	1,010,525	13%	361,188	13%	367,656	38%	1,067,955
Statewide	38%	2,324,128	10%	636,762	22%	1,394,414	30%	1,874,483

Office of the Legislative Auditor Recycling and Waste Reduction (February 2015)

The Office of the Legislative Auditor (OLA) prepared a report, *Recycling and Waste Reduction*, for the Legislature in 2014. The report (http://www.auditor.leg.state.mn.us/ped/pedrep/recycling.pdf) examined various policies, financial and programmatic issues, and made recommendations on how to advance a successful integrated solid waste management system in Minnesota. The MPCA agreed with many of the findings of the report and offered additional recommendations, which can be found in the MPCA Commissioner's response letter published in the OLA's final report.

The primary findings from the OLA report include:

- Minnesota's approach to managing waste focuses too narrowly on recycling, rather than on the full range of waste management activities.
- Establish goals for all tiers of the hierarchy, including landfill disposal, and track progress toward these goals.
- Incentivize activities that encourage management methods consistent with the waste hierarchy.
- Increase resources to develop markets that use recyclable materials.
- MPCA should ensure that, to the extent possible, waste is processed before it is disposed of in a landfill.

Overall, the report provides good insight into the existing system dynamics and areas that should continue to be improved. Additional findings from the OLA are examined in more detail and policy recommendations developed throughout the rest of this report.

Recycling and Solid Waste Infrastructure Evaluation

The state of Minnesota recently completed a Recycling and Solid Waste Infrastructure Evaluation (May 2015). (See full report: http://www.pca.state.mn.us/index.php/view-document.html?gid=23460.) The primary purpose of this report was to determine the current state of infrastructure in Minnesota and to identify major waste-sheds of material flow. The study is designed as a reference manual to help inform decisions regarding orderly facility development, statewide MMSW and recycling capacity needs, and capital improvement projects, to inform future planning priorities including things like Certificate of Need (CON). Some of the important findings are as follows:

Solid waste infrastructure

- Large portions of Minnesota are served only by MMSW landfills, generally in Greater Minnesota.

- Most of the waste-to-energy facilities are at capacity, with the exception of the Metro Area facilities and Olmsted County. Most of these facilities have been in operation for 20 years or more.
- There are approximately 15 logical waste-sheds in the state that each have unique waste management systems, and therefore have different levels of success. Roughly half of these waste-sheds are served by public facilities (Table 4).
- Private industry provides over 60% of the landfill capacity in the state, although much of that capacity is at the four landfills that serve the seven-county Metro Area.

Table 4. MMSW managed in Minnesota (as reported in SCORE)

Region	Ownership of primary disposal facilities
Crow Wing	Public and private
East Central	Public
Mar-Kit	Public
Metro	Private
Northeast	Private
Polk Group	Public
Pope/Douglas	Public
Prairie Lakes	Public and private
Southeast	Public and private
Southwest	Public
Traverse	Private
Tri-County North	Public and private
Tri-County South	Public and private
West Central	Private

Recycling infrastructure

- The Metro Area is served by large single-stream materials recovery facilities (MRFs) that are well capitalized and have excess capacity available.
- Roughly 80% of all recycled material in Minnesota was processed at the six largest facilities in 2013, all of which are located in the seven county Twin Cities Metropolitan Area.
- In Greater Minnesota, most of the MRFs are rapidly aging and nearing the end of their useful lives. These facilities are largely publicly owned.
- Over 760,700 tons of recyclable material are currently not being recovered, and instead are being disposed of, based on analysis of the 2013 Waste Characterization Study.
- Developing markets for recyclable materials in Minnesota should be a priority.
- Private industry provides the vast majority of the recycling processing capacity in Minnesota.

Overall

- In order to achieve the new legislative goal of achieving a 75% recycling rate by 2030 in the Metro Area, more private-public arrangements are necessary to expand collaboration between the public and private sectors.

The 2013 waste composition study, OLA report, and Waste Infrastructure and Capacity Assessment in addition to other solid waste data helped inform the MPCA on issues to be addressed in this Solid Waste Policy Report (SWPR). They are foundational pieces of information that provide insight on the current system and what is necessary to continue to improve the management and flow of solid waste in Minnesota.

Sustainable materials management: An evolution in the approach to solid waste management

This report seeks to develop policies and approaches that will move Minnesota to a more sustainable future and by improving the management and flow of materials throughout their life cycle to maximize environmental benefit. It starts from recognition that products and materials vary in the environmental impacts they cause throughout their life cycles, and that the largest portion of those impacts is typically caused in the extraction of raw materials, manufacturing, and sometimes use phases (see Figure 6).

Figure 6. The Environmental life cycle of materials

Environmental outcomes can be influenced by actions taken at all stages. The benefits of actions, however, will vary depending on the type of material and which life cycle stage causes largest portion of environmental impacts.

Image credit: EPA, 2009, *Sustainable materials Management: The Road Ahead 2009-2020*

Sustainable materials management (SMM) focuses on the best use and management of materials based on how they impact the environment throughout their life cycle. SMM considers impacts of extracting raw materials, scarcity of materials, product design, product use, and reuse. Traditional concerns of managing discards are also included in SMM — optimizing systems of recycling, energy recovery, and disposal.

This is not an entirely new concept; it builds on the foundation of work set in motion by the Waste Management Act and past policy reports (e.g. resource conservation). The waste management hierarchy already emphasizes practices that have little to do with management of discarded products. "Reduce", which refers to preventing creation of discards altogether, and "reuse" primarily involve changes in consumption and use materials, not management of discards.

While the waste management hierarchy puts reduction and reuse at the top, in practice, the main focus of the state, cities, counties, and private sector over the last 30 years has been on recycling and disposing of the waste that has already been created. There are two reasons for this:

1. Over time, as noted in the OLA report, the waste management hierarchy has been operationalized to create incentives for pursuing recycling or composting over reducing the size, material, or toxicity of an item. For example, because many state and local goals are tied to recycling rates of MMSW, there has been little incentive for state, local and private parties to develop ways to reduce or better manage MMSW.
2. It has been easier for the state, cities, counties, and industries to manage and measure discards instead of working to influence (and measure the impact of influencing) product design, industrial practices, and community consumption patterns — the areas where reduction and reuse can be achieved. Reduction and reuse efforts often require a wider range of partners, more time, and data that is difficult to obtain.

Framing Minnesota's efforts to conserve resources and protect our air, land, and water by using a SMM approach requires evolution of the traditional waste management hierarchy put into state law 35 years ago. SMM provides a framework based on data and analysis tools developed since the hierarchy was established. That SMM framework will enable public and private efforts to better target specific materials that have the greatest overall impact on the environment, including energy, water, and resource use, as well as greenhouse gas generation. Within that framework, the hierarchy still holds as a model for managing discards. For example, past stakeholder efforts identified extending the life of computers as an excellent step for environmental benefits and resource conservation. The challenge will be putting staff and program resources in place to make these types of initiatives as much a part of our work as recycling and disposal has been to date. Collecting meaningful data to determine the success and effectiveness of such initiatives will also be a challenge.

While SMM offers important information on environmental impacts and helps policy makers focus efforts on achieving the highest and best environmental use of materials, neither SMM nor the hierarchy provides information on other important factors such as economic (e.g. jobs) and social/political (e.g. environmental justice) considerations which would also need to be evaluated before final decisions are made. Though the focus of the Solid Waste Policy Report is primarily environmental, the MPCA has and will continue to consider all of these implications when making decisions on policy, planning, and implementation.

The hierarchy and sustainable materials management

Minnesota's solid waste management hierarchy tells us to reduce, reuse, and recycle materials and then process remaining solid waste before landfilling. An SMM framework helps us understand that the hierarchy is a useful tool to be used as part of an integrated process of actions throughout materials' life cycles rather than as a single choice at the point of discard – to reuse, recycle or throw away.

The ideal is to first engage in source reduction at the product design and manufacturing stage or at the citizen consumption point. This means first working with manufacturers to create durable, fixable, and lightweight products that use less material and materials with lower environmental footprints, and secondly, putting in place policies and infrastructure that extends the life of products, through repair, rental, refurbishing and reuse of all kinds. Ideally, goods are designed in a way that when they cannot be used or repaired further, the components are easily separated for recycling. Continued work is needed to support and develop recycling markets and recycling technologies for products where markets aren't mature or technologies don't yet exist.

The importance of recycling is reaffirmed in the SMM framework. The benefit of recycling is commonly thought to be in managing discards to reduce demand for disposal facilities, when in fact, the larger environmental value of recycling lies primarily in providing feedstocks to manufacturing and reduced need for extraction and processing of virgin raw materials. Thus, as addressed later in this report, developing the highest use markets for materials of highest environmental impact is preferred.

Case study: Minnetonka Middle Schools

Schools dump disposables for reusable utensils

When Minnetonka Middle Schools (East and West) decided to dump their plastic single-use knives and forks, they first considered switching to compostable products. But recognizing that reduction and reuse are higher on the waste hierarchy than recycling and composting, they instead switched to reusable stainless steel, with help from a grant from the MPCA. You might think that reusables for schools would increase water consumption as well as costs, but the schools discovered the opposite was true.

The switch in utensils prevented almost 6,000 pounds of trash per year and was expected to save the schools $26,000 over three years in purchase costs including purchase of the initial set of reusable utensils. And that's not all.

Life cycle analysis estimates, which take into account the environmental footprint of manufacturing, revealed that the reusables had a much smaller total environmental footprint. Compared to the disposable plastic, the stainless steel reusable utensils reduced greenhouse gases by 77% and water consumption by over 80,000 gallons (after taking school dishwashing into account). In addition, the reusable stainless steel, resulted in 74% net reductions in air acidification (sulfur dioxides) and smog (oxides). How is this possible? Because instead of needing 700,000 plastic utensils manufactured, packaged and shipped each year, they only needed 12,000 metal ones. Reuse works to conserve materials and reduce pollution.

Better prioritization

SMM highlights at which point in the life cycle a material has the biggest environmental impact, and in turn, which type of materials management activity could make the most improvement. It goes beyond solid waste management and traditional focus on MMSW recyclables to consider high impact product categories like cement or specific types of food or textile fibers[5]. Under an SMM framework, therefore, C&D and ISW and their sources will be considered together with MMSW and its sources in determining priority work.

In our current system, incentives and resources are primarily put on increasing recycling of traditional recyclables in waste — even low-impact or low-tonnage materials. All recycling is of equal value, and all reuse is of equal value. Starting from a SMM perspective, it may prove more beneficial to focus resources on capturing aluminum over another material, extend the life of computers, or replace asphalt shingles with more durable steel roofing. SMM will also allow focus on materials that have higher toxicity, helping to bridge toxics reduction and solid waste interests.

Case study: Mayo Clinic and MnTAP unwrap environmental benefits of reusable sterilization containers

Healthcare facilities incur considerable annual expense in managing the surgical tool sterilization process. The volume of single use polypropylene blue wrap being disposed by larger facilities has been estimated to be as high as 20% of the surgical services waste stream or 5% of a hospital total waste stream. The Mayo Clinic Hospital, Saint Mary's Campus allowed the Minnesota Technical Assistance Program (MnTAP) to study impacts of the sterilization process in their Rochester, MN facility. The cradle-to-grave assessment, conducted by MnTAP and University of Minnesota researchers, compared the environmental impacts of disposable blue wrap to reusable aluminum sterilization containers. The study included raw material extraction, product manufacture, use in the hospital, and end-of-life disposal.

Results showed the reusable cases reduce solid waste by 88% and have roughly half the greenhouse gas (GHG) emissions impact of the disposable wraps. The use phase has the greatest environmental impact due to the large amount of energy consumed during the sterilization and decontamination processes. The reusable cases had less use phase impact than disposable wrap. The lesson is clear, and reinforces the benefits of reuse.

Better measures

Decision-making informed by SMM can result in better overall environmental outcomes. However, adoption of this approach would require new measures for gauging progress. For example, if large companies in the state transition to use of reusable transport packaging rather than cardboard boxes, the amount of old corrugated cardboard (OCC) collected for recycling could decline, showing a drop in recycling rate. Using (and rewarding) current metrics of recycling rates, this action could seem a poor choice. The overall environmental benefits of waste prevention through source reduction are superior, but go unrecognized. This demonstrates that better measurement and evaluation of full life-cycle accounting is important.

Recent development and refinement of analysis tools and available data, including life cycle assessment, allow a more complete view of the environmental impacts of products and materials through a product's life cycle, a helpful addition to the traditional metric of tons managed. By incorporating these new tools, SMM can inform decision making that results in better overall environmental outcomes.

Measuring capture rate of recyclables in addition to traditional overall recycling rate is recommended. A capture rate indicates how much of a specific recyclable material is captured, relative to the total amount of that specific material that has been discarded. A recycling rate, on the other hand, looks at how much of all recyclable material is captured, relative to all discarded materials. See Appendix D for additional information on capture rate v. recycling rate.

By allowing an apples to apples comparison of the amount of recyclables collected to the amount of recyclables available for collection, capture rate more precisely conveys the effectiveness of recycling programs. Additionally, using the above example, if OCC is replaced with lighter weight cardboard or with reusable boxes, the capture rate isn't negatively affected.

Finally, while recycling rate measures have been instrumental in driving positive changes in solid waste management in Minnesota, a capture rate would allow improved targeting of specific materials for recycling or reuse initiatives based on their overall environmental impact.

Effectively promoting programs that advance the hierarchy, especially the top of the hierarchy, are important to achieving the environmental goals of the state. Targeting and measuring those materials and practices that have the greatest impact on our environment will help ensure we are successful. The SMM framework and related evaluation tools will allow policy and decision makers more targeted and effective information for future problem solving.

The *Office of the Legislative Auditor Recycling and Waste Reduction (February 2015)* audit of state and local solid waste programs finds:

> **"Minnesota's approach to managing waste focuses too narrowly on recycling, rather than on the full range of waste management activities. We recommend the Legislature establish goals and performance measures for all levels of the waste management hierarchy."**

The MPCA agrees with this assessment and further recommends that the state develop a more comprehensive and representative set of goals, including reduction and reuse goals that better reflect the priorities of Minnesota's solid waste management hierarchy. This expanded approach will provide goals and recommend incentives to achieve the goals of the hierarchy based on an SMM approach.

Recommendations for moving toward sustainable materials management

1. Set goals for reduction and reuse, in addition to existing recycling goals.

- MPCA will review and recommend research needed to develop and measure effective materials management goals for all types of materials, not just focusing on the MMSW stream. Findings will be shared and discussed with stakeholders for additional input, refinement, and implementation.

2. Measure and report all waste.
   - Currently other than what gets discarded and managed as MMSW, approximately two-thirds of solid, non-hazardous waste generated in Minnesota is not tracked. The reporting that does exist is present in facility annual reports, but is not reported in SCORE by counties, and, in turn, material that is recycled (i.e. shingles) does not "count" toward the recycling rate. Further, by not counting these materials, policies may be more MMSW-focused when the actual environmental impacts from other waste streams are more damaging. Additionally, SMM principles need to be applied when evaluating waste streams to promote their highest and best use.
3. Determine a set of priority materials to focus on, based on life cycle environmental impacts.
   - The MPCA will build on the 2009 solid waste stakeholder effort by bringing in other measures such as energy, resource and water impacts. This stakeholder work used the EPA's limited lifecycle analysis based Waste Reduction Model. See Environmental Initiative, Integrated Solid Waste Management Stakeholder Process, 2009.
4. Measure the capture rate of recyclables in addition to the recycling rate.
   - MPCA will work with a few communities to test and refine the measurement methodology and estimate the financial needs (e.g. sorting of recyclables and waste) that are necessary to support a broader use of this approach. Using the results of these pilots, the MPCA will determine how best to apply this approach to local, regional and state level analysis.
5. Require waste composition studies at all disposal facilities.
   - Waste-to-energy facilities are currently required to conduct waste composition studies every five years. This requirement should be extended to all disposal facilities for consistency. The data provides important trend information on waste composition (types and quantities of materials disposed). The addition of landfill information will help policy, planning, and implementation efforts, such as assessing capture rates. This requirement should include all landfills, not just MMSW facilities.

6. Reform the waste deposit disclosure requirement and specifically require haulers to provide information to consumers on the final destination of their waste.
   - Currently, some customers receive a list of all facilities a hauler may take the waste picked up at the curb. This does not provide sufficient information and can cause problems down the road if there is a question of liability for a specific waste. Ideally, this allows a customer to understand how their waste is managed and make informed decisions on selecting a hauler.

Recommendations for supporting the waste hierarchy

1. Reform SWMT structure to clearly dis-incentivize land disposal. Specifically, change tax/fees, the pay-as-you-throw policy, and other policies to ensure that the least preferable management methods are the most expensive.
   - Currently all waste destined for disposal at either a waste-to-energy facility of landfill pay the same tax rate. The overall goal is to move material up the hierarchy to its highest and best use.

The economics of waste in Minnesota

Traditional waste management methods create the perception that land disposal is the most cost-effective solution. But there are externalities and hidden costs to land disposal that should be considered. Generators should be aware of the true costs associated with any type of disposal option. All aspects of managing waste, including long-term management and monitoring costs, lost opportunities for material recovery, and environmental impacts should be considered. Managing materials in accordance with SMM and the hierarchy supports economic growth and development in the creation of new industries, markets, and jobs necessary to support these endeavors.

Material that is recycled and reintroduced as a feedstock into a manufacturing process continues to generate economy activity. The very act of manufacturing adds value to material. Landfilling adds no further value to the material. Once material is landfilled, it ceases to produce any additional economic activity.

While the waste management hierarchy provides direction and focus on material recovery, the reality is that nearly one third of the material we generate in Minnesota ends up being landfilled. Given the significant volume and impact this material has now and into the future, it is important to explore some of the economic variables that influence waste disposal.

Further, the externalities of land disposal are not often considered when evaluating price associated with land disposal. All environmental, social, and economic factors should be evaluated in order to put a true cost on a waste management method. Minnesota's Closed Landfill Program (CLP) provides information and the long-term cost associated with historic landfills in the state. Although the landfills in the CLP were designed differently than today's modern landfills and may have been higher risk for contamination, it is still true that landfilling waste is a higher risk option than other disposal methods. Financial assurance is paid by landfill operators with the intent of covering long-term costs. However, because we cannot predict the future, it is still unclear whether that will cover all costs needed for closer and long-term care at landfill sites.

What has been happening in the market lately

During the 1990s, the State of Minnesota and private industry invested millions of dollars in developing recycling end markets. The success of the current collection system and end markets for recycling that are in place today directly reflect those investments.

In the 2000s, the investment pace slowed down on the end market side to a crawl. The paper and steel industries experienced many rounds of consolidation and closure due to the increased amount of material being imported from China. The export of our domestic market capacity picked up speed with the massive investment by China in paper, steel, and plastic. China and other southeast economies Gross Domestic Product (GDP) was 8.45% in 2000 peaking at 14.2% in 2007. The GDP has trended downward since 2007 first quarter 2015 GDP about 7%.

The domestic collectors of recycled material relied on China for an increased portion of their sales in the 2000s. China consistently paid above market prices until about 2013. The domestic market saw a downward trend in pricing with the recession and dramatic price drops in 2013. In 2013, the Chinese government instituted a policy called the Green Fence. The policy banned the import of all but the cleanest, most organized bales of recyclables. The lack of investment in domestic markets since 2000 meant the domestic market could not take up the increased amount of material, which resulted in these price drops. The state of Minnesota's emphasis has been on developing local, regional and domestic

markets in conjunction with partners. These partners include haulers, recyclers, national, state and local governments, and the domestic end markets.

It is important with poor markets and China's slowing economy to invest in domestic markets. This would mean more processing and end market development. The opportunity exists to create jobs domestically. This will require financial investment by the state and private sector to take advantage of this opportunity. At the same time, we have to maintain and strengthen the existing markets. Currently there are low feed stock prices and Minnesota is experiencing a steady, but growing economy.

Economic activity associated with Minnesota's reuse and recycling industries

Since 1996, the MPCA has examined the economics associated with the recycling sector. Recently, the MPCA has also done studies on the economics of the reuse, rental, and repair industries as well as worked with the Minnesota Composting Council to evaluate the economics of organics[6]. MPCA's studies report on the employment numbers associated with these industries as well as the economic activity such as gross annual sales information, percent of the state's gross domestic product, annual wages, and individual income and sales tax. Most of this information was obtained by purchasing information from Dun & Bradstreet, but Regional Economic Models, Inc. (REMI) was also used to model things such as the indirect jobs, induced jobs, salaries, tax revenue and gross state product.

The recycling, reuse, rental and repair sectors of the economy generated an estimated $1.338 billion in federal, state tax and local tax revenue and employed approximately 63,500 thousand people in direct jobs. These jobs, in turn, supported another 74,500 thousand people downstream in indirect and induced jobs. All together these jobs, which paid a $6.28 billion in wages, represent a major force in Minnesota's economy. This sector represents about $26 billion in sales, which is approximately 6% percent of Minnesota's economy.

By not recovering materials that could be recycled, $2.3 billion of potential material was discarded between 1996 and 2013 in Minnesota.

Appendix F includes estimates of the potential market value lost because materials were disposed of and not used as feedstocks to make new products. It includes a breakdown of the types of material disposed and their potential market value.

Tables 5 and 6 are intended to provide a snapshot in time of economic activity associated with the recycling value added manufacturing and reuse repair and rental sector. Caution should be exercised in comparing this analysis to the previous analysis, as the data sources are different than previous work.

[6] A Study of the Economic Activity of Minnesota's Reuse, Repair and Rental Sectors. Minnesota Pollution Control Agency. 2011.

Table 5: Economic activity associated with Minnesota's value-added recycling manufacturers

Job category	2015 employment
Direct jobs	18,000
Indirect jobs	18,600
Induced jobs	23,600
Total direct, indirect, and induced jobs	60,200
Economic outputs	**Dollars**
Total wages and salary	$3.42 billion
Total tax revenue	$665 million
Total value-added activity	$6.68 billion
Total output (sales)	$15.7 billion

Source scenarios calculated using Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, December 2015, Minnesota Pollution Control Agency, Wayne Gjerde.

Definitions

Direct jobs: Jobs held by employees or workers who are directly involved in the production of goods or services

Indirect jobs: Jobs held by those working for companies that supply materials and/or services to companies to produce a final product.

Induced jobs: Jobs created when employees in direct and indirect jobs purchase goods and services in the community.

Total wages and salary: Money paid to employees from all sources

Total tax revenue: All business and personal federal and state income, sales, excise and miscellaneous taxes

Total value added activity: The value a company gives its product or services before offering the product to customers; contribution to Gross State Product, similar to Gross Domestic Product output, excluding all goods purchased to manufacture products as well as wages & profit

Total output (sales): The amount of production, including all goods purchased to manufacture products, as well as wages and profit

Table 6: Economic activity associated with Minnesota's reuse, repair and rental sector

Job category	2015 employment
Direct jobs	45,500
Indirect jobs	11,400
Induced jobs	20,900
Total direct, indirect and induced	77,800
Economic output	**Dollars**
Total wages and salary	$2.86 billion
Total tax revenue	$673 million
Total value-added activity	$6.97 billion
Total output (sales)	$10.26 billion

Source scenarios calculated using Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, December 2015, Minnesota Pollution Control Agency, Wayne Gjerde.

Public and private systems

Minnesota's solid waste system has evolved from being a public-only system put in place to provide sanitation services to protect public health to one that has both public entities and private businesses operating in a joint system. As private businesses began to play a larger role in the system and more business opportunities were recognized, the system matured to include services well beyond trash collection. In today's complex waste management marketplace, we see the collection and management of recyclables, processing facilities for waste and recyclables, and more recently the expansion of organics collection from only yard waste programs to now include food, non-recyclable paper and other compostable materials.

Both public and private entities play an important role and must work together to maintain the integrity of the whole system as well as look for opportunities to manage materials more effectively, efficiently and in environmentally responsible ways. Both have made substantial investment in and play important roles in the operation of a successful marketplace.

Challenges do exist in the current system. Managing materials in accordance with the hierarchy does not always result in the lowest cost option. In order to be more successful, the economics need to be adjusted so that the short-term costs and profits promote better environmental outcomes. Although it can seem as though the public and private sectors are at odds when it comes to the current waste management system, it is important to recognize the efforts and jobs created by private enterprises choosing to do business in Minnesota. These private entities help spur the state's economy by creating and keeping jobs local while also providing a necessary service to residents of Minnesota. Therefore, it is important to identify common goals between the public and private sectors to move toward sustainability.

Differences between Greater Minnesota and the Twin Cities Metro Area

In Greater Minnesota, counties have established transfer stations, MMSW processing facilities, recycling facilities, and/or landfills. In these counties, waste collectors generally use public infrastructure to unload their trucks and manage waste. This has the effect of establishing a level playing field for waste collectors in terms of waste management (after collection).

Waste haulers in the Twin Cities Metro Area are heavily dependent on private infrastructure for waste management. There are only two large public

Impacts of flow control

Prior to the 1990s, public entities could, by state law and local ordinance, designate all waste generated within their jurisdiction to a specific solid waste facility. Federal litigation regarding county authority to direct the flow of waste effectively ended the use of what is commonly referred to as "flow control" via waste designation in 1994.

Since that time, counties have had to use subsidies, long-term contracts and other approaches to process waste higher on the hierarchy. These other methods have been less effective and more costly than flow control, primarily because most of the waste management infrastructure is owned by private waste management entities who have financial incentives to take waste to their own landfills or landfills that charge a lower tip fee than waste-to-energy facilities and counties have used subsidies to ensure waste flow to preferred facilities.

In 2013, a court decision revisiting the issue of flow control ruled that local governments can designate waste to publicly owned facilities. Because of this change, several Minnesota counties have expressed interest in designating their waste to publicly owned facilities and have started the process of updating existing or creating new designation plans and ordinances.

waste management facilities[7] located in the Metro Area, the Hennepin Energy Recovery Center, and Hennepin County's Brooklyn Park Transfer Station. The other essential infrastructure for waste management including transfer stations, recycling centers, MMSW processing facilities, and landfills are privately owned.

There has been an increase in vertical integration by waste collection and management firms, where MMSW is collected and taken to privately owned landfills. Vertical integration is the process of a company owning assets in collection, transfer, and management of waste and recyclables. It results in the company saving money on tip fees and other costs that would be incurred if they had to deliver material to a competitor's facility. Much of the permitted landfill capacity in and around the Metro Area was acquired by vertically integrated waste management companies to serve their collection operations and the needs of other waste haulers.

Waste classification

Definitional discrepancies concerning waste types, and in particular industrial wastes, may be interfering with implementation of the state's long-standing waste hierarchy. Specific areas affected by this are Metro Area processing requirements for MMSW under Minn. Stat. § 473.848; conservation of MMSW landfill capacity under the Certificate of Need (CON) statute, risk management at landfills, and the difference in tax rates between MMSW and ISW.

In 1988, solid waste management in Minnesota looked like this:

- "Industrial waste" meant some variety of manufacturing or processing waste, or commercially generated waste that needed special handling if disposed along with industrial waste.
- There were no ISW landfills taking waste from a wide variety of commercial customers; the only ISW landfills were "captive landfills" owned by industries to dispose of their own residues such as coal ash, paper-mill sludge, and auto fluff.
- Taxes and fees on waste disposal for all types of solid waste (MMSW, ISW and C&D) were low.

At that time, no one expected generators and haulers to shift commercially generated, organic MMSW materials into the ISW category. And state taxes had not yet been applied to waste disposal services (taxes that would later offer a significant rate reduction if classified as ISW), so there was no pressing financial incentive to reclassify traditional MMSW as ISW.

ISW received extra attention from inspectors and incurred extra expense due to classification and screening requirements, and ISW carried a perceived liability in the case of Superfund actions at landfills that took such waste. In addition, ISW landfills were more expensive due to waste testing, toxicity characteristic leeching procedure (TCLP) analysis, material safety data sheet (MSDS) documentation, and waste manifesting. All of these things made the disposal of industrial solid waste as a co-disposal item with MMSW much harder.

In 2014, the picture looked like this:

- 63% of industrial wastes are categorized as "other" on annual reports to the MPCA and are not specifically characterized in the same way that ISW streams were in the 1980s.

[7] Ramsey and Washington Counties recently voted to purchase the Resource Recovery Technology (RRT) Processing Facility in Newport.

- MMSW separation requirements for recycling and organics are increasing, particularly in the Metro Area — but not for ISW and C&D.
- The nature of ISW being landfilled has changed, though a waste composition study is needed to confirm this. Observers report that the waste is less dense than it used to be and contains less foundry sand and contaminated soil.
- ISW landfills have lower regulatory requirements than MMSW landfills (no CON, less mandatory environmental review, lower fees on waste arriving at the gate, more flexible design requirements, lower taxes on generators). One result is that Minnesota landfills now have 1,841 years of ISW space if current statewide volumes were to continue.
- A 2010 law that raised siting and financial requirements for new landfills (both MMSW and ISW landfills) is encouraging the industry to expand landfills already in operation, rather than build new ones. Under current laws, it is easier to expand an ISW or Class III demolition landfill than it is to expand an MMSW landfill.

In 2014, 6.6 million tons of solid waste was disposed of at landfills in Minnesota. This includes municipal, industrial, and construction and demolition wastes. Currently, these three waste streams are managed independently of one another, and non-MMSW, for which there is little data, makes up more than two thirds of the total. All waste types need to be tracked more effectively to ensure proper management and protection of human health and the environment.

Table 7. Waste disposed of in Minnesota in 2014

Waste type	Landfill type	Quantity
Industrial solid waste	Non-MMSW landfills or non-MMSW disposal cells at sanitary landfills	2.7 million tons*
Construction and demolition	Demolition landfill	2.0 million tons
Mixed municipal solid waste	MMSW landfill	1.9 million tons

*Of the 2.7 million tons of ISW disposed of in Minnesota in 2014, 1.7 million or 63% of that waste was labeled as "miscellaneous," "other," or described as a blend of multiple types.

Land disposal practices, waste characteristics, and financial incentives have changed dramatically over the last three decades, but the laws and rules have not kept pace. As Table 7 above demonstrates, 2.7 million tons of ISW was disposed of in 2014. Of that 2.7 million tons, 1.7 million tons was classified as miscellaneous, other, or as a mix of various types. Some information suggests a portion of the wastes that would have traditionally been classified as MMSW is now being managed as ISW. Some reasons for this may include the State's current definitions of ISW in statute and rule and the current landscape of MSW and ISW capacity. Regardless of the reasons, the MPCA needs to look closer at the situation to determine if there are impacts to the system and discuss how data is classified and submitted for reporting. Additional data is needed on the makeup of the waste classified in the other category to determine what types of materials are being disposed and if facilities are equipped to manage those wastes.

This potential shift of waste from one category to another raises environmental concerns. One example of such a concern is where a portion of waste received might react with other waste in the landfill (chemically or biologically). Industrial wastes and municipal solid wastes are not, in some cases, compatible in the same landfill. The problem can arise when large quantities of industrial wastes are reactive in conditions typical of landfills taking MSW, which contain moist, biologically active organics that are slow to degrade when buried. Examples include aluminum smelting residues and baghouse dust. The reactions, which can produce elevated temperatures deep in the waste, and combustion

byproducts, is not addressed by long-standing hazardous waste regulations, as these rules have more difficulty characterizing chemically reactive materials than characterizing toxic materials. There is also the concern of ensuring landfill capacity is indeed being managed through the certificate of need process (CON)[8] as intended by statute.

Until the definitions are updated and clear, there is the possibility for similar waste to be classified differently in various situations. Unlike other definitional categories such as demolition debris and medical-pathological that are tied directly to the inherent and visible nature of the waste itself, some in the solid waste field regard ISW as a flexible term. They see the term "ISW" less about the inherent, visible characteristics of waste and more on how generators, haulers, and landfills decide to separate and handle it. This allows for the potential selection between MMSW and ISW categories, depending on response to market demand, distance to facilities, facility capacity, liability risks, and public opinions about landfills in the neighborhood, local fees, and state taxes.

The MPCA rule definition of ISW is causing problems with the MPCA's ability to implement state law and policy. The rule definition is more inclusive than the definition of "industrial waste" under Minn. Stat. § 115A.03, which requires thoroughly separate handling from cradle to grave. The Department of Revenue's implementation of the SWMT relies on the more restrictive ISW definition from Minn. Stat. § 115A.03, because the SWM tax law (Chapter 297H) directly references the 115A definition. Meanwhile, MPCA and regulated parties have been using the broad definition of ISW found in Minn. Rule Chapter 7035.

Recommendations for clarifying waste classification

1. Modify the current industrial definitions to ensure consistency between those found in both rule and statute.
2. Collect additional data on the types of wastes disposed of in Class III and Industrial Solid Waste landfills to determine the composition of these wastes.

[8] CON is the process in which MMSW landfills apply for additional capacity in order to expand (Minn. Statute 115A.917). CON applies only to MMSW landfills.

Greater Minnesota solid waste plan reform

Solid waste plans were established in statute in the early 1970s (and updated significantly in the 1980s with the introduction of the Waste Management Act and adoption of solid waste rules) to provide a foundation and framework for solid waste management in Minnesota.

County plans do many things, including providing the framework for:

- The orderly and deliberate development of solid waste facilities
- Solid waste outreach and education efforts to support the existing local and regional systems
- An assessment of waste generation and opportunities for increased diversion
- An evaluation of the financial needs, policies, goals and strategies to support the system

Approved solid waste plans are required for many programs that are important to state and county planners. These programs include solid waste permitting, calculation of landfill capacity needs (Certificate of Need), Environmental Assistance (EA) grants, SCORE grants, and Capital Assistance Program (CAP) grants, solid waste data, policy and research development (e.g., Statewide Waste Composition Study), and development of state and local solid waste policy and legislation.

Since its inception, there have been many changes that have created challenges to the effectiveness of county planning. Counties have seen reductions in the number of staff dedicated to solid waste activities. State staffing levels have also decreased from a high of 6 FTEs to the current level of 2 FTEs located in Duluth and Marshall. These reductions in staff have meant less time is available to develop the most effective, proactive, and innovative plans required to meet state and local polices and requirements.

Greater Minnesota county plans were initially updated every 5 years. As a result of state and local staff and resource challenges, the cycle was increased to 10 years in in the mid-2000s. While this reduced some of the burden and arguably paved the way for an increased focus of time and resources on implementation, the end result was pushing the problem down the road and a greater concentration of plans needing approval at one time. For example, 18 plans are set to be updated in 2023 and 26 plans are set to be updated in 2024.

While the MPCA plans to talk to the counties about ways to streamline the logjam, developing an effective plan takes time and resources. If both the state and counties invest so much time and resources in these documents, and they are crucial to so many of the state and county's needs, more support and reform needs to occur over the next 4 years.

Case study: County-wide curbside recycling in Winona County

In 2012 Winona County became the first to offer county-wide curbside recycling in Greater Minnesota. Recycling participation rose by 50%, to reach 97%. Materials collected increased 60% from 3,000 to 5,000 tons per year. The county also saw a noticeable reduction in wind-related litter with the addition of recycling carts. Education was vastly enhanced with permanent education labels molded into the cart lids.

Current program costs

Curbside at households/small businesses	$3.33 per month
Multi-family and commercial as needed service	$26.40 per stop
Total annual contract costs	$852,000
Per capita annual costs	$16.56
Tons recycled annually	5,000
Annual pounds per capita recycled	200

What's in the future?

Winona County is looking to see if they can capture efficiencies through the use of dual collection trucks for rural trash collection and recycling since they are already out there picking up recycling.

Using the Metropolitan Solid Waste Policy Plan as a model

The Metropolitan Solid Waste Policy Plan provides comprehensive recommendations for the development of the solid waste system in the Metro Area. Individual Metro County Master Plans must conform to those polices. Having a common set of solid waste policies leads to a more coordinated

system overall for the region. Greater Minnesota solid waste plans do not have a similar guidance document.

A statewide solid waste plan (that the existing Metro Solid Waste Policy Plan could be folded into) would provide a more comprehensive, coordinated framework and vision for solid waste management throughout Minnesota. The plan would build on information from existing county and regional master plans, waste composition information, and other data and research (e.g., *Recycling and Solid Waste Infrastructure Evaluation*) and provide policy recommendations that individual and regional county plans would need to be consistent with.

Such a plan would also provide policy recommendations to reform the Greater Minnesota planning structure, including minimum requirements for basic plan development and incentives for counties and regions that go beyond the minimum requirements. By providing a range of planning options and associated incentives, counties that choose to focus on developing a basic plan will invest less time and resources than they currently do, while still focusing on the most important yet basic requirements. A stakeholder group consisting of county solid waste staff and the MPCA would review the existing plan structure and requirements and develop a proposal for a new planning structure. Most importantly, the statewide plan would be based in part on the principles of sustainable materials management, and priorities will focus on materials and practices that yield the greatest environmental benefit vs. a primary focus on discards management.

System accountability needs to be improved and minimum standards established for all counties such as making annual review and work plan adjustments a standard part of all county plans so they are not a document that is looked at once every 10 years, but instead a purposeful and useful planning and policy tool that is used regularly and effectively.

Recommendations for county planning

1. Establish a requirement in the Waste Management Act for a statewide solid waste plan (that the existing Metro Solid Waste Policy Plan could be folded into) and require Greater Minnesota county plans to be consistent with state plan.
2. Develop a stakeholder group consisting of MPCA and county solid waste staff to review the existing plan structure and requirements and develop a proposal for a new planning structure.
3. Seek out opportunities for collaboration among counties and build on the regionalization and waste-shed recommendations from the OLA report, waste composition studies, and the *Recycling and Solid Waste Infrastructure Evaluation*.
4. System accountability needs to be improved and minimum standards established for all counties such as making annual review and work plan adjustments a standard part of all county plans so they are not a document that is looked at once every 10 years but instead a purposeful and useful planning and policy tool that is used regularly and effectively.
    - Consider using withheld SCORE funds (from delinquent county plans) to support efforts that advance Sustainable Materials Management programs and measurement.
    - When a county's solid waste plan is out of date, state SCORE dollars are withheld until a new plan is approved. Once approved, those withheld SCORE dollars are remitted to the county in a lump sum. Explore how these withheld funds could be better used to provide additional support for counties and regions who exceed minimum performance requirements (e.g. recycling rate) and seek to expand their waste reduction, reuse, recycling, composting or waste processing efforts. Funding could favor activities higher on the hierarchy with a preference for efforts that advance sustainable materials management.

Recycling market development

Recycling only works when there are businesses to buy the collected materials and reprocess them. Recycling market development is a critical component of Minnesota's waste management system, because it creates markets that use materials that would otherwise be disposed of. It keeps those materials in circulation, creating jobs, saving resources, and reducing negative environmental impacts. Additionally, it promotes using materials for their highest and best use by turning those recyclables into a new, high-value product.

Using recycled materials as feedstock allows businesses to increase profits, develop new products, demonstrate their commitment to sustainability, and reduce waste in Minnesota. In the past, recycling market development was about developing new products made from recyclable materials. It has since evolved to include everything from increasing generation of recyclables to new product development.

Critical components to a strong market development program include the following:

- Implementing a sustainable materials management approach.
- Ensuring markets remain secure and strong for traditional recyclable materials collected through curbside collection and that there are facilities to process the materials
- Connecting private companies with resources to overcome barriers to developing new products
- Promoting economic growth through environmental innovation
- Creating repair, recycling manufacturing, and organics jobs
- Increasing the prevalence of recycled-content products
- Keeping valuable commodities out of landfills
- Implementation of programs to stimulate and support markets for specific materials
- Reacting in a timely manner as opportunities and challenges arise
- Connecting companies with new material feedstocks and increasing collection of difficult to obtain materials
- Producing quality products on a consistent basis
- Develop markets for new or emerging recyclables including compost from source separated organics

The role of MPCA in recycling market development

The Minnesota Pollution Control Agency provides oversight and helps coordinate market development opportunities and projects around the state. The MPCA's market development program:

- Works with businesses, haulers, processing facilities, brokers, manufacturers, and counties to solve problems related to recyclables. For example, if a material has been regularly collected and a reliable end market is no longer available, the MPCA will work with all parties involved to come up with a short-term solution until a permanent fix can be found.
- Analyzes the economics of the recycling industry to determine viability of markets and value of materials. MPCA tracks market conditions for all commodities as it relates to Minnesota end markets. Fluctuations in price affect the marketability of commodities and in turn affect the flow of materials and who is willing to purchase those materials as feedstock.
- Evaluates potential new materials and their ability to be collected. For a market to be successful, the materials used to make a new product must be able to be collected and transported to the business in an economical and efficient way.
- Administers loan and grant programs that can be used to help new projects and processes to get off the ground.
- Provides technical assistance to maintain projects that have already been implemented. Unfortunately when staff time is limited, offering technical assistance is a challenge.

Although all these activities fall within the purview of market development activities, the level at which they are currently implemented is much less than what is needed to maintain a strong program. Many opportunities are being missed because of a lack of funding and staff time. The Office of the Legislative Auditor report specifically called out the need for additional resources dedicated to recycling market development.

"MPCA devotes few resources to developing markets for recycled materials…MPCA should consider increasing the amount of resources dedicated to market development for recycled material." (Office of the Legislative Auditor, State of Minnesota, Evaluation Report: Recycling and Waste Reduction, 2015)

For detailed information on the current programs as well as market development opportunities in Minnesota, see Appendix F.

Recommendations for market development

1. Expand MPCA's recycling market development program based on priority materials identified through a SMM approach and the waste management hierarchy.
2. Revive the Market Development Council or create a similar board to provide direction to the State on market development.
    - This dedicated, multi-interest group is needed to help guide the direction of market development in Minnesota. Representatives from various state agencies (MPCA, Department of Employee and Economic Development, Agriculture, Commerce, and Revenue), counties, cities, businesses, and the recycling industry should be included.

Evaluation of new technologies

New technologies to use or recycle materials that would otherwise be waste continue to be part of the discussion in Minnesota. Private and public sector organizations around the state are giving serious consideration to making substantial investments in technologies like anaerobic digestion, technologies that convert plastic wastes into oil, or other processes designed to capture value from "waste."

The waste management hierarchy is a useful and important tool for deciding what management method offers the greatest environmental benefit. But that calculation becomes more complex with these new technologies, since they don't always fit neatly into the hierarchy. Even within each of these categories of technology there can be a diverse array of benefits and consequences. For example, anaerobic digestion using biosolids and that produce digestate that is only suitable for land application may not offer equivalent benefits compared to anaerobic digestion using source separated organics that produce a digestate that is suitable for composting. There may be other scenarios in which digestate is contaminated to the extent that it must be landfilled. In addition to using different feedstocks, and producing different types of digestate, these facilities are often custom designed which means the performance of one facility may not be equal to the performance of another.

New technologies require substantial economic investment to become reality. In many cases, public dollars are part of the financing picture. Thus communities must not only evaluate if the new technology offers an inferior or superior environmental benefit compared to another waste management method, but also prioritizes human health. They must also evaluate what commitment they are making to continue to provide such a facility with a sufficient quantity of waste to operate economically. Given the comparably superior benefit of preventing waste, creating a substantial financial incentive for a community to deliver large quantities of waste may not actually be beneficial even if the new technology offers advantages compared to landfilling or other less desirable waste management strategies.

Proposed new facilities should be evaluated on a life-cycle-basis, because a single process may result in products that fit in multiple tiers of the hierarchy. For example, a materials recovery facility (MRF) produces feedstocks for recycled content products as well as residuals that require disposal. Only the portion of the incoming material that is actually recycled "counts" as recycling. So, for example, depending on the type of process an anaerobic digester uses, there may be a fraction of compost, waste-to-energy and land disposal all utilized, and the fraction of each would apply to hierarchy goals. It is true there are tax benefits to companies that recycle or compost, and the portion of any end product that fits into the definition of recycling would be exempt from the solid waste management tax.

Recommendations for new technologies

1. Establish a process for the MPCA to evaluate and review new technologies at facilities using life-cycle analysis techniques. Outline the resources, barriers, and steps needed to determine where and why they fit into the waste management hierarchy.

Managing organic materials

The MPCA's 2013 waste characterization study identified that organics (food, non-recyclable paper, etc.) comprise 40% of the waste that Minnesotans currently throw away. Of all the material generated, only 4% is being collected through an organics program. Organics collection includes food donation efforts, food-to-animals programs, and composting.

The 75% recycling goal in the Metro Area cannot be met by collecting only traditional recyclables like cans and newspapers. The Metro Area will also need to capture organics. This means the state will need to improve access to organics collection, improve its ability to collect and process organics, develop markets for compost, and educate the public. A multifaceted strategy and partnerships will be critical for the effort to be successful.

You can't talk about organics without considering the top of the waste management hierarchy — prevention. Waste prevention initiatives consistently offer the most environmental and social benefit. At this time, 1 in 6 Americans lack a secure supply of food. Reducing food losses across the supply chain by 15% could help feed more than 25 million Americans every year.

Wasted food has received a great deal of attention because of both the social and environmental consequences of throwing food away. Preventing wasted food also avoids using the substantial resources that go into growing, transporting, and processing that food.

As Minnesota builds systems for capturing organics, the MPCA and its partners need to weigh public investment in food-to-animals, composting, and in the future possibly anaerobic digestion as management methods against prevention efforts.

Wasted food, wasted resources

The Natural Resource Defense Council (NRDC) issued a report on wasted food in 2012. The report notes that 40% of the food in the U.S. today goes uneaten — that averages more than 20 pounds of food per person every month.

Many resources go into food production. NDRC found that 10% of the U.S. energy budget, 50% of U.S. land, and 80% of freshwater are consumed to deliver food to our tables. Consumers spend more than $165 billion each year to purchase food that is thrown away. On average, each household is losing between $1,350 and $2,275 each year in wasted food.

In addition, this amount of wasted food from a lifecycle perspective, or from farm to fork to landfill, contributes to 14% of our total domestic greenhouse gas (GHG) emissions that contribute to climate change.

Fortunately, the report identifies strategies for households, businesses, and government to reduce food waste. Recommendations for state and local government include setting targets for reduction, providing direction and infrastructure to enable food waste prevention programs, addressing date labeling confusion, creating incentives for donation programs, and including education about prevention with the launch of composting programs.

The full report can be found here: https://www.nrdc.org/food/files/waste-food-ip.pdf .

Access to organics collection

A 2013 survey conducted by the MPCA of city recycling programs suggests that only about 8% to 9% of the state's population has access to curbside organics collection. Most of the curbside access is through subscription-based programs where residents opt in and pay a fee to participate. The survey also suggests that access to organics drop sites is more prominent, but still only about 23% of the state's population have an organics drop-site in their city. Several counties, cities, and the Western Lake Superior Sanitary District (WLSSD) host drop-sites open to any residents within the political boundaries; so additional residents could also participate if they are willing to transport their organics to other nearby cities.

Minimal data is currently available to evaluate statewide access to organics collection for commercial businesses. Collection of organics is certainly happening in the commercial sector, but there are likely still many areas of the state where collection services are not available. Commercial organics options, including food donation efforts and food-to-animals programs and composting, remain an important part of the overall organics diversion effort. Donation and food-to-livestock approaches are generally less likely to be viable for residential organics collection.

In order to meet the state's recycling goals it is clear access to organics collection will have to expand. For organics to succeed, residents, businesses and institutions must at a minimum have access to organics collection opportunities.

Expanding access to collection opportunities is an important starting point, but for programs to be successful, investments in education and outreach are critical. Collection systems will need to be evaluated and refined once more collection programs are in operation. Compost facilities will have to adapt to handling more material and find additional markets for compost. Further establishing these industries will require investment of public and private dollars. The benefits of this investment will reduce dependence on landfills and waste-to-energy facilities, and achieve a number of environmental benefits that improve quality of life.

Case study: Duluth Grill

Duluth Grill, a restaurant in Duluth, has been diverting leftover food and organics for years. Extra food goes to area food pantries, and table scraps and back-of-the-house trimmings are delivered to the Western Lake Superior Sanitary District's (WLSSD) award-winning composting facility.

Says Duluth Grill's owner, Tom Hanson, the restaurant directs at least two thirds of its discards to recycling and composting, away from landfills. Sometimes conservation takes extra creativity: offered a 500-pound load of locally grown bell peppers that would otherwise have not found a buyer in time, the Grill cut them up, breaded and fried them, and substituted "pepper rings" for its onion rings … and found them a best seller.

WLSSD's composting program kicked off in 2001 with voluntary organics recovery from businesses and institutions. Haulers or businesses could bring source-separated organics to the compost site at no cost. In 2004, the district set up several food scrap drop off sites for residents and small businesses. WLSSD established a local ordinance in 2006 that required large-volume generators of organics (such as food processors, restaurants, grocery stores, and cafeterias) to separate edible food and compostable organic material from the waste stream for beneficial use in feeding programs and composting.

More than 200 area businesses and institutions send over 3,000 tons of source-separated organics each year to the district's compost facility. The compost is blended with wood chips, leaves, and yard trimmings and sits on an impermeable pad near the district's wastewater treatment plant at harborside. After six months, the material is screened, cured, and sold in bulk bags. State grants in 2001 and 2010 helped pay for the composting facility and the concrete compost pad.

Organics facility capacity and collection systems

There are facility and collection issues specific to organics that will affect our ability to implement successful programs. For example, currently a substantial portion of the solid waste in the state is managed by being consolidated at a transfer station before being brought to its ultimate destination. Using the transfer station to aggregate larger volumes of material and transport it allows for more efficient and cost-effective collection. However, current use of transfer stations for managing organics is quite limited. The MPCA needs to work with our partners to explore options to add capacity to the system to consolidate and transport organics at transfer stations. There is also a need to expand access residents have to organics recycling programs, with the primary focus on expanding access to curbside collection since it has been demonstrated that recycling programs must be convenient if they are going to be successful.

Minnesota composting facilities recycled more than 660,000 tons of organics in 2013.

A 2014 study conducted by the Minnesota Composting Council indicated the relatively new industry has created an estimated 700 direct and indirect jobs. The compost industry's gross revenues from private and public composting grew from $30 million in 2008 to $38 million in 2013. According to the findings of the 2014 study, statewide composting facilities have recycled more than 660,000 tons in 2013.

Furthermore, evaluating the different organics collection options will be important. For residential programs, there have been three primary models: co-collecting organics with yard waste, collecting organics independently, and collecting organics in a durable compostable bag that is placed inside a trash container and then sorted elsewhere. It is likely that different collection systems will be successful in different parts of the state.

The agency will monitor these programs and assist partners in evaluating them so as new programs come online they can use best practices. Furthermore the agency will need to work cooperatively with partners to address a number of issues as collections expand, including funding, permitting, tax policy, and capacity for sorting (as it pertains to durable compostable bags that are co-mingled with other streams of material).

Currently operating facilities generally have the capacity to handle more material. That may change as programs come online and additional organics are captured. But the more immediate need is on transfer capacity and sorting if we move forward with some of the commingled collection methods.

It is important to note that the co-mingled collection options supported by the agency all maintain source separation of the organic material to prevent contamination by other types of waste. The efforts in the 1990s and early 2000s to pull organics from MMSW were not successful because the quality of the material was poor, which meant the products produced had limited value. As it pertains to organics, it's important that the systems we develop and support are set up to collect quality materials and make quality products.

One of the advantages of incorporating organics recycling through composting into the state's recycling infrastructure is that the process, when conducted on an industrial scale, can handle a wide array of materials. Commercial compost facilities can accept and compost virtually any type of food scrap including items that cannot be composted in a backyard setting. Items like meat, dairy and bones are compostable. Commercial compost facilities also can take paper that is not suitable for recycling including items like napkins, paper plates, paper cups and paper towels. Additionally compost facilities can take plastics that are specifically designed to break down in a compost pile. Including the paper and

compostable plastics as acceptable materials can make composting much easier for the public. For example, if you eat a hot dog served in a paper boat at a baseball game, you can discard any uneaten food, ketchup, a napkin, and the paper boat in the organics recycling bin.

Compostable product labeling

Many facilities have encountered problems with products that appear to be compostable but are not. Some products are marketed as being biodegradable, or degradable, or even compostable but despite that claim many of these items do not meet the industry standards for compostabilty.

The issue of compostable plastic bags for yard waste collection has been largely addressed. American Society for Testing and Materials (ASTM) has established standards that have been vetted by government and industry to ensure that plastics are designed properly for composters. Minn. Stat. § 325E.046 already establishes proper labeling for plastic bags. This change was very helpful to the compost industry. It was effective in reducing contamination, improving worker safety, and improving the quality of the finished compost.

Minnesota would benefit from building upon the existing requirements to ensure that product manufacturers have a clear obligation to honestly market their products. This proposal seeks to address the issue of fair labeling for all compostable products, including food service items, cups, plates, utensils, and other similar items. Only products that have been tested and meet the appropriate scientific standards should be allowed to make claims about their compostability. Furthermore, use of terms like biodegradable, oxo-biodegradable, and degradable should not be allowed unless the product's claim of an environmental benefit scientifically proven.

Markets for compost

Organics are not unlike traditional recycling in that the products resulting from the process have value. And just like traditional recycling, it is important that we're attentive to developing and expanding those markets so costs for organics can remain competitive with disposal. The agency will continue to support policy that favors food donation and food-to-animals as strategies for managing organics. The agency will also look to expand markets for compost by encouraging use of compost for a wider array of projects.

One effort will be to more fully use compost with public sector projects. Compost has the ability to help landscapes better protect groundwater and surface water and to prevent erosion. Thus using compost during construction projects, along roadways and in stormwater protection applications will continue to be important.

The agency will also look to the private sector to support expanded use of compost. Landscapers, golf courses, homeowners and farmers all may benefit from utilizing compost more. Education and outreach about the benefits of compost will help, as will implementation of demonstration projects.

Several local governments have also developed ordinances that support expanded use of compost. These ordinances have required newly constructed buildings to amend soils with compost so they more efficiently retain water. The ordinances apply to public, private and residential construction and are primarily intended to protect water resources. Cities like Eagan, Minnesota and Denver, Colorado have successfully implemented this type of ordinance. The agency will support adoption of similar policies by local governments in Minnesota because theses ordinances support both our desire to protect water resources and to ensure there are markets for compost.

Furthermore, the agency will continue to work with professional composters to ensure that quality materials are collected for composting and that appropriate tests are done on finished product. Ensuring that quality material is produced is essential to successful market development, so the agency will continue to evaluate the best mechanisms to support the effort to get the highest quality materials.

Recommendations for organics recovery

1. Expand the "Opportunity to Recycle" requirement to include five broad material types instead of just four.
    - This would encourage increased curbside collection of organics as the current four broad material types already covers the traditional recyclables – paper, plastic, glass and metal.
2. Explore legislative or rule changes to simplify the process for communities to host organics drop-sites.
    - Either a rule or statute change to streamline and simplify the process for organics drop-sites would likely result in increased opportunities for Minnesotans to manage their organics in accordance with the hierarchy and not put them in the trash.
3. Add capacity to the system to consolidate and transport organics at transfer stations.
4. Expand current requirement (Minn. Stat. 325E.046) regarding labeling of compostable plastic bags to include all compostable products, ensuring that only products designed to meet specific scientific standards can make claims about their compostability.
    - ASTM compostability standards should be referenced.
    - The use of misleading terms on product labels claiming environmental benefits that have not been scientifically validated (i.e. "greenwashing") should be banned. Specifically the uses of terms like biodegradable, oxo-degradable, and degradable should not be allowed unless the products claim of an environmental benefit is scientifically verified.
5. Adopt policies that encourage the use of compost in public construction projects including:
    - Revising public road authority specifications for use of compost to allow any type of class one compost to be used with a preference for compost that has met the US Composting Councils Standards for Testing Assurance (STA) standards
    - A requirement that any publicly funded project that brings soil into a site uses soil that has a minimum 5% compost

Supporting product stewardship

Product stewardship means all parties involved in designing, manufacturing, selling, and using a product take responsibility for environmental impacts at every stage of that product's life.

When determining which materials are good candidates for product stewardship, the MPCA considers a number of factors:

- Toxic components of products and disposal rates
- The effectiveness of current collection and recycling of the material
- Costs to local governments for managing the material
- Interest and readiness of industry, governments, and markets
- Life-cycle analysis

Existing product stewardship programs

Since the MPCA adopted a product stewardship policy in 1999, the agency has promoted product stewardship as a strategy to internalize the environmental costs associated with a product's life cycle, examine and realign roles and responsibilities for members of the product chain and promote private management of collection and recycling services.

There are currently three product stewardship programs in Minnesota: rechargeable batteries, electronic waste, and paint.

Batteries

The first program in Minnesota to require the engagement of manufacturers in managing their products was enacted in 1994 for rechargeable batteries. Call2Recycle® is the stewardship organization operating on behalf of nearly 300 (roughly 85% membership) manufacturers that are selling rechargeable batteries or products containing rechargeable batteries in the state, such as cellphones.

The most recent report from Call2Recycle® (2013 and 2014) indicated that the collection of rechargeable batteries has increased over the previous reporting period.

In 2013, Call2Recycle collected 156,185 pounds of rechargeable batteries and cellphones in Minnesota. In 2014,the combined number increased by 8% to 169,196 pounds. Rechargeable battery collections alone grew from 151,389 pounds in 2013 to 161,473 pounds in 2014 — an increase of 7%.

Collection of primary (non-rechargeable) batteries increased 68%, from 4,053 pounds in 2013 to 6,797 pounds in 2014 — with 90% of this coming from the retail and business (non-retail) sectors.

E-waste

The Minnesota Electronics Recycling Act was enacted in 2007 to implement a producer responsibility approach to managing and financing the collection and recycling of waste electronics from Minnesota households. The program has resulted in a significant increase in the weight recycled, an expansion of collection opportunities and significant economic activity for processors of electronic waste.

Table 8. E-waste

	2013 Program year 6	2014 Program year 7	2015 Program year 8	
Recycled per capita, statewide (pounds)	6.1 lbs.	6.6 lbs.	7.3 lbs.	Supply
Covered electronic devices recycled (pounds)	32.6 million	35.6 million	39.7 million	
Conversion: Program pounds*	37.9 million	41.7 million	45.6 million	
Video display device sales (pounds)	23.1 million	19.9 million	21.8 million	Demand
Manufacturer recycling obligation (pounds)	18.5 million (80%)	15.9 million (80%)	17.4 million (80%)	
Purchased: Program pounds (and actual pounds)	25.7 million (23.1 million)	25.9 million (23.0 million)	32.2 million (28.1 million)	
New recycling credits**: Net change	7.9 million	10.0 million	7.2 million	Credits
Recycling credits available at program-year-end	54.6 million	64.6 million	71.8 million	

*Program pounds reflect 1.5x multiplier applied to pounds collected outside of the 11-county Metro Area
**Recycling credits have the same value as program pounds, bur their use was restricted starting in program year 3

According to the MPCA's 2013 Waste Characterization Study, electronic products made up about 1.2 percent (35,000 tons) of all material disposed of as MMSW in 2012. The study estimated that 70 tons of laptops and 1,400 tons of televisions were disposed of during 2012 in Minnesota. 35,000 tons of electronics are still being disposed of per year, demonstrating that there is more work to be done to improve collection opportunities.

The e-waste program has matured over the last 8 years, and there have been significant changes in technology and consumer's purchasing habits. Several changes in the e-waste program are necessary to ensure its continuing effectiveness and integrity.

The MPCA and other stakeholders have identified several challenges to the functioning of the act, including:

- The total weight of products sold in the state is declining while the weight of material collected remains constant and the obligation is based on sales.
- The narrow scope of product addressed under the act.
- Several counties in Greater Minnesota do not have adequate access to collection service.

Architectural paint

During the 2013 legislative session, the Legislature enacted a product stewardship program for managing architectural paint in Minnesota. The law requires paint manufacturers to implement and finance a statewide product stewardship program that manages architectural paint by reducing the paint's waste generation, promoting its reuse and recycling, and providing for negotiation and execution of agreements to collect, transport, and process the architectural paint for end-of-life recycling and reuse. The program is funded by a stewardship assessment paid by paint manufacturers and managed through the sales chain.

The program now operating in Minnesota is consistent with the paint stewardship program (PaintCare) operating in eight other states. PaintCare submitted a stewardship plan to the MPCA that describes how the program will function. The program for retail collection was implemented on November 1, 2014. There are approximately 175 retail sites now collecting paint. Integrating the county HHW programs into the program operated by PaintCare was more challenging than anticipated, but documents addressing funding agreement, operational requirements and liability were concluded in July 2015.

When fully implemented, the MPCA anticipates a number of benefits from a product stewardship approach for managing architectural paint in Minnesota such as:

- Expanding the number of recycling locations for paint with an expected overall increase in the amount of paint recycled
- Creating an incentive for retailers to collect paint, particularly smaller entities
- Transitioning from solely government-funded collection and recycling programs to one funded by consumers and manufacturers
- Supporting economic development opportunities for paint recyclers
- There are no recommendations to this program at this time due to its infancy.

Other problem materials

Mercury-containing lamps, carpet, and mattresses are all products that pose challenges for the solid waste system. The MPCA suggests that manufacturers of these products are well positioned to contribute to the financing and management of their products at end of life, thus creating greater recycling opportunities for Minnesota residents. Transferring financial responsibility for recycling from local government to manufacturers and consumers will reduce the fiscal pressure facing Minnesota communities.

Mercury-containing lamps

Minnesota has required residents to recycle fluorescent lamps since 1994 under Minn. Stat. § 115A.932. A recent survey of Minnesota homeowners found that 73% of households were using at least one compact fluorescent lightbulb (CFL)[9], but 60% of respondents did not know that state law requires CFL recycling.

Consumer preferences: 74% of respondents stated that retail locations would be the most convenient place to drop off lamps for recycling. 55% stated a preference for funding a CFL recycling program through an increase in the cost of lamps, rather than paying a fee at the time of recycling (30%) or paying through utility bills (13%). 80% of respondents said they would buy about the same number of lamps if the price of a lamp increased 50 cents to cover the cost of recycling. 50% said they would buy about the same number of lamps if the price of a lamp increased by $1.50 to cover the cost of recycling.

Carpet

Carpet is a bulky and difficult item to handle during disposal, and it constitutes a sizable portion of the waste stream. Waste composition studies indicate that approximately 60,000 tons of carpet is disposed of as MMSW annually, while approximately 40,000 tons is disposed of in construction and demolition landfills.

[9] CFL Advisory Group Summary, August 12, 2009, Center for Energy and the Environment and Great River Energy

The amount of carpet from Minnesota that is being recycled has not increased appreciably over the past decade despite a national voluntary product stewardship agreement that was concluded in 2002 between the carpet industry, 17 states, and US EPA. Approximately 830 tons of carpet was collected for recycling in Minnesota in 2010; 500 tons of which is processed by Bro-Tex in St. Paul.

Carpet is well suited to product stewardship, because it is usually collected at the time of installation by the carpet layer. It would be efficient to allow the carpet installers to figure out a good system for recycling and collection.

California enacted a state law (AB 2398) in 2010 that creates a product stewardship program for carpet and resulted in the creation of 14 new private sector collection and/or processing facilities in the state. The industry stewardship plan is available at: http://www.calrecycle.ca.gov/epr/Carpet/CrptPlan.pdf

Mattresses

The MPCA estimates that 742,550 mattresses, nearly 20,500 tons, are discarded annually statewide. The 2010 SCORE report indicates that 570 tons of discarded mattresses were collected for recycling during the year and processed at the facilities in Minnesota.

While the MPCA does not have a firm estimate of the recycling rate for mattresses in Minnesota, there were sales of 386,194 mattresses in the Twin Cities Metropolitan Area in 2010 with only 10,930 recycled. When mattresses end up in landfills, they create problems for the facility. They tend to float to the surface and do not compact well due to the springs. At waste-to-energy facilities, mattresses are too large to fit into the furnace.

They are, however, well suited for a product stewardship model, because most furniture stores offer back-haul of the mattress when you buy a new one. In addition, they offer recoverable materials such as steel, cotton, foam, and wood. There are currently two processing facilities located in the state Goodwill (Duluth) and at PPL Industries (Minneapolis) http://mattressrecyclingcouncil.org/.

Agricultural plastic and boat wrap

Silage bags, bale wrap, twine, seed bags, flower trays, drip tape, mulch film, water pipes, hoop house covers, totes, storage covers, and boat wrap are a type of film plastic that is not currently being regularly recycled. The widespread use of plastic by the dairy and horticultural industries has increased the amount of plastic used in agricultural operations. As a result, this has also caused an increase in improper disposal of agricultural plastic by burning to become a problem in Minnesota. The plastic is heavily contaminated and needs additional processing to put it into a marketable form. The amount of material available for recycling is estimated to be 15 to 30 million pounds in Minnesota.

Boat wrap has seasonal disposal issues. Markets are beginning to develop in the U.S. for both agricultural plastic and boat wrap but are hindered by the ability to collect and aggregate the plastic and by limited end markets.

Recommendations for product stewardship

1. Implement changes to the existing e-waste legislation.
    - The MPCA initiated a process in the fall of 2013 to identify areas for program improvement and policy options to address challenges with the current e-waste legislation. The MPCA will continue to conduct outreach to local government, electronics recyclers, manufacturers, retailers and other stakeholders to solicit input and identify support and concerns with the

range of policy approaches for consideration during future legislative sessions. Examples of specific changes currently under consideration include:

- Change the obligation so that it is not dependent on weight sold, rather weight collected
- Expand the scope of products to include smaller screen sizes.
- Close the gap between the amount of electronics sold and the amount that retailer/manufacturers are obligated to recycle
- Expand access to collection in counties that are lacking

2. Develop a product stewardship program to address mercury-containing lamps.
   - This initiative will require producers to file a program plan, which must be approved, to sell in the state and initiate the program. The producers must also submit annual progress reports to the MPCA and it is expected that producers will establish a network of collection sites using existing HHW sites and retailers.
3. Develop a strategic plan for prioritizing product stewardship focus based on sustainable materials management and life cycle impacts.
4. Develop a product stewardship program for agricultural plastic and boat wrap.

Resource needs

The recommendations brought forward in this report, if implemented, could significantly advance the management of materials and waste in Minnesota. However, current staff and funding levels at the MPCA are not sufficient to carry out these activities.

Counties are experiencing similar reductions in staff and funding, which inhibits their ability to implement solid waste plans. Additional resources – both staff and funding – are needed to take Minnesota to the next level of materials management.

Recommendations for financing and resource allocation

1. The MPCA and Legislature should allocate sufficient funding and staff resources to carry out the recommendations within this report.
2. The state will take steps to better align its funding distribution criteria to encourage highest and best use of materials. A more incentive-based funding approach could include programs such as SCORE, Environmental Assistance (EA) grants, Capital Assistance Program (CAP), Local Recycling Development Grants (LRDG) and other grant and loan programs.
3. Explore a Green Bond program to fund Sustainable Materials Management (SMM) in Minnesota. Green Bonds are used to raise capital and invest in new and existing projects with environmental benefits. Using green Bonds in Minnesota would enable capital raising and investment for new and existing projects with environmental benefits. The majority of current Green Bonds are being used to fund renewable energy and energy efficiency projects nationally and internationally. In Minnesota, These funds could be used for loans or grants to finance both private and public recycling infrastructure, recycling end market development, the reuse sector and other SMM projects.
    - The program would be established using Green Bond Principles (GBP) as presented by the International Capital Market Association (ICMA). These are voluntary process guidelines that recommend transparency and disclosure and promote integrity. The GBP explicitly recognizes Sustainable Waste Management (AKA Sustainable Materials Management) as an eligible category to fund projects.

Appendix A: Summary of policy recommendations

The following proposals will help the waste management hierarchy operate as it was intended and streamline state and county efforts.

Recommendations for moving toward sustainable materials management

1. Set goals for reduction and reuse, in addition to existing recycling goals.
   - MPCA will review and recommend research needed to develop and measure effective materials management goals for all types of materials, not just focusing on the MMSW stream. Findings will be shared and discussed with stakeholders for additional input, refinement, and implementation.
2. Measure and report all waste.
   - Currently other than what gets discarded and managed as MMSW, approximately two-thirds of solid, non-hazardous waste generated in Minnesota is not tracked. The reporting that does exist is present in facility annual reports, but is not reported in SCORE by counties, and, in turn, material that is recycled (i.e. shingles) does not "count" toward the recycling rate. Further, by not counting these materials, policies may be more MMSW-focused when the actual environmental impacts from other waste streams are more damaging. Additionally, SMM principles need to be applied when evaluating waste streams to promote their highest and best use.
3. Determine a set of priority materials to focus on, based on life cycle environmental impacts.
   - The MPCA will build on the 2009 solid waste stakeholder effort by bringing in other measures such as energy, resource and water impacts. This stakeholder work used the EPA's limited lifecycle analysis based Waste Reduction Model. See Environmental Initiative, Integrated Solid Waste Management Stakeholder Process, 2009.
4. Measure the capture rate of recyclables in addition to the recycling rate.
   - MPCA will work with a few communities to test and refine the measurement methodology and estimate the financial needs (e.g. sorting of recyclables and waste) that are necessary to support a broader use of this approach. Using the results of these pilots, the MPCA will determine how best to apply this approach to local, regional and state level analysis.
5. Require waste composition studies at all disposal facilities.
   - Waste-to-energy facilities are currently required to conduct waste composition studies every five years. This requirement should be extended to all disposal facilities for consistency. The data provides important trend information on waste composition (types and quantities of materials disposed). The addition of landfill information will help policy, planning, and implementation efforts, such as assessing capture rates. This requirement should include all landfills, not just MMSW facilities.
6. Reform the waste deposit disclosure requirement and specifically require haulers to provide information to consumers on the final destination of their waste.
   - Currently, some customers receive a list of all facilities a hauler may take the waste picked up at the curb. This does not provide sufficient information and can cause problems down the road if there is a question of liability for a specific waste. Ideally, this allows a customer to understand how their waste is managed and make informed decisions on selecting a hauler.

Recommendations for supporting the waste hierarchy

1. Reform SWMT structure to clearly dis-incentivize land disposal. Specifically, change tax/fees, the pay-as-you-throw policy, and other policies to ensure that the least preferable management methods are the most expensive.
    - Currently all waste destined for disposal at either a waste-to-energy facility of landfill pay the same tax rate. The overall goal is to move material up the hierarchy to its highest and best use.

Recommendations for clarifying industrial solid waste

1. Modify the current industrial definitions to ensure consistency between those found in both rule and statute.
2. Collect additional data on the types of wastes disposed of in Class III and Industrial Solid Waste landfills to determine the composition of these wastes.

Recommendations for county planning

1. Establish a requirement in the Waste Management Act for a statewide solid waste plan (that the existing Metro Solid Waste Policy Plan could be folded into) and require Greater Minnesota county plans to be consistent with state plan.
2. Develop a stakeholder group consisting of MPCA and county solid waste staff to review the existing plan structure and requirements and develop a proposal for a new planning structure.
3. Seek out opportunities for collaboration among counties and build on the regionalization and waste-shed recommendations from the OLA report, waste composition studies, and the *Recycling and Solid Waste Infrastructure Evaluation*.
4. System accountability needs to be improved and minimum standards established for all counties such as making annual review and work plan adjustments a standard part of all county plans so they are not a document that is looked at once every 10 years but instead a purposeful and useful planning and policy tool that is used regularly and effectively.
    - Consider using withheld SCORE funds (from delinquent county plans) to support efforts that advance Sustainable Materials Management programs and measurement.
    - When a county's solid waste plan is out of date, state SCORE dollars are withheld until a new plan is approved. Once approved, those withheld SCORE dollars are remitted to the county in a lump sum. Explore how these withheld funds could be better used to provide additional support for counties and regions who exceed minimum performance requirements (e.g. recycling rate) and seek to expand their waste reduction, reuse, recycling, composting or waste processing efforts. Funding could favor activities higher on the hierarchy with a preference for efforts that advance sustainable materials management.

Recommendations for market development

1. Expand MPCA's recycling market development program based on priority materials identified through a SMM approach and the waste management hierarchy.

2. Revive the Market Development Council or create a similar board to provide direction to the State on market development.
    - This dedicated, multi-interest group is needed to help guide the direction of market development in Minnesota. Representatives from various state agencies (MPCA, Economic Development, Agriculture, Commerce, and Revenue), counties, cities, businesses, and the recycling industry should be included.

Recommendations for new technologies

1. Establish a process for the MPCA to evaluate and review new technologies at facilities using life-cycle analysis techniques. Outline the resources, barriers, and steps needed to determine where and why they fit into the waste management hierarchy.

Recommendations for organics recovery

1. Expand the "Opportunity to Recycle" requirement to include five broad material types instead of just four.
    - This would encourage increased curbside collection of organics as the current four broad material types already covers the traditional recyclables – paper, plastic, glass and metal.
2. Explore legislative or rule changes to simplify the process for communities to host organics drop-sites.
    - Either a rule or statute change to streamline and simplify the process for organics drop-sites would likely result in increased opportunities for Minnesotans to manage their organics in accordance with the hierarchy and not put them in the trash.
3. Add capacity to the system to consolidate and transport organics at transfer stations.
4. Expand current requirement (Minn. Stat. 325E.046) regarding labeling of compostable plastic bags to include all compostable products, ensuring that only products designed to meet specific scientific standards can make claims about their compostability.
    - ASTM compostability standards should be referenced.
    - The use of misleading terms on product labels claiming environmental benefits that have not been scientifically validated (i.e. "greenwashing") should be banned. Specifically the uses of terms like biodegradable, oxo-degradable, and degradable should not be allowed unless the products claim of an environmental benefit is scientifically verified.
5. Adopt policies that encourage the use of compost in public construction projects including:
    - Revising public road authority specifications for use of compost to allow any type of class one compost to be used with a preference for compost that has met the US Composting Councils Standards for Testing Assurance (STA) standards
    - A requirement that any publicly funded project that brings soil into a site uses soil that has a minimum 5% compost

Recommendations for product stewardship

1. Implement changes to the existing e-waste legislation.
    - The MPCA initiated a process in the fall of 2013 to identify areas for program improvement and policy options to address challenges with the current e-waste legislation. The MPCA will continue to conduct outreach to local government, electronics recyclers, manufacturers,

retailers and other stakeholders to solicit input and identify support and concerns with the range of policy approaches for consideration during future legislative sessions. Examples of specific changes currently under consideration include:

- Change the obligation so that it is not dependent on weight sold, rather weight collected
- Expand the scope of products to include smaller screen sizes
- Close the gap between the amount of electronics sold and the amount that retailer/manufacturers are obligated to recycle
- Expand access to collection in counties that are lacking

2. Develop a product stewardship program to address mercury-containing lamps.
   - This initiative will require producers to file a program plan, which must be approved, to sell in the state and initiate the program. The producers must also submit annual progress reports to the MPCA and it is expected that producers will establish a network of collection sites using existing HHW sites and retailers.
3. Develop a strategic plan for prioritizing product stewardship focus based on sustainable materials management and life cycle impacts.
4. Develop a product stewardship program for agricultural plastic and boat wrap.

Recommendations for financing and resource allocation

1. The MPCA and Legislature should allocate sufficient funding and staff resources to carry out the recommendations within this report.
2. The state will take steps to better align its funding distribution criteria to encourage highest and best use of materials. A more incentive-based funding approach could include programs such as SCORE, Environmental Assistance (EA) grants, Capital Assistance Program (CAP), Local Recycling Development Grants (LRDG) and other grant and loan programs.
3. Explore a Green Bond program to fund Sustainable Materials Management (SMM) in Minnesota. Green Bonds are used to raise capital and invest in new and existing projects with environmental benefits. Using green Bonds in Minnesota would enable capital raising and investment for new and existing projects with environmental benefits. The majority of current Green Bonds are being used to fund renewable energy and energy efficiency projects nationally and internationally. In Minnesota, These funds could be used for loans or grants to finance both private and public recycling infrastructure, recycling end market development, the reuse sector and other SMM projects.
   - The program would be established using Green Bond Principles (GBP) as presented by the International Capital Market Association (ICMA). These are voluntary process guidelines that recommend transparency and disclosure and promote integrity. The GBP explicitly recognizes Sustainable Waste Management (AKA Sustainable Materials Management) as an eligible category to fund projects.

Appendix B: Past SWPR recommendations implemented in Minnesota

Over the years, the Solid Waste Policy Report has recommended numerous policy updates and changes. Many of those recommendations have resulted in changes to policy and Rule. The following have all been featured in past SWPRs.

Topic	Progress
Commercial recycling	· Mandatory recycling for commercial entities in the Metro are generating 4 cubic yards of more of waste adopted by the 2014 Legislature and becomes effective January 1, 2016
Organized collection	· Revisions to the organized collection statute streamlined the process for cities to seek organized collection of trash
Organics management	· Ban of non-compostable plastic bags for yard waste in Metro in effect January 1, 2010 · Compost Rule revisions to reduce barriers to opening new compost facilities and to streamline and modernize requirements for existing facilities adopted in December 2014
Product stewardship	· Manufacturer managed and funded rechargeable battery collection program enacted in 1994 · Minnesota Electronics Recycling Act enacted in 2007 · Paint stewardship program enacted in 2013
Burn barrels	· Initial burn barrel survey conducted in 2005; follow up surveys in 2010 and 2016, with the intention of conducting a similar survey every five years · No-burn resolutions adopted by 31 counties throughout the state
County funding	· Additional funds for SCORE program were implemented by 2014 Legislature
SCORE reporting	· Statute revisions reduced the burden on counties related to SCORE surveys

Appendix C: Efforts underway as recommended by OLA report

Reduction and reuse

As recommended by the OLA report, the MPCA and other entities are working on projects to manage waste that more closely aligns with the waste management hierarchy. This includes focusing efforts on the high end of the hierarchy – source reduction and reuse – and developing methods to measure source reduction and reuse.

In recent years the MPCA has focused on expanding efforts in two main areas of reducing waste: increasing reuse and repair of products and strengthening Minnesota's sustainable purchasing program (also called environmentally preferable purchasing). Other entities have also been increasing efforts in the area of reduction and reuse.

This table shows a sample of the source reduction and reuse activities underway, and which OLA report findings or recommendation(s) they relate to:

Initiative	Related activities	Related OLA recommendation(s)
Prioritize reuse in Environmental Assistance Grants	· Established source reduction and reuse as priority project areas in 6 of the last 8 Environmental Assistance grant rounds. · Projects ranged from supporting reuse businesses' ability to measure and report reuse metrics to developing models for community-wide reuse programs.	· Adopt incentives that encourage the disposal of waste consistent with the waste management hierarchy
Reduce waste and pollution in State procurement	· MPCA and Department of Administration work together on state procurement contract specifications that reduce waste and pollution. Examples include preference for less packaging, concentrated and less toxic cleaners, and requirements to meet third party electronics sustainability standards. · 2012 EPA grant provided funding to analyze and prioritize state contracts based on life cycle environmental impacts, resulting in increased focused on more high impact purchases such as fuel, information technology services, construction and food.	· Minnesota's approach to managing waste focuses too narrowly on recycling, rather than on the full range of waste management activities.
Support launch and work of ReUSE Minnesota	· Provided funding and staff time to support this reuse-focused non-profit advocacy and networking organization. · Optimized reuse by creating business-to-business networking; created public-facing interactive website (in progress) to connect citizens to reuse, repair, and rental options throughout Minnesota. · MPCA and ReUSE MN partnered to develop a measurement tool to standardize measurement techniques and quantify the environmental	· Minnesota's approach to managing waste focuses too narrowly on recycling, rather than on the full range of waste management activities. · The Legislature should establish goals for all tiers of the waste

	benefits of reuse, specifically the reuse that occurs via Minnesota's reuse, repair and rental businesses (in progress).	management hierarchy and require counties and MPCA to track progress toward these goals.
Education and outreach	· Local government information sharing network meets quarterly (Cities and Counties Involved in Source Reduction and Recycling). · Programs begun by Hennepin County and community partners, such as Fix-it-clinics, Choose to Reuse, Pack and Give Back, and Master Recycler classes are growing and expanding throughout the Metro Area. · MPCA staff give Waste Prevention workshops 6-12 times annually.	· Minnesota's approach to managing waste focuses too narrowly on recycling, rather than on the full range of waste management activities.
GreenCorps	· GreenCorps members conduct source reduction and reuse projects around the state, in schools and other communities, each cycle.	· Minnesota's approach to managing waste focuses too narrowly on recycling, rather than on the full range of waste management activities.
Measurement	· Voluntary business reuse reporting in development (see ReUSE MN above) · Adapted EPA's source reduction characterization methodology for use in Minnesota (see EPA, national Source Reduction Characterization Report, November 1999)	· The Legislature should establish goals for all tiers of the waste management hierarchy and require counties and MPCA to track progress toward these goals.

Restriction on disposal

The MPCA has been working toward obtaining compliance with Minn. Stat. § 473.848. MPCA has updated applicable landfill permits and entered into Compliance Agreements with applicable resource recovery facilities to restrict the land disposal of unprocessed MMSW generated in the Metro Area as outlined in state law. Both MMSW landfills and resource recovery facilities are now required to submit data to the MPCA so that compliance can be monitored. The restriction on disposal aims to require that MMSW generated in the Metropolitan Area be processed prior to being disposed in a landfill, if there is processing capacity available. Metropolitan Counties will participate in the compliance regime as per state law.

Improved data collection

The MPCA has been working on improving the quality of the solid waste data that is collected. Rather than relying on Counties to provide data, the agency is now shifting to a system where the entities that collect, transport, and manage the material are responsible for reporting. In addition, the agency is reconfiguring our solid waste database so that all of the data resides in the same system and can be tied together.

Permitted solid waste facilities and facilities with permit-by-rule have been reporting into the new database for two years, starting in 2014 for 2013 data. County SCORE data and HHW data began

reporting into the system for reporting year 2015. The biggest change happened during the 2015 legislative session. Hauler reporting is now required statewide. Initial reporting will begin in 2016 with the full scale roll out being in 2017 as we know that not all haulers were collecting this information and are not currently aware of the requirement.

Ultimately the agency will have a data system that contains the most accurate information provided by haulers and facilities. The facility and the hauler data can then be used to cross check to determine where there may be data issues/gaps. As with any change, this one is taking some time and has some growing pains, but the end result will be data that the agency will have a greater confidence in than the data currently provided by counties.

Appendix D: Capture rate vs. recycling rate

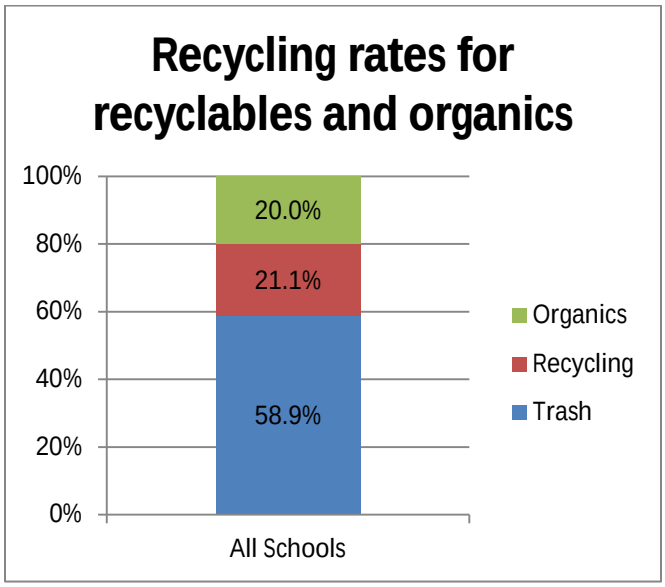
There is a difference between a capture rate and a recycling rate. They are both useful, but tell two different stories.

In 2010, the MPCA and partners conducted a large waste composition study at six separate schools in the Metro Area (MPCA, Digging Deep through School Trash, 2010, https://www.pca.state.mn.us/sites/default/files/p-p2s6-14.pdf). Everything in the trash, in the recycling bins, and in the organics bins was collected and sorted.

Recycling rate

Figure G-1 shows the *recycling rate* for the schools was just over 21%. It shows the percentage of everything (trash, compost and recyclables) generated by the schools and what was recycled (put in recycling bins). The recycling rate was calculated by taking the weight of the recyclables collected in recycling bins and *dividing by combined weight of the trash, organics, and recycling*.

Figure G-1



The recycling rate for the schools was just over 21%. This is the amount of recycling collected out of the total discards.

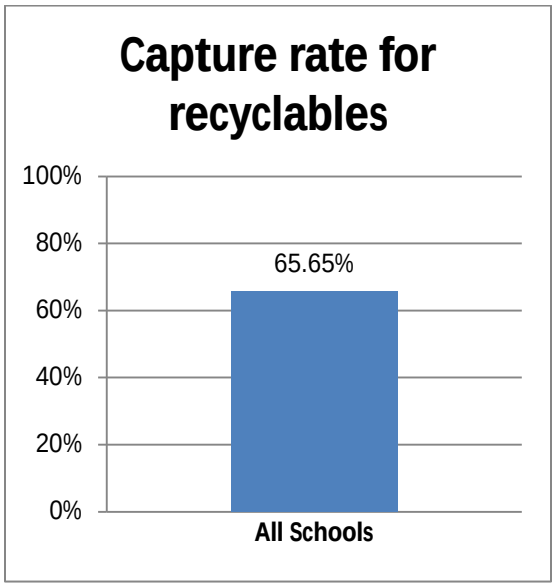
Capture rate

Figure G-2 shows that the capture rate for the schools was 65.65%, much higher than the recycling rate. The difference between the capture rate and the recycling rate is the denominator in the calculation. The *capture rate* is calculated by taking the weight of a specific recycled material) and *dividing by the weight of all the recyclable material collected in both the trash and recycling.* Capture rate does not incorporate the total amount of trash.

One might see the 21% recycling rate and make an assumption that these schools are doing a poor job of recycling. However, the capture rate shows that in fact, 65% of the recyclables that the schools generate are being captured in the recycling, not bad at all.

It is actually impossible for the schools to reach a 100% recycling rate, because some of what the schools discard isn't recyclable. They could however reach a 100% capture rate, by doing a perfect job of putting all that is recyclable into recycling bins.

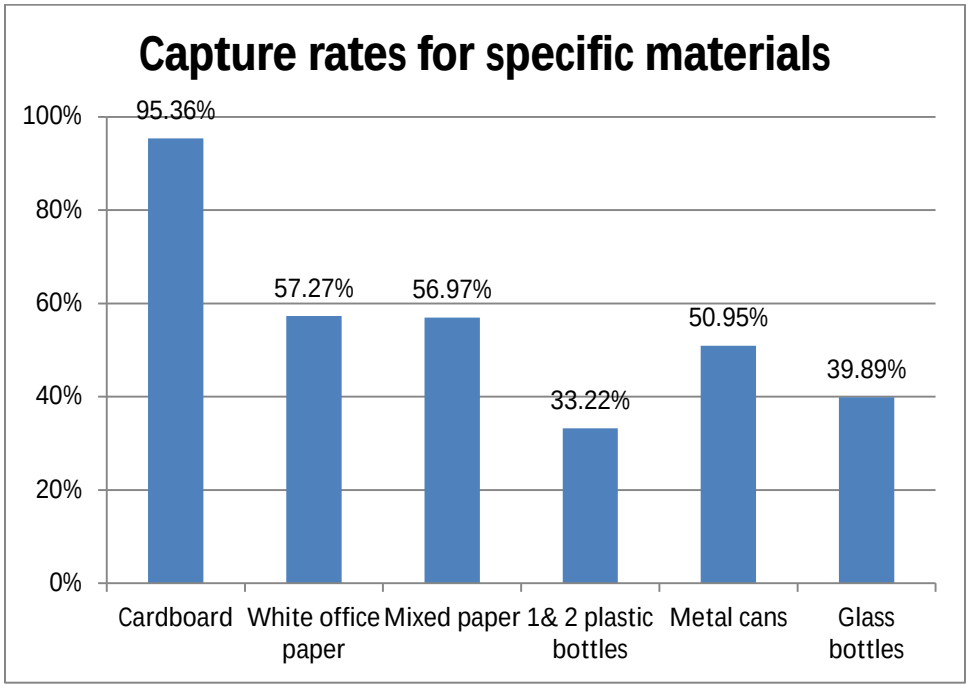
Figure G-2



The average capture rate for recyclables was over 65% which is the amount of recyclables collected out of the total amount of *recyclables* discarded (in trash or recycling bins).

Capture rates can be calculated for specific materials too. This additional information may lead a recycling manager to target the materials that aren't being captured as well. For instance, in the school waste composition results the capture rates shows that the schools are collecting nearly 100% of their cardboard but containers like glass and plastic bottles are being collected at less than 50% (see Figure G-3 below).

Figure G-3



The average capture rate for the recyclables generated in the school by material type.

Appendix E: Estimate of recyclable materials available for recovery

By not recovering materials that could be recycled, billions of dollars of potential are not being recognized. This material would also be used to either sustain the jobs we already have in these sectors or create additional jobs. The following table estimates the value lost between 1996 and 2013 because materials were disposed of and not used as feedstocks to make recycled products.

Aggregate estimate and value of recyclable materials available for recovery that are currently disposed of in Minnesota, 1996-2013

Materials	Available tonnage	Market value potential*	
Newsprint	1,670,602	$105,580,322	1996-2013
High grade office	1,307,588	$129,267,585	2000-2013
Uncoated OCC	2,840,823	$235,310,590	1996-2013
Paper boxboard	1,394,948	$77,817,091	1996-2013
Magazines	988,209	$56,442,153	1996-2013
Mixed paper	2,798,132	$134,348,490	1996-2013
Gable top/Aseptic containers/Cartons	94,072	$9,150,022	2004-2013
Pet	561,272	$143,957,023	1996-2013
HDPE	424,395	$138,930,525	1996-2013
Polystyrene	682,286	$9,201,498	2010-2013
Other plastic containers (#3,4,5,7)	371,541	$7,798,247	2007-2013
Plastic Film	2,601,973	$437,784,487	2007-2013
Aluminum beverage containers	320,868	$356,141,516	1996-2013
Other aluminum	321,074	$284,252,056	1996-2013
Steel/tin containers	458,680	$48,432,935	1996-2013
Other metal	1,599,193	$87,251,204	1996-2013
Glass beverage containers	960,495	$48,888,187	1996-2013
Other glass containers	213,277	$9,842,395	1996-2013
Totals	**19,609,429**	**$2,320,396,326**	

* Data for pricing estimate comes from a variety of sources: The MPCA estimates the market value based on data trends and expertise, as well as average pricing from Anchor, E-Cullet, and Strategic Material companies

The following table provides tonnages of additional materials disposed of that could be recovered and managed through reuse, recycling or composting. Further study is needed to determine the potential market value of these materials.

Aggregate estimate of materials available for recovery that are currently disposed of in Minnesota, 1996-2013

Other materials	Available tonnage
Food waste	8,235,722
Compostable paper	4,723,505
PLA and compostable plastics	no data available
Yard waste	1,527,006
Other glass	234,221
Treated and untreated lumber	3,641,355
Textiles	1,953,553
Carpet	1,303,623
Electronics	844,722

Appendix F: Market Development supplemental information

The following table demonstrates the current level of effort on various Market Development issues and provides two levels of improvement, a "better" and "best" scenario.

Recycling market development topic	Status quo	Better	Best
Maintain contact and relationships with processing and end markets	Currently reacting to problems as they arise	Proactive: Be able to check on these projects routinely so small problems do not turn into a crisis.	Increase capacity to handle more material
Policies to stimulate the end markets	Limited work. Mostly thinking about it.	Develop strategic policies to increase recycling rates and end market products	Bring curbside recycling statewide
Processing facilities and their capacity	Answer questions and put requests in contact with the right people	Planning and designing for additional processing capacity	Build more capacity
New recycled product development (See Table…)	Limited to concentrating on 2-3 material priorities at a time due to time and resources.	Evaluate material and decide which materials need more end products.	Financial and FTE resources to implement opportunities available

The following table outlines opportunities for recycled product market development that currently exist.

Material	Potential market development opportunity
3-7 plastics	Develop further processing for the low value stream coming out of MRF's There is a need for this material in the end markets if it is clean.
Beverage/food container glass	Additional processing capacity is needed in the wake of eCullet's closing. Plenty of material available in the marketplace. Additional end markets for glass need to be developed and expanded.
Paper cartons and aseptic packaging	The only market for cartons is located in Wisconsin. Processing capacity would benefit the paper manufacturing system in Minnesota.
Ag plastic/boat plastic & plastic film	Provide collection sites for this material would be the first step in reducing a current practice of burning it in some areas in Minnesota (Ag Plastic). Most processing of this material occurs outside Minnesota. End markets in Minnesota need this processed material, but since it is processed outstate, it usually doesn't come back.
Vinyl siding	There are end markets that will take this material. Vinyl siding installers need training/certification on separating the siding from garbage.
Asphalt shingles	New plant to recycle shingles is coming on line and will need feedstock identification assistance.
Tires	Funding to expand R and D on new products and expand processing of tires into higher value material (steel and crumb rubber). Use of tire-derived aggregate in the water table needs further research.
Carpet	New processing methods need to be developed to process carpet backing. Currently only the face fiber is being recovered.
Textiles	There are end markets for textiles that are not of retail quality but the mechanism to collect the material and the education to the public is lacking.
Windshield glass and window glass	There are approximately one million windshields landfilled each year. Windshield glass has no value unless it is separated from the polyvinyl butyl core. Processing facility in Minnesota needs to be developed to handle this material and window glass.
Gypsum wallboard	The market for wallboard as a soil amendment is growing. Infrastructure to process material needs to be developed.
C & D wood	The market for wood as fuel in the biomass commercial industry is growing, but changes in rules regarding painted wood need to be developed.
Deconstruction, also related to reuse initiatives	Development of local regulation needed to allow enough time for materials to be recovered before demolition activities begin. This will develop and support a deconstruction industry that will be able to bid on these projects, which will result in less disposal of C&D materials.
Organic material	Provide advice and support to staff and industry working on facility development. Provided economic analysis about the impacts of the composting industry.

Appendix G: Acronyms

AD: anaerobic digestion

ASTM: American Society for Testing and Materials

C&D: construction and demolition

CAP: capital assistance program

CFL: compact fluorescent light bulb

CLP: Closed Landfill Program

CON: certificate of need

EA: environmental assistance

EJ: environmental justice

FTE: full time equivalent

FY: fiscal year

GBP: green bond principles

GHG: greenhouse gas

HHW: household hazardous waste

ISW: industrial solid waste

LCA: life cycle analysis

MMSW: mixed municipal solid waste

MNCC: Minnesota Composting Council

Mn/DOT: Minnesota Department of Transportation

MPCA: Minnesota Pollution Control Agency

MRF: materials recovery facility

MSDS: materials safety data sheet

OCC: old corrugated cardboard

OLA: Office of the Legislative Auditor

PCE: personal consumption expenditure

ROD: restriction on disposal

REMI: Regional Economic Models, Inc.

SCORE: select committee on recycling and the environment

SMM: sustainable materials management

SWMT: solid waste management tax

SWPR: solid waste policy report

TCMA: Twin Cities Metropolitan Area

TCLP: toxicity characteristic leeching procedure

U.S. EPA: United States Environmental Protection Agency

WMA: waste management act

WLSSD: Western Lake Superior Sanitary District

WTE: waste to energy