

February 14, 2022

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RE: Toxics and Pollution Prevention Evaluation Report

Dear Committee Chairs and Minority Leads:

With sincerest apologies for the delay, enclosed is the 2021 *Toxics and Pollution Prevention Evaluation Report*. This report discusses Minnesota's progress with electronics recycling, toxics in packaging and pollution prevention objectives established in the Minnesota Toxic Pollution Prevention Act as required in Minn. Stat. 115A.121.

If you have any questions regarding this report, please feel free to contact me at 651-757-2312.

Sincerely,

Tom Johnson

This document has been electronically signed.

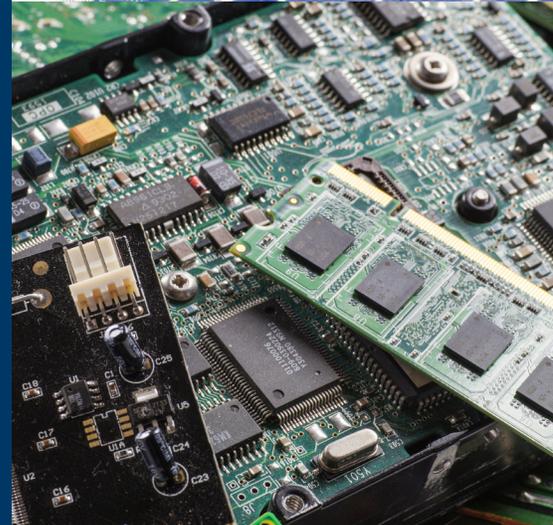
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TJ:MS:cmbg

FEBRUARY 2022

Toxics and pollution prevention evaluation report

A detailed look at MPCA's efforts to eliminate or reduce the sources of toxic pollutants and hazardous wastes at their use, generation, or release.



Legislative charge

Minn. Statutes § 115A.121 Toxics and Pollution Prevention Evaluation Report

The commissioner shall prepare and adopt a report on pollution prevention activities required in chapters 115A, 115D, and 325E. The report must include activities required under section 115A.1320. The commissioner must submit the report to the Senate and House of Representatives committees having jurisdiction over environment and natural resources by December 31, 2013, and every four years thereafter.

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Introduction

This year marks 35 years since the passage of the Emergency Planning and Community Right-to-Know Act, which directed the U.S. Environmental Protection Agency (EPA) to create the Toxic Release Inventory (TRI). This in turn led to the passage of the Minnesota Toxic Pollution Prevention Act (TPPA) that authorizes the publication of this report by the Minnesota Pollution Control Agency (MPCA) to evaluate the state's progress in toxics and pollution prevention.

Each of the agency programs discussed in this report have successes to highlight — some are significant, while others are incremental. What they all have in common, however, more effort is needed to make real progress in reducing the use of toxic chemicals by Minnesota manufacturing and industry and the waste generation associated with that.

Many of the products and packaging we use every day contain or were manufactured using hazardous chemicals. Some of these chemicals are intentionally part of the product design for cost or performance reasons, while others are introduced unintentionally through individual parts, ingredients, or processes used to manufacture the final product. In Minnesota and elsewhere, concerns about exposure to harmful chemicals in consumer products has continued to grow as we learn more about the impacts they can have when exposed to humans and the environment. Because of the prevalence of these chemicals in products, Minnesota's policy is to eliminate or reduce at the source the use, generation, or release of toxic pollutants and hazardous wastes.

The Minnesota Pollution Control Agency (MPCA) works to address the challenges from our use of chemicals by:

- Working with manufacturers to find ways to reduce chemical waste or avoid the use of toxic chemicals *in the production process*.
- Working with companies to find ways to reduce or avoid the use of toxic chemicals *in the products they make and ensure those products containing toxic chemicals are properly managed at the end of their useful lives*.

In selecting priorities on which to focus its work, the MPCA consults with partner agencies, stakeholders, and customers. Considerations also include analysis of as much data as possible, including environmental and biomonitoring measures, chemical production and waste reporting, hazard levels and potential for exposure data, health and community data on who may be exposed (e.g., children or disadvantaged communities), and research outlining the availability of feasible alternatives.

Why is it important?

Our knowledge about the hazards posed to people and the environment from toxic chemicals is growing rapidly. A greater understanding of risks underscores the need to take opportunities to reduce exposure to toxic chemicals through pollution prevention. Air, water, and soil samples show the unintended presence of toxic chemicals due to human activity, and investigations of children's products and personal care products have found multiple examples where levels of toxic chemicals have violated state statutes.

Key points

Sustainable materials management

MPCA has adopted a sustainable materials management (SMM) approach to minimize the environmental and human health impacts of materials and products over their full life cycles. This

approach helps to ensure materials are used and reused in the most productive way, that toxic chemicals and environmental impacts are reduced, and that impacts on resources do not decrease the availability of those resources today as well as those of future generations.

Sustainable government purchasing

Minnesota's Sustainable Purchasing Program is a collaboration between the MPCA and the Department of Administration's Office of State Procurement (OSP). The Sustainable Purchasing Program currently prioritizes 19 state contracts for the inclusion of sustainability requirements and as of fiscal year 2020, 53% of priority contracts are considered "100% sustainable."

Trends in generation and releases of toxic chemical waste by Minnesota industrial sectors

According to 2019 data from Minnesota's 502 reporting facilities, releases of Toxic Chemical Inventory (TRI) chemical waste continue to decline from 2015 levels. However, TRI chemical wastes generated by manufacturers and recyclers increased from 2015 to 2019, contributing to an increase in overall waste generated by all Minnesota TRI reporters. This indicates that while we are seeing improvement in how TRI chemical wastes are being managed, we are still not seeing the overall decline in generation that is the goal of pollution prevention.

The prevalence of toxics in products and packaging, notably lead and mercury, remains high and continues to raise concerns for human and environmental health. Focus has been placed on efforts to track and eliminate the use of lead in fishing tackle and ammunition, mercury in lighting and dental amalgam, and mercury in skin lightening products. The Toxics in Packaging Clearinghouse has updated their Model Legislation for toxics in packaging, which serves as a basis for Minnesota's law, to include Per- and polyfluoroalkyl substances (PFAS) chemicals.

Green and safer product chemistry

Efforts continue to improve product chemistry through financial support programs, compliance monitoring and enforcement efforts against violations of children's product chemicals restriction laws, and pollution prevention approaches for managing PFAS chemicals.

Product stewardship efforts

Minnesota's larger product stewardship programs for end-of-life management currently include e-waste and architectural paint, with recent progress on solar panels through a community stakeholder process. The challenges faced by product stewardship efforts may be best addressed through the creation of a policy that identifies chemicals that manufacturers should strive to avoid using in their product designs, or in cases where safer alternatives are not available, plans for managing those products at end of life should be required to be established.

- **E-waste:** Products made using recycled plastics from e-wastes are showing detectable levels of organohalogen flame-retardants (FRs), which are linked to a myriad of health effects, including disruption of reproductive system development and cancer. Some companies are voluntarily redesigning products to reduce the need for FRs in plastics, but additional steps are needed to address when a product is too toxic to be recycled and how to drive better product design.
- **Solar panels:** An emerging issue with the rapid growth in solar panel installation is how will non-working panels be managed at end-of-life? The MPCA worked with the Department of Commerce, Minnesota Solar Energy Industries Association, local governments, and other stakeholders to identify a series of policy ideas for the optimal management options for solar panels after they are decommissioned in the future.
- **Paint:** The Architectural Paint Product Stewardship Program in Minnesota, managed by PaintCare, has significantly expanded the number of recycling locations for paint. It has also

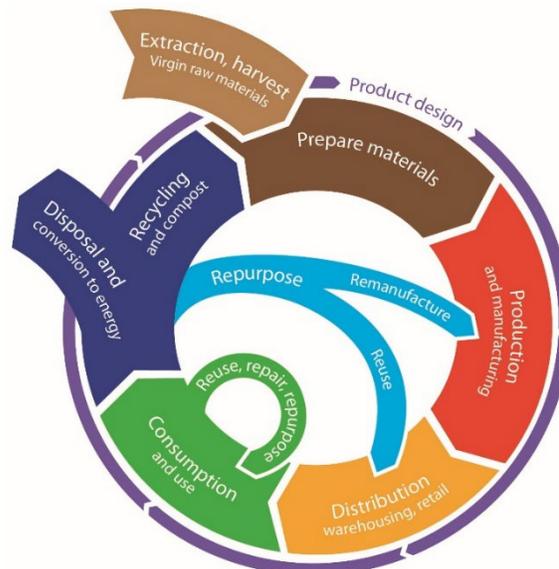
increased the amount of paint collected and recycled, while reimbursing local government organizations for their paint management costs through the paint stewardship fee assessed to customers who purchase paint. Aerosol paints are currently not covered by the PaintCare Program, but it is recommended that the program ultimately be expanded to include them.

Sustainable materials management

The last Toxics and Pollution Prevention Evaluation Report introduced the sustainable materials management (SMM) framework as a systematic approach for programming and prioritization of materials use over their entire life cycles – from product design, to raw material extraction, to production processes, to use (and reuse), and to best management when ultimately discarded. The main priorities of SMM tend to be the chemicals, resources, and materials used to manufacture products. Designers and manufacturers can use life cycle assessment (LCA) to determine the phase(s) their products have the biggest impact on the environment and what specifically is being impacted (e.g., water, air, human health, etc.). For instance, electronics manufacturers can look at the entire life cycle of their product and determine that the biggest environmental impacts occur during the manufacturing and use phases. The use phase impacts come from energy use, so the manufacturer can work to make the product use less energy, promote not charging the device when the battery is not low, or encourage powering the machine off when it is not in use.

Using LCA to determine which materials in a product have the biggest environmental impact can be difficult because often several changes can be made and some of the trade-offs lower one environmental impact and raise another. LCA does require some value judgement on what is more important to the designer and manufacturer. The environmental impact that is valued the most is often the first one to be changed. Another SMM-related consideration for a manufacturer or designer involves designing for reparability and providing replacement parts, instead of creating products with a shorter life span and planned obsolescence that need to be replaced every couple of years. Material and product choices, such as the examples provided, demonstrate design aspects that can appeal to customers, increase safety, and potentially reduce cost.

Figure 1. Toxics waste and other pollutants can be emitted at every phase of a product's life.



Intersection of pollution prevention and solid waste

Minnesota is a leading state in both pollution prevention and managing solid waste. Two distinct statutes guide these activities, Minn. Stat. §§ 115D and 115A respectively.

The goal of the TPPA, Minn. Stat. § 115D, is twofold:

1. To protect the public health, welfare and environment by preventing toxics from being made or used and minimizing the transfer of toxic pollutants from one part of the environment to another.
2. To increase awareness of the need and benefits of pollution prevention and coordinate all elements of government, industry, and the public in carrying out pollution prevention activities.

By this statute, Minnesota defined *prevention* as the preferred approach for minimizing toxics and their harm.

This *prevention* principle is reiterated in Minnesota's solid waste statute. Minn. Stat. § 115A states that waste reduction is the preferred method for waste management (Minn. Stat. § 115A.02) and for

reducing the toxicity of that waste. It defines waste reduction (Minn. Stat. § 115A.03, subd. 36b) as “an activity that prevents generation of waste or the inclusion of toxic materials in waste” and includes:

- Reducing material or the toxicity of material used in production or packaging.
- Changing procurement, consumption, or waste generation habits to result in smaller quantities or lower toxicity of waste generated.

These are all pollution prevention activities. Though they are in the Waste Management statute, they refer to steps taken preventatively, *before* something becomes a waste. Like the TPPA, the Waste Management Act includes toxicity reduction through product design, production process, and purchasing choices.

There are many examples where pollution prevention and solid waste challenges intersect. But without an integrating framework to connect these two areas of focus, we may miss opportunities to protect our air, water, land, climate, and health. For example, when a discarded product *can* be recycled but contains a toxic component, should it be recycled? A purely solid waste perspective would say yes, recycling is preferred to disposal. A purely pollution prevention perspective would say no, better to remove the toxic material to prevent the circulation that would occur if the product were recycled.

Three specific examples of pollution prevention and solid waste challenges intersecting include:

- Common receipt paper is typically comprised of one to two percent bisphenol A (a Priority Chemical) or a similarly toxic chemical, bisphenol S. The receipt paper can be recycled with other paper; however, there is evidence that when it is recycled the BPA or BPS moves to the process water, transferring the pollutant from the solid waste to the water. Should we recycle receipts or throw them away once it was known that the chemicals could be transferred? After much discussion the decision was made to educate Minnesotans to throw their receipts away instead of recycling them. Even though this paper is recyclable, it was determined to be a better practice to remove the thermal receipts from recycling to avoid the chemicals from being transferred.
- If a company prioritizes reducing the toxicity of the plastic components of their product over increasing the percent of recycled content, that choice could result in the decision to reduce the amount of recycled plastic being used given current practices of spraying certain plastics with highly toxic flame retardants. Is it more sustainable to dispose of those plastics sprayed with flame retardants?
- Food packaging manufactured with antimicrobials and nanoparticles reduces wasted food, but those antimicrobials and nanoparticles could be transferred to another media such as land or water at end-of-life. Which is more important?

SMM is about intentionally looking at materials and products from a systemic perspective instead of through the narrow lens of a single discipline’s vantage point. While there are tools available to assist in getting that systemic understanding, SMM is not about deploying a specific, defined set of analysis steps or methods that results in a definitive answer. It is akin to understanding a great statue in a museum. You get a more complete understanding by walking around it than from standing in one position. You can also test the materials from which the statue is made, research the history of the time and place in which it was created or learn about the life of the artist. Each exploration gives you additional information. The point is, you can make a more informed assessment if you make an effort to develop a more comprehensive understanding.

SMM is already yielding a more sophisticated understanding of what is a "best" practice or decision. An example of the MPCA implementing SMM, by using all the available information to change the environmental outcome and create a "best" practice or decision was done with the state sustainable

purchasing program. This program historically prioritized recycled-content products, and as a result, included recycled-content vinyl flooring in its flooring contract. By taking a life cycle systems approach that incorporates toxic reduction goals, a different decision emerged. Recycled-content vinyl flooring can contain toxic heavy metals, so a decision was made to restrict such flooring unless shown to be free of toxics. Similarly, because of the waste hierarchy, the MPCA has historically promoted reuse of products with some exceptions (e.g., mercury thermometers). The MPCA can use SMM to determine the answers to questions posed above by also using full life cycle assessment information. Under SMM, solid waste and toxics reduction staff are jointly developing more specific guidelines for MPCA programs about what types of products should be reused and which are better discarded for proper end-of-life management.

Limitations of an SMM perspective

Taking a systemic view of environmental problems can point out where environmental impacts are occurring and LCA can inform which impacts are most significant. These tools, however, cannot tell us which impacts to prioritize. That is ultimately a question of judgement and values, not analysis. Additionally, while use of LCA and taking an SMM perspective yields information on environmental impacts and helps policy makers focus efforts on high leverage opportunities, neither SMM nor pollution prevention principles provide information on other important factors such as environmental justice or economic considerations. Though the focus of the MPCA is primarily on the environment and human health, the MPCA has and will continue to consider implications for all these factors when making decisions on policy, planning, and implementation.

Improving environmental outcomes with SMM

In an SMM approach, partners can be those working anywhere in the life cycle of a product. The MPCA's Pollution Prevention Program has always worked with a wide variety of partners — from primary chemical formulators and academic researchers, to brand owners, to retailers and consumers. The MPCA Solid Waste Program has picked up from there, to work with reuse businesses, recyclers, and disposal facilities for all types of wastes. Ideally both programs operate with partners across the complete life cycle of products, prioritizing upstream opportunities given the potential for the greatest environmental benefit.

So how will SMM help integrate pollution prevention and solid waste? The simple answer is by asking that both solid waste and pollution prevention impacts be looked at together.

Sustainable government purchasing

Overview

Minnesota's state Sustainable Purchasing Program is a collaboration between the MPCA and the Department of Administration's Office of State Procurement (OSP). This partnership resulted in the creation of the [Sustainable Procurement Charter](#), which documents program goals and metrics, a plan for contract prioritization, the program structure and resource commitment, and program deliverables. The goals outlined in the charter also align with Executive Order 19-27 – 'Directing State Government to Conserve Energy and Water, and Reduce Waste to Save Money,' which states that 25 percent of total spend on priority contracts is to be sustainable purchases by 2025. Over the past several years, Minnesota's Sustainable Purchasing Program has made notable progress and as of fiscal year 2020 (FY2020), initial program data indicates the 25 percent goal has been exceeded with 30 percent of total spend on priority contracts going towards sustainable purchases.

State and local purchasing is critical to address because it accounts for a large amount of greenhouse gas pollution, especially when counting both direct emissions (like driving state-owned vehicles) as well as indirect and embedded emissions (like those generated in the manufacturing of computers the state purchases). MPCA analysis shows that the direct and indirect emissions from State of Minnesota purchasing of goods and services (not counting road or building construction) is over 900,000 metric tons of CO₂e. Reduction and reuse of these purchases reduce emissions, solid waste, toxicity, and use of both renewable and non-renewable resources. Ultimately, the mission of the State of Minnesota's Sustainable Purchasing Program is to use our purchasing power to drive the market for sustainable goods and services by making purchases that demonstrate the highest level of environmental, social, and economic responsibility drawing on SMM and pollution prevention as guiding frameworks.

Updates and accomplishments

Environmental and social sustainability of priority contracts

The Sustainable Purchasing Program currently prioritizes 19 state contracts for the inclusion of sustainability requirements, based on a spend analysis that identified the contracts responsible for the greatest percentage of total state expenditure and the greatest environmental impact related to the products available through that contract. When state agencies purchase from these contracts, that spending is considered "sustainable" and contributes to the sustainable procurement goal. We consider contracts to be "100% sustainable" when all products offered on the contract meet specified sustainability requirements. Select purchases from the remaining contracts can also count toward the sustainable procurement goal.

As of FY2020, 53 percent of priority contracts are considered "100% sustainable." There are nine contracts specifically that require more sustainable products to be available in the market before they can be considered "100% sustainable." Even with this additional opportunity for achieving the "100% sustainable" status for remaining priority contracts,

State government sustainable purchasing 100% sustainable contracts:

- Cleaning supplies (C-252)
- Cleaning compounds and detergents for dishwashing and laundry machines (C-983)
- Janitorial paper products (P-661)
- Carpet and resilient flooring (C-432)
- Office furniture (F-379)
- Refurbished furniture (F-464)
- Ballasts (B-308)
- Lamps (L-290)
- Computers (C-1046)

preliminary FY2020 vendor data shows the Sustainable Purchasing Program has exceeded the target defined in Executive Order 19-27 that 25 percent of total spend on priority contracts is to be sustainable purchases, with approximately 30 percent of total spend on priority contracts going towards sustainable purchases.

Table 1. Sustainable government purchasing annual results

	Goal	FY2018	FY2019	FY2020
Environmental sustainability	25% of purchases on priority contracts are sustainable by 2025	16.6% (approx) of sustainable purchases on priority contracts	21.1% (approx) of sustainable purchases on priority contracts	30% (approx) of sustainable purchases on priority contracts*
Social sustainability	10% of all state purchasing will be with certified minority, woman, economically disadvantaged and veteran-owned businesses	7.7% total spending was with certified minority, woman, economically disadvantaged and veteran-owned businesses	8.2% total spending was with certified minority, woman, economically disadvantaged and veteran-owned businesses	8.1% total spending was with certified minority, woman, economically disadvantaged and veteran-owned businesses**

* Vendor reporting for FY2020 is still in process as of the date of publication for this report. The totals for FY2020 environmental sustainability are preliminary as a result and may change slightly once all vendor data is finalized.

** Diverse spend for state agency purchasing went up to \$130 million, which is a record high. The adjusted total spend (used for diverse spend reporting) went up from FY19 to FY20, resulting in a similar final percent.

Environmental benefits

Benefits for FY2020 are conservative and reflect only purchases of electronics and paper. Paper-related environmental impact estimates were made using the [Environmental Paper Network Paper Calculator Version 4.0](#).

Table 2. Sustainable government purchasing environmental benefits (FY2020)

Carbon dioxide	Water	Energy	Lifetime costs
17,061 metric tons of CO ₂ e saved	47,052,659 gallons saved	77,317 MWh saved	\$3,216,085 in lifetime costs* saved

*Lifetime costs include cost savings for non-hazardous solid waste disposal and for energy use

These environmental benefits for state purchases of electronics and paper in one year are equivalent to:

- Eliminating CO₂ emissions from 11,916 passenger vehicles.
- Powering 6,598 Minnesota homes.
- Saving water equivalent to the water use for approximately 2,479 Minnesota residents.

B2Gnow Platform

The 2017 Toxics and Pollution Prevention Evaluation Report included a goal (Goal 5) to ‘amend State purchasing to reward products with fewer health and environmental impacts,’ with the recommendation (Recommendation F) to ‘Establish funding for a reporting system and staff support to assure vendors are complying with state contract sustainability terms.’ In June 2020, the Sustainable Purchasing Program launched a reporting tool using the B2Gnow platform as a first step towards addressing this recommendation and establishing better quality, more consistent reports. This reporting tool collects product sustainability data and purchasing data from vendors in order to simplify and

improve tracking of the number of sustainable purchases happening across state agencies. The B2Gnow sustainable purchasing reporting tool is in its pilot phase and currently the program is working to incorporate reporting through this platform as a contract requirement during negotiations.

Safer Choice support

The MPCA has been participating in a broad coalition of public and private entities working to restore the EPA Safer Choice Program following changes made during the last federal administration. In March 2021 the coalition sent a letter to EPA Administrator Michael Regan, and in June 2021 a similar letter was sent to leaders in Congress as they made appropriations deliberations. The MPCA signed both letters expressing support for the Safer Choice Program and encouraging the allocation of funding at a level that would allow the program to be fully staffed and resourced.

The MPCA supports Safer Choice as one of the leading (and only U.S. governmental) third-party certifiers of fully reviewed product chemistries. Products evaluated by EPA scientists to receive the Safer Choice label, must meet requirements for safer chemical ingredients, performance, packaging, ingredient disclosures, and volatile organic compounds (VOCs). The Sustainable Purchasing Program relies on this label for ensuring safe products are included on state contracts like the cleaning supplies contract. As of November 2021, the EPA announced plans to bolster the Safer Choice Program, returning it to its former status as a dedicated branch within the Office of Pollution Prevention and Toxics, adding new product categories, identifying additional safer chemicals for use in products, and strengthening standards.

Contract successes

Sustainable Purchasing staff added requirements in contracts covering computer equipment and multi-functional devices (including desktops, laptops, printers, scanners, etc.) stating all eligible electronics must meet specifications outlined in the Electronic Product Environmental Assessment Tool (EPEAT) and be EPEAT-registered. EPEAT is a global ecolabel for the IT sector that includes different levels depending on the environmental performance criteria achieved by a product. From a toxics perspective, this can include the elimination of concerning materials such as cadmium, lead, mercury, and hexavalent chromium. Additionally large parts must be free of polyvinyl chloride, and batteries must be free of lead, cadmium, and mercury.

The Sustainable Purchasing Program also participated in the contract review process for office furniture and restricted the inclusion of a “hazardous handful” of chemicals, including flame retardants, formaldehyde, fluorinated chemicals (like PFAS), antimicrobials, and polyvinyl chloride. These chemicals persist in the environment and bio accumulate in the human body, which can result in potential health impacts such as cancer, reproductive toxicity, endocrine disruption, and immune impairment.

Opportunities

The State of Minnesota’s Sustainable Purchasing Program has made significant strides towards meeting the targets outlined in the program charter and continuing to reduce the toxicity and environmental impacts of government purchasing. In the future there are a few key areas of focus and opportunities for furthering the growth and success of the program.

Secure funding to repeat the state government spend analysis

Given current progress towards achieving the “100% sustainable” status on priority contracts, it is important for the program to repeat the spend analysis that originally identified the 19 priority contracts. This will help the program identify any gaps in the work being done, enable the program to

identify additional high impact contracts, expand the scope of the program to recognize high impact individual products (even if the contract is not identified as a priority), and realign program priorities with broader agency and enterprise focuses. Limited resources and staff capacity have delayed the Sustainable Purchasing Program from repeating this spend analysis. Additional funding to contract an external partner, like the first spend analysis, will ensure this exercise can be completed soon enough to support the next phase of this program.

Hire LCA-trained staff to expand agency modeling

Now that the B2Gnow Platform is in place, additional staffing support is needed to ensure reporting requirements are included in contract negotiations and to verify vendors are accurately reporting information through the system.

Once vendor reporting improves with the B2Gnow Platform the next step is to translate the data into environmental impact measurements. Currently the Sustainable Purchasing program is limited to reporting on environmental impacts for electronics purchases and paper purchases based on available LCA tools. Adding an LCA modeler to the Sustainable Purchasing team would allow the program to report on the environmental impacts of more product categories, and also broaden the types of environmental impacts that the program reports on in the future.

Grow the Sustainable Purchasing Team to strengthen reporting and outreach

In addition to needing more staffing support for reporting, the Sustainable Purchasing Program also has an opportunity to strengthen and expand the program reach with additional team members. Currently the program is unable to offer as many trainings and presentations to other state agencies, Minnesota tribal nations, and Cooperative Purchasing Venture (CPV) members. With an expanded team, more focus could be placed on creating resources and training videos and offering in-person presentations and information sessions. The success of this program is not only based on modifying contracts to be more sustainable, but also ensuring those contracts are being used frequently and consistently.

Statewide trends for Toxic Release Inventory reporting industries

Overview

The MPCA evaluates data from Minnesota facilities reporting to the EPA TRI program to determine trends in quantities of chemicals generated and released. Facilities that report to the TRI are typically larger facilities involved in manufacturing; metal mining, electric power generation, and hazardous waste treatment. In general, chemicals covered by the TRI are those that cause:

- Cancer or other chronic human health effects
- Significant adverse acute human health effects
- Significant adverse environmental effects

There are currently over 800 chemicals covered by the TRI. Facilities that manufacture, process, or otherwise use them in amounts above established levels must submit annual TRI reports on each chemical. The 2019 data for Minnesota suggests that while TRI chemical releases from all industrial sectors continue to decline (Table 5), overall progress in pollution prevention among manufacturers has stalled as TRI chemical waste generation has increased in the past four years to exceed 2015 levels. While it is good to see that the additional TRI chemical waste being generated by manufacturers is being managed through recycling rather than released or treated (Table 3), it still does not represent progress in pollution prevention. The objective is to use fewer toxic chemicals and create less waste to begin with so that total generation of TRI chemical waste is reduced.

Updates and accomplishments

Manufacturing sector: TRI chemicals generation

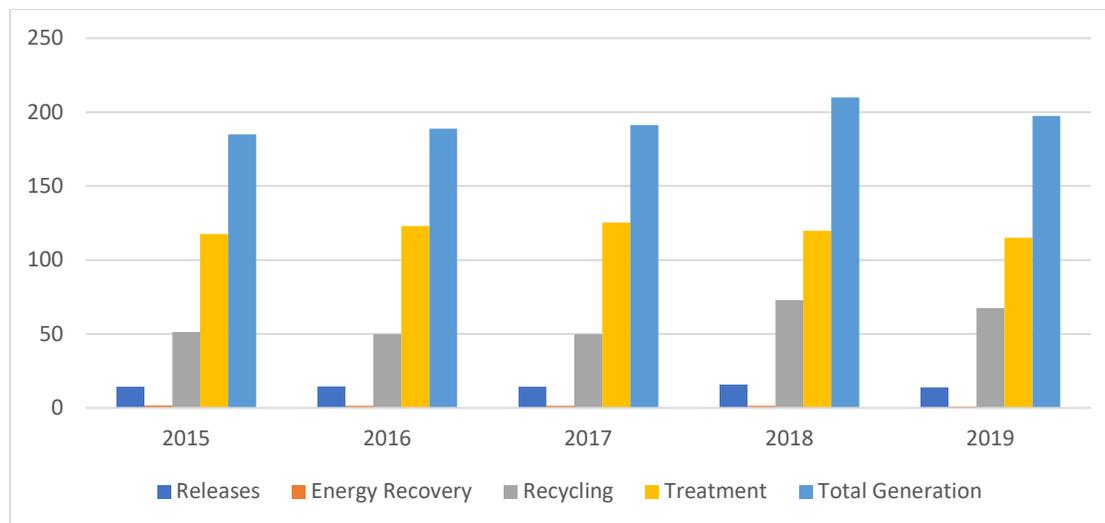
For the purposes of TRI reporting, TRI chemical waste generation is defined as the sum or aggregate of the quantities for each waste management method employed, which includes releases (direct release to air, water, or land); recycling (on- and off-site); treatment; and energy recovery. In general, Minnesota's pollution prevention efforts focus on working with manufacturers to reduce TRI chemical waste through improving the efficiency of production processes or finding ways to use less or non-toxic chemicals in those processes.

Table 3. Management method of TRI chemical wastes generated by manufacturers (in millions of pounds)

	2015	2016	2017	2018	2019
Releases	14.3	14.5	14.3	15.9	14
Energy recovery	1.6	1.5	1.5	1.4	0.9
Recycling	51.3	49.9	49.9	72.9	67.4
Treatment	117.7	123	125.4	119.8	115.1
Total generation	184.9	188.9	191.1	210.0	197.4

Note: These numbers were reported by manufacturers.

Chart 1. Statewide trends for TRI chemical wastes generated by manufacturers



As Chart 1 shows, total TRI chemical waste generated by manufacturers continues to increase, with 2019 showing a nearly seven percent increase over 2015. However, much of the increase in total TRI chemical waste generation from manufacturers comes from wastes that were able to be recycled, such as metals or solvents, which increased by 31 percent. TRI chemical wastes managed through other means declined by about 2.5 percent.

As discussed in the previous edition of this report, TRI chemical waste generated by manufacturers is becoming increasingly concentrated among a small number of facilities. Seventy-five percent of the 197 million pounds of chemical waste reported to TRI by manufacturers comes from just ten of the 502 facilities that report to the TRI. Nearly 28 percent comes from just one facility, Flint Hills Resources, with the remainder representing industry sectors such as: petroleum refining, laminated plate and sheet manufacturing, pulp and paper mills, water purification equipment manufacturing, coated and laminated paper manufacturing, small arms manufacturing, rolled steel manufacturing, and biodiesel manufacturing.

All industrial sectors: TRI chemicals generation

This table includes the data from manufacturers covered by the previous section, along with TRI chemical waste generated by non-manufacturers (primarily electric utilities), recyclers (mostly metals recycling), and waste treatment facilities, which is TRI chemical waste incinerated at the 3M Cottage Grove facility.

Table 4. Total amount of TRI chemical wastes generated by all reporters (in millions of pounds)

	2015	2016	2017	2018	2019
Manufacturers	184.8	188.9	191.2	210	197.4
Non-manufacturers	13.5	12.6	11.7	13.7	10.6
Recyclers	32.7	39.9	46.8	46.7	50.1
Waste treatment facilities	21.2	21.9	20.1	22	18.7
Total generation	252.2	263.3	269.8	292.4	276.8

As Table 4 shows, TRI chemical waste generation from non-manufacturers mostly declined from 2015 to 2019, with an exception in 2018. It is expected this group will continue to generate less TRI chemical waste as more of the coal-fired generating plants are removed from service. TRI chemical waste generation from waste treatment facilities leveled off after a 60 percent increase between 2011 and 2015. This is expected to decline further going forward when 3M-Cottage Grove shuts down their incinerator at the end of 2021. TRI chemical waste generation from recyclers increased about 50 percent from 2015 to 2019 due to significantly more lead being recycled at Gopher Resources.

All industrial sectors: TRI chemical releases

Similar to the TRI chemical waste generation trends seen in Table 3, we can see in Table 5 that chemical releases from non-manufacturers (primarily electric utilities) mostly declined as more coal-fired generating plants were taken out of service. Chemical releases from manufacturers, recyclers, and waste treatment facilities all held steady.

Table 5. Total amount of TRI chemicals released by all reporters (in millions of pounds)

	2015	2016	2017	2018	2019
Manufacturers	14.3	14.5	14.3	15.9	14
Non-manufacturers	11.5	9.5	8.5	9.5	8.1
Recyclers	0.8	0.8	1	0.9	0.8
Waste treatment facilities	0.9	1.1	0.9	1	0.8
Total releases	27.5	25.9	24.7	27.3	23.7

The MPCA’s pollution prevention efforts working with manufacturers to reduce the environmental impacts and resource use of manufacturing are accomplished primarily through a partnership with MnTAP at the University of Minnesota. MnTAP and its intern program help Minnesota businesses and organizations develop and implement tailored solutions that prevent pollution at the source, maximize efficient use of resources (including water and energy), – reduce costs, and improve public health and the environment. Between 2016 and 2020, MnTAP assisted 1,552 companies.

Table 6. MnTAP Project Impacts 2016 – 2020

Impact Type	Impact - Projected	Impact - Actual
Water reduction (gal)	735,400,000	149,200,000
Electric energy reduction (kWH)	71,800,000	15,700,000
Gas energy reduction (therms)	1,700,000	320,000
Waste reduction (lbs)	22,700,000	3,600,000
Cost savings (\$)	15,800,000	4,900,000

The MPCA has partnered on several special projects with MnTAP in recent years that were funded by the EPA Pollution Prevention Grant Program.

- During 2017 and 2018, MnTAP worked with facilities in the food processing sector, completing six facility assessments and four summer intern projects. Their work helped these companies

realize over 36 million gallons in water savings, 143,000 kWh in electricity savings, 98,000 therms in gas savings, and reduced hazardous materials use by 31,000 pounds and non-hazardous materials use by 78,000 pounds. This combined for a cost savings of \$233,000 annually.

- In 2018, the MPCA and MnTAP began a project to help manufacturers using trichloroethylene find safer alternatives. Shortly after the grant was awarded, Water Gremlin made the news over their improper management for the trichloroethylene used in their manufacturing processes. As part of Water Gremlin's settlement with the MPCA, a supplemental environmental project (SEP) was started for additional outreach and technical assistance that built off of the work plan from the EPA Region 5 grant awarded to the MPCA. To date, MnTAP engaged with four facilities under the EPA grant with one having completed replacement, two implementing replacements, and one still considering the options recommended to them. Under the SEP, four additional facilities are considering recommendations and one has initiated their search for safer alternatives.

For the past several years, MnTAP has also engaged with small businesses that use automotive degreasers, such as brake cleaners, to encourage them making the switch to safer alternatives. Most recently, this effort included working with small business owners who are members of the Leech Lake Band of Ojibwe Reservation. Staff worked with auto shops to identify safer degreasers to test, and the shops were then given a case of the new product for continued testing to ensure it met cleaning expectations. The 13 participating sites found new degreaser options that reduced VOC emissions by 1,200 pounds per year and hazardous air pollutant (HAP) emissions by 520 pounds per year.

For MnTAP's 2021 summer intern cohort, 14 talented and industrious interns identified environmental impact reductions and process improvements that could save their companies:

- 24,000,000 gallons of water, saving \$74,000
- 4,000,000 kWh electricity, saving \$430,000
- 630,000 pounds of waste, saving \$410,000
- 190,000 pounds of chemical waste, saving \$90,000
- 200,000 therms of energy, saving \$90,000
- \$14,000 in production impacts

These projected results translate into environmental impacts equivalent to:

- Eliminating CO₂ emissions from 220 passenger vehicles.
- Powering 390 Minnesota homes.
- Saving water equivalent to the water use for approximately 1,000 Minnesota residents.
- Eliminating nearly 400 fifty-five-gallon drums of chemical use.

More details on this year's intern projects are available in MnTAP's [2021 Solutions report](#).

In October 2020, the MPCA and MnTAP began a project to provide technical assistance to metal fabricators, particularly precision manufacturing, to reduce the use of chemicals such as n-propylbromide, dichloroethylene, perfluoroalkylsulfonate (PFAS) materials, cutting fluids and chloride sources. To date, the work has focused on surveying and interviewing companies and vendors to identify opportunities, with site assessments set to begin in 2022.

Toxics in packaging

Overview

In 1992, the Minnesota Legislature passed the “Prohibitions on Selected Toxics in Packaging” law (Minn. Stat. § 115A.965, 1992 Session Laws Ch. 337, Sec. 50). The enacted law was based on Model Legislation drafted two years earlier by a working group created by the Coalition of Northeastern Governors (CONEG), with active cooperation of a wide range of stakeholders from environmental groups, industry, and governmental agencies. The law prohibits the intentional introduction of lead, cadmium, mercury, or hexavalent chromium into packaging or the components of packaging offered for sale or distributed for promotional purposes. It also prohibits the incidental presence of these metals at concentrations exceeding 100 parts per million (ppm) total by weight for the four metals.

Minnesota is one of 19 states that have adopted toxics in packaging legislation based on the model. Because most packagers and package manufacturers selling into the U.S. market distribute to at least one of the 19 states, the packaging laws are viewed as a national standard in the absence of federal legislation, at least for major domestic packaging manufacturers and distributors. This was one of the first laws enacted in Minnesota to pursue a “source reduction” strategy, which strives to keep unwanted materials (e.g., the four metals) out of the recycling and waste streams entirely by eliminating the use of those unwanted materials in the first place. The law applies to manufacturers, distributors, and suppliers of packaging, and manufacturers of packaged products. The law requires these parties to maintain on file current certificates of compliance that show they are following the packaging laws.

Updates and accomplishments

Joint action

In 1992, several states with enacted laws formed the Toxics in Packaging Clearinghouse (TPCH) under the auspices of CONEG to provide coordinated and streamlined implementation of each state’s toxics in packaging law. Administration of TPCH was transferred to the Council of State Governments, and then to the Northeast Recycling Coalition in 2005. Currently there are nine state members of the Clearinghouse, including Minnesota, and ten states that have toxics in packaging laws but who are not members of the Clearinghouse.

Table 7. States with toxics in packaging legislation

TPCH Member States	States with Legislation/Not TPCH Members
1. California	1. Florida
2. Connecticut	2. Georgia
3. Iowa	3. Illinois
4. Minnesota	4. Maine
5. New Hampshire	5. Maryland
6. New Jersey	6. Missouri
7. New York	7. Pennsylvania
8. Rhode Island	8. Vermont
9. Washington	9. Virginia
	10. Wisconsin

As originally enacted, the laws allowed manufacturers to request exemptions for use of the four metals in packaging, for example in reusable containers with a limited distribution system or in medical or other packaging where there were state or federal requirements for use of the metals in packaging. At this time, all the exemption provisions have expired or they have not been requested for over 20 years. In the past, TPCH member states considered exemption requests jointly to ensure that all parties receive the same information, to minimize the administrative costs borne by individual states, and to ensure that the states provided consistent responses. The TPCH receives and answers requests for information and clarification from businesses, governments, and stakeholder groups. Current information may be found at the clearinghouse website, <http://www.toxicsinpackaging.org>.

Enforcement actions

The MPCA has enforcement authority for Minn. Stat. § 115A.965. As a member of TPCH, Minnesota participated in discussions of and supported enforcement actions by other state members for packaging that was used and sold by national retailers. Between 2012 and 2021, TPCH has evaluated several types of packaging through x-ray fluorescent (XRF) screening projects for coordinated state enforcement of state toxics in packaging laws.

Between 2017 and 2021, TPCH screened flexible PVC packaging with XRF technology and found that cadmium continues to be present in this type of packaging above levels allowed by state laws. However, in comparison to previous screening projects, the prevalence of cadmium use seemed to be lower, and lead was not found at elevated levels in the screened packaging. TPCH member states used the results of this XRF screening project for coordinated state enforcement. On behalf of member states, TPCH contacted 12 product manufacturers, distributors, and retailers that had non-compliant packaging. Through negotiations with TPCH, the companies took actions to comply with the law, which included recalling and withdrawing noncompliant packaging from the distribution chain in TPCH member states, and working with packaging suppliers to ensure that packaging components are in compliance going forward. These twelve companies reported that they removed over 6,000 non-compliant packages from distribution centers and retail locations in TPCH member states.

No enforcement actions were undertaken individually by the MPCA during this reporting period. Similarly, no exemption requests were received or granted by TPCH or Minnesota during this reporting period.

TPCH outreach and communications

Minnesota joined the TPCH in 1993 and has remained an active member continuously since that time. Minnesota served as chair of TPCH for fiscal years 2018 through 2021 (July 1, 2017 through June 30, 2021).

During the 2017-2021 reporting period, the TPCH:

- Continued to communicate with states that have legislation but are not TPCH members regarding toxics in packaging issues and possible membership in TPCH, in order to raise awareness, improve national coordination, and increase state involvement in research, outreach, and compliance activities. States with the legislation may be more interested in membership if the updated Model Legislation including PFAS and ortho-phthalates is enacted in some states. These communications to non-member states included a 2018 letter co-signed by MPCA Commissioner John Linc Stine while Commissioner Stine was President of the Environmental Council of the States.

- Coordinated and communicated on toxics in packaging issues and concerns with the EPA, other interstate organizations, environmental groups, trade groups that are not advisory members of TPCH, as well as testing laboratories and packaging manufacturers and distributors.

TPCH publications and screening projects

During the reporting period, TPCH and member states worked on several screening projects, including:

- Continuing to evaluate the potential for imported glass wine bottles to exceed the threshold for metals regulated by state laws and worked with the Glass Packaging Institute to address this issue. One member state that has state-owned liquor stores worked directly with its supply chain to communicate its concerns and the need to distribute packaging compliant with state laws.
- Initiating a research project on metal packaging components (for example zippers, grommets, etc.) to assess compliance with state toxics in packaging laws and pursue coordinated state enforcement when appropriate.
- As described above under ‘Enforcement Actions,’ TPCH initiated and completed a screening project for flexible PVC packaging and associated components. The final report for this project was released in November 2017.

Toxics in packaging Model Legislation updates

TPCH members began working on updates to the Model Legislation in the spring of 2017. The process of developing the updated Model Legislation included a 45-day public comment period in July - August 2020.

Final Model Legislation adopted by TPCH

TPCH member states unanimously approved the final updated Model Legislation in early 2021. The model:

- Adds PFAS family chemicals and ortho-phthalates to the list of prohibited chemicals.
- Defines intentional use for PFAS family chemicals and ortho-phthalates as intentional use in manufacturing and presence in the final product, not the less restrictive definition that the substance is serving a function in the final product. The distinction for this is PFAS chemicals are used in manufacturing and processing, and are present in the final product, but do not serve a function in the final product. PFAS family chemicals are widely used as manufacturing or processing aids in the manufacture of packaging, and not intended to serve a function in the finished product. However, data shows that PFAS used as a manufacturing or processing aid will carry over into the final packaging as a manufacturing residual, and cannot be removed. When this packaging is recycled the PFAS chemicals are spread more widely into all types of packaging with postconsumer recycled content, with resulting human exposure and environmental release. The same type of dispersion applies to ortho-phthalate chemicals in packaging that is recycled, however this is on a lesser scale than the PFAS family chemical use and dispersion.
- Establishes criteria and a process for a state agency to identify additional chemicals as candidates for the prohibitions in the law, and allows for state-specific processes to add those chemicals to the law through legislation or rulemaking.
- Removes exemptions and timelines from the law that are no longer needed by industry or in effect in any state.

- Resets the limit for incidental presence of the regulated substances from 200 ppm to 100 ppm. TPCH changed the limit in the Model Legislation to 200 ppm over ten years ago, only one state adopted it in law, and currently all member states view 100 ppm as the appropriate limit for incidental presence.

Actions to-date on the updated Model Legislation

A bill including the updated Model Legislation was introduced in the 2021 Connecticut Legislative session, SB926, which was not enacted. However, the Connecticut Legislature did enact a prohibition on intentional use of PFAS in food packaging effective December 31, 2023, with intentional use defined as the material providing a function in the finished product. This legislation is an amendment to the state's toxics in packaging law and can be found in Public Act 21-191, Sec. 2. Minnesota adopted a similar prohibition on the intentional use of PFAS in food packaging in the 2021 Legislature (2021 Session Laws, Ch. 6, Sec. 105), with the same definition of intentional use as Connecticut. This prohibition is codified in a new section, 325F.075, and does not amend Minnesota's Toxics in Packaging law. This statute has a broader definition of food packaging than the 2021 CT law, "a container applied to or providing a means to market, protect, handle, deliver, serve, contain, or store a food or beverage," including individual, intermediate, and transport packaging, and all individual components of such packages. The Minnesota law is not limited to the packaging component that is in direct contact with food or beverage products.

Opportunities

Update Minnesota's Toxics in Packaging law

The MPCA recommends the Minnesota Legislature revise the Minnesota Toxics in Packaging law to incorporate the changes outlined in the TPCH updated [Model Legislation of 2021](#), including the most restrictive definition of intentional use. PFAS concerns in Minnesota warrant adoption of the Model Legislation package that includes the important provisions phasing out all intentional use of PFAS in the production of packages and packaging components. Minnesota concerns regarding safe recycling and safe waste disposal of all types of packaging and packaging components warrant adoption of the additional changes of the updated Model Legislation in Minnesota's Toxics in Packaging law, Minn. Stat. 115A.956. The full package of revisions in the Model Legislation should be enacted, instead of only addressing PFAS in food packaging in a more limited manner in 325F.075 as described above.

Lead in consumer products: tackle and ammunition

Overview

Fishing tackle and firearms ammunition are virtually the only two categories of consumer products sold in the U.S. with significant metallic lead content that do not have strict limits or prohibitions on lead content, or other sales, use, and end-of-life management requirements due to the lead content.

A critical step in phasing out use of lead in tackle and ammunition are efforts to educate and raise awareness among anglers, hunters, and the general public regarding the universal toxicity of lead, the problems with lead tackle and ammunition, and the availability, safety, and superior performance of non-lead products. Since the early 1990's, state and federal agencies have been actively engaged in educating anglers and hunters about the environmental and health impacts of lead in tackle and ammunition and encouraging the use of non-lead options.

In particular, MPCA revived the Get the Lead Out! Program starting in 2019. This program is a non-lead tackle outreach program that initially ran between 2000 and 2010, providing public education about lead fishing tackle concerns and promoting the availability of non-lead fishing tackle.

Updates and accomplishments

Get The Lead Out!

In 2018-2019, the MPCA competitively sought and secured Deepwater Horizon Natural Resource Damage Assessment (DWH NRDA) funds through the U.S. Fish and Wildlife Service (U.S. FWS) to protect and enhance the loon population of Minnesota through outreach and education on lead tackle and non-lead alternatives that reduce loon exposure to lead and reduce the mortality resulting from exposure. The cooperative agreement with U.S. FWS provides approximately \$1.2 million to fund the project through December 2024. The MPCA employs two program staff for the entire project term and two Minnesota GreenCorps members for four GreenCorps service years, starting in the fall of 2019 and running through the summer of 2024.

This program updates and strengthens the MPCA's original Get The Lead Out! non-lead tackle outreach and education program that ran from 2000 to 2010. Two of the program's foundational elements, in-person outreach and tackle exchanges that provide non-lead tackle samples for turned-in lead tackle, had to be significantly reimaged and reworked due to Covid-19. Outreach, education, and tackle exchanges were carried out mostly online and through partner organizations in 2020 and 2021. This included the program's presence at the 2021 Governor's Fishing Opener and two years at the annual Minnesota Conference on Science Education through the Conference's online platform for exhibitors and partners.

'Hunter's Choice' Copper Ammunition Outreach Project

In 2014, the MPCA partnered with the Raptor Center at the University of Minnesota, the Minnesota Department of Natural Resources (DNR), the Wildlife Society MN Chapter, and several other organizations to submit a funding proposal to the Legislative-Citizen Commission on Minnesota Resources (LCCMR) for the 'Hunter's Choice' Copper Ammunition Outreach Project. This project educates hunters about the advantages of copper ammunition for food safety, firearms/ammunition accuracy, environmental stewardship of ammunition choices, and protection of raptors and other wildlife that are exposed and poisoned by feeding on gut piles and other lead exposure pathways. In 2021, the Legislature awarded funds to the project, and it is currently underway for at least two years,

starting July 1, 2021. The project is developing outreach materials and seeking partners for the events and audiences as described in the initial and post-funding work plans and budgets.

Federal actions

In 1991, the U.S. FWS phased out the sale and use of lead shot in waterfowl hunting due to the serious wildlife and environmental impacts resulting from accumulation of lead ammunition in waterbodies and wetlands. EPA has since received multiple citizen's petitions over the past three decades under the Toxic Substances Control Act (TSCA) for appropriate labeling for non-lead products and for a phase out of the manufacturing, sale, and use of lead ammunition and fishing tackle. Labeling would create transparency, however, there are no product or package labeling requirements for lead-containing or non-toxic ammunition to-date. While federal changes appeared to have been given serious consideration in the early 1990s when EPA granted the TSCA labeling petition and proposed a more stringent rule (59 FR 11121) to prohibit lead in these products, a final rule was never published. Most recently, in 2010-2011, in response to additional TSCA citizen petitions to address lead ammunition and tackle, the EPA stated that Congress never intended TSCA would apply to lead in tackle or ammunition as a toxic substance, despite the fact that EPA granted the TSCA citizens petition and issued a proposed rule as described above.

The U.S. FWS' decision to phase out lead shot for waterfowl in 1991, and the EPA rule proposal in 1994 to phase out lead tackle manufacturing and use demonstrate that federal government has the necessary jurisdiction. An example of the federal government taking action to protect public health by phasing out and tightly regulating lead-containing products is the federal infrastructure bill enacted in November 2021, which appropriates approximately \$15 billion for replacement of lead service lines in public water systems.

Opportunities

Educate Minnesotans about lead free tackle and ammunition, and work to expand availability

While state level education and outreach activities are important and productive for raising awareness and changing behavior, lead tackle and ammunition continue to be dominant products in the marketplace and lead continues to be released to the environment through the use of these products. Non-toxic alternative products with comparable or superior performance are available today, in part because the federal and state governments have taken action requiring manufacturers and retailers make them available, but they need to be *more* accessible to anglers and hunters than the lead options.

Mercury in consumer products: lighting and dental

Overview

For many years, the MPCA and partners have engaged in mercury product outreach, education, and collection activities targeted at households and various business sectors to increase awareness of mercury presence in products, reduce accidental product breakage and release, promote proper end-of-life collection, and promote the purchase and use of non-mercury alternative products. The sale of most types of mercury products is now prohibited in Minnesota and most sectors have stopped using mercury, including healthcare, laboratories, and education. However, a range of mercury-containing product types do continue to be in use or in storage, and it is difficult to know the size of this mercury reservoir or the disposition or release of products. The primary mercury product collection programs in place are the Household Hazardous Waste (HHW) and Very Small Quantity Generators (VSQG) programs for households and businesses, retailer collection of mercury lamps, and manufacturer product stewardship programs for mercury HVAC thermostats and mercury displacement relays.

In 2020, mercury in products represented an estimated 38 percent of the total mercury emitted statewide. The largest contributors to the total emissions from mercury in products is mercury related to solid waste (estimated at 24 percent of statewide total) and mercury from dental and cremation-related mercury (estimated at 10 percent of statewide total). Most other mercury releases are from a point source commercial or industrial facility where mercury inputs or outputs (releases or captured amounts) can be measured or estimated with more accuracy.

The MPCA's Statewide Mercury Total Maximum Daily Load (TMDL) stakeholder meeting in September 2021 confirmed that releases from mercury-containing products are not decreasing rapidly enough. This is due in part to the nature of releases for mercury products – they are area or non-point releases from product breakage or disposal that are very difficult to model or measure. Although the MPCA must rely on modeling estimates, it is clear mercury in products is still a problem and it will be difficult to reach the reduction goal approved in the 2007 TMDL study of 789 pounds per year by 2025.

Updates and accomplishments

Mercury collection

MPCA staff have monitored online sales and auction sites for legacy mercury product listings by sellers within the state for several years. When listings are found, staff notify prospective sellers of the state sales prohibitions, and provide information regarding proper end-of-life management. There have also been situations where large quantities of elemental mercury are listed on auction or sales websites, requiring MPCA staff to ask owners of that mercury to take it to their local collection program. The MPCA then covers the management cost of large quantities brought to HHW facilities.

In at least one case, the MPCA and the local HHW program collaborated to pay an online seller a nominal amount to bring a large quantity of high purity mercury to an HHW collection site. The news covered this situation, and afterward the MPCA and local programs received several calls from individuals with quantities of mercury they wanted to manage properly. While some individuals were happy to make sure that their mercury was managed properly and no longer in their possession, others were interested in compensation, believing the mercury has significant market value.

Following numerous instances where large quantities of mercury were brought into HHW facilities, plus some preventable spills and releases, the MPCA determined a nominal bounty for mercury products and bulk mercury would be beneficial. In 2017, MPCA staff developed and submitted a proposal to the Legislative-Citizen Commission on Minnesota Resources (LCCMR) for a mercury bounty program to serve as a pilot for the effectiveness of such an approach in reducing the mercury reservoir and reducing easily prevented spills and releases. The proposed program would have paid \$3 per mercury device and \$5 per pound for bulk mercury. LCCMR did not accept the proposal for funding.

More recently, the COVID-19 pandemic brought about a new flurry of broken fever thermometers across the state. Individuals who kept their mercury fever thermometers in the medicine cabinet after the exchange programs and sales prohibition of the early 2000's may have dusted them off to monitor for COVID-19 fevers and many were promptly broken.

Mercury products remaining on the market and in use

At this time, the two primary product categories still being sold, used, and likely released in Minnesota are mercury-containing lighting and dental mercury. Releases from lighting are typically from breakage or waste disposal of lighting, with small amounts released from lamp recycling activities. Dental mercury is released primarily at the dental clinic where mercury amalgam fillings are placed or removed, or through cremation where mercury amalgam fillings are present. Mercury releases from dental clinics are primarily air releases or in post-separator wastewater, though there can be releases through solid waste disposal or untreated wastewater.

Mercury lighting

Household and small business mercury lighting has been addressed in Minnesota through collection at county-based HHW facilities, small and large retailers, and through public and private VSQG programs. Minnesota has a unique requirement in the Minnesota Department of Commerce statutes (216B.241, subd. 5) for large retail electric providers (200,000 or more retail customers) to support recycling of mercury lighting for their residential and small business customers, and expenditures count toward Conservation Improvement Program (CIP) requirements. When this was enacted, mercury lighting provided significant energy conservation benefits compared to the predominantly used incandescent lighting. LED lighting now has higher efficiency than mercury lighting, and it is essential that mercury lighting is captured at end-of-life and not released to the environment.

In practice, East Central Energy, Great River Energy, Minnesota Power, and Xcel Energy support residential/small business lamp recycling under this requirement by providing financial and promotional support to county-based HHW programs and retail collection locations in their service areas. Many cooperative and municipal electric providers have voluntarily provided the same types of HHW and retail collection support; however, this is not consistent across the board and several investor-owned utilities have also chosen to not provide recycling support. This statutory framework has resulted in a patchwork of mercury lighting recycling support and collection programs across the state, with approximately one out of every four Minnesota counties not having access to year-round lamp collection.

Dental mercury – dental offices

The MPCA and the Minnesota Dental Association have a 2007 memorandum of understanding (MOU) with responsibilities for the two organizations to individually and jointly address capture of mercury wastes generated by dental practices and reduce the use of dental mercury given the availability and performance of alternative restorative materials and techniques.

As an MOU responsibility, the MPCA established criteria and a process for approving dental amalgam separators for installation and use by dentists in Minnesota, which has been endorsed by the Minnesota Dental Association. In brief, separators must meet the requirements of the current American National Standard – American Dental Association (ANSI-ADA) standard for separators as determined by an accredited testing laboratory, with 99 percent recovery measured as the average of the empty and full tests, and the manufacturer must be issued a certificate for the product by an accredited certification body in accordance with this standard. This standard for Minnesota dental clinics evolved from the Metropolitan Council Amalgam Recovery Program established in cooperation with the Minnesota Dental Association in 2002. As an MOU responsibility, the Dental Association worked with dentists across the state to ensure that every dental office installed separator meeting the MPCA criteria. In 2014 the Dental Association reported that virtually every dentist in the state had installed a separator. In 2017, the EPA issued a mercury pretreatment and control rule for dental clinics, requiring the installation of amalgam separators by all dentists within three years. Tracking and compliance are delegated to the states or in some cases the local wastewater treatment authority. The federal rule is issued by the Office of Water under the authority of the Effluent Guidelines and Standards Program for the Dental Office Point Source Category. Information on the federal requirements and a list of separators approved for installation in Minnesota is maintained by MPCA. The Dental Association transferred its records of dental clinics and installed separators to the MPCA for agency tracking and oversight pursuant to the federal rule.

Dental mercury – cremation

Dental mercury is released into the air from cremation facilities when bodies containing mercury amalgam fillings are cremated. Cremations are predicted to increase in Minnesota and across the U.S. in the future. Currently, emissions from cremation facilities are not regulated by any jurisdiction in the U.S., and there are no known requirements for other methods to reduce mercury releases from cremation. The MPCA and University of Minnesota collaborated on a research project to estimate the number of amalgam fillings and mercury content of those fillings in the age cohort (63-79) of Minnesotans that may be cremated. The project used patient dental records at the University of Minnesota Dental School and patient records in the University of Minnesota Anatomy Bequest Program, maintaining confidentiality. The project report, “Quantifying Mercury Emissions Resulting from Cremation of Dental Amalgam in Minnesota,” was released in September 2015. The project concluded that the average person in this age cohort with fillings had 2.3 grams of mercury in fillings and that approximately fourteen percent of the population had no mercury fillings or no teeth. This data was used to re-calculate the MPCA’s 2014 estimate of mercury emissions from crematoria at 95 pounds, compared to an earlier estimate of 112 pounds for 2011. The project results were also used to refine the agency’s future estimates of mercury emissions from crematoria. Although this is less mercury than previously estimated, the amount of mercury emitted from crematories is growing as more people choose cremation. Roughly 62 percent of deceased people in Minnesota were cremated in 2017, compared to 57 percent of deceased people in 2014, leading to an increase in estimated crematoria mercury emissions to 110 pounds for 2017.

One of the major cremation equipment manufacturers, Matthews, has reportedly developed mercury control technology in anticipation of potential regulation in the EU or elsewhere. Matthews has two models of ‘Abatement Ready Cremation Systems’ that meet current EU emission standards.

Opportunities

Fund a mercury bounty program

The MPCA believes a bounty program is the best single method to raise awareness and motivate people to remove mercury and mercury products, safely manage them at end-of-life, and prevent them from entering the waste stream and subsequently the environment. The MPCA recommends establishing this type of program and outreach, and needs funding and staffing resources to initiate these efforts to recover bulk mercury and products statewide with the payment of a nominal bounty.

Explore options to improve access to retail collection and recycling support for mercury lamps

As described above the state has a patchwork of mercury lighting collection programs for household and small business lighting. County-based HHW programs are the primary channel for collecting household and small business mercury lighting. Where electric utilities are supporting collection under the Efficient Lighting Program statute (Minn. Stat. § 216B.241, subd 5), counties can operate a program with that funding. This has been very effective in providing convenient collection that is free to the resident or small business, usually on a year-round basis. Where electric utilities are not supporting collection under this program, counties must decide whether and how to fund a program from county revenues. Many counties, especially smaller and rural counties with limited tax base, revenues, and program capacity, have chosen not to fund the collection and recycling of mercury lighting, so their residents and small businesses have no convenient management options even though state law prohibits disposal and there should be equal access to these programs across the state.

To address the statewide patchwork and the lack of lamp collection programs in many counties in the state, we propose that the MPCA work with partners to identify opportunities to fill the gaps in the current system and ensure that households and small businesses throughout the state have convenient and free access to year-round collection programs for mercury lighting. Potential partners in this effort include but are not limited to counties and other local governments, retailers, Department of Commerce, electric utilities with and without efficient lighting or CIP obligations, and lamp manufacturers.

Update messaging using the U.S. Food and Drug Administration dental mercury Safety Communication

In September 2020, the U.S. Food and Drug Administration (FDA) issued a Safety Communication regarding dental mercury amalgam use. The U.S. FDA recommends dental mercury amalgam not be placed in children, especially under age 6; women who are pregnant, nursing, or of childbearing age; or individuals with impaired kidney function, neurological issues, or a known sensitivity or allergy to mercury or other components of dental amalgam. On the basis of this Safety Communication and the responsibilities outlined in the MOU, the MPCA will consult with the Minnesota Dental Association to update its messaging to and activities with dentists and patients to incorporate the FDA recommendations and promote broader use of non-mercury restorative materials and techniques in all patients. This may include activities to encourage all dentists to update their training and continuing education to include the latest restorative materials and methods available to the profession.

Initiate a cremation mercury emissions pilot project

To better understand actual crematory emissions from dental mercury and determine the feasibility and effectiveness of mercury controls to reduce emissions, the MPCA recommends development of a pilot project proposal and cost estimates to measure mercury emissions without controls, and then install controls and measure emissions with the use of control equipment currently commercially available through Matthews or other manufacturers. The MPCA has worked with two crematories located in the Twin Cities area that have indicated a willingness to engage in research and pilot projects on this topic to demonstrate the industry's commitment to understanding the issues and taking the appropriate actions to address mercury emissions.

Mercury in consumer products: skin lightening creams

Overview

MPCA staff have partnered with federal, state, and local authorities for several years to search for and remove skin lightening creams containing mercury from store shelves. This effort began after the Minnesota Department of Health (MDH) found a growing number of new mothers in Minnesota had elevated levels of mercury in their urine, likely from using these creams. Skin lightening creams containing mercury are often manufactured in other countries, brought into the US, and sold illegally online or in stores and markets across the state.

In addition to the health concerns posted by these creams, they also need to be managed properly to help comply with the TMDL reduction goal. When skin lightening products are disposed of in a landfill, mercury vapor is emitted into the air as mercury pollution. In turn those mercury vapors return to the earth as wet or dry deposition and end up in our waters.

In order to fully grasp the challenge with mercury in skin lightening creams, it is important to understand why people use these products. One of the primary motivations is in response to racism and colorism, or discrimination within a racial or ethnic group, typically favoring people with lighter skin over those with darker skin. This form of discrimination can vary across cultures, but its roots in white colonial history mean that in most cases darker skin is associated with negative attributes and lighter skin is connected to positive attributes. It is both a global and U.S.-based phenomenon that has brought global skin lightening products to Minnesota. Unfortunately, mercury is successful in lightening skin and continues to be used despite the dangers. As the MPCA and partners address this problem, it is important to also be sensitive to and account for the societal issues that drive demand for the products.

Updates and accomplishments

Partnership with MDH

One of the most effective ways to detect inorganic mercury in a person's body is analyzing their urine, which is the approach used by the MDH Biomonitoring team in collaboration with clinics around the Twin Cities metropolitan area to analyze mercury in pregnant women. In 2018, the [Minnesota Family Environmental Exposure Tracking \(MN FEET\)](#) conducted a study at Twin Cities clinics using this method and testing pregnant women for concerning levels of mercury, lead, and cadmium. The sites selected for the study were metro clinics with a higher rate of Black, Indigenous, and people of color (BIPOC) patients. A total of 396 women provided urine samples and were asked if they use or had used skin lightening products. Current or past use of skin lighting products was confirmed by 46 participants. Of those 46, nine women had high levels of mercury in their urine (above five micrograms per liter). The women with these results were asked if they would be comfortable allowing researchers to conduct a home visit to identify what was contributing to the high levels of mercury in their urine. Six of the nine women agreed to a home visit.

MDH contacted the MPCA and local public health departments for the areas in which these six women lived. Four of the six women had one or more skin lightening products present in the home. Using the Lumex mercury vapor detector on these products, the MPCA found extremely high emissions levels from mercury vapors between 1,000 to over 50,000 (maximum detection limit) nanograms per cubic

meter (ng/m³). If an individual is exposed to levels this high for long periods of time, it can lead to serious health issues.

The MPCA and local public health officials advised safe disposal of the mercury-containing skin lightening creams at local HHW program facilities, and 10 products were collected and sent to the lab for more granular testing. After the products were removed, households shared they felt their mental and physical health had notably improved.

The MPCA will continue to work with MDH and local units of government to produce fliers, scripts, and ads intended to target the demand and proper disposal of these products. Having a constant tone and focus from all layers of government will greatly assist with the removal of mercury skin lightening products for sale and from homes. These efforts protect human health, namely for women and children in BIPOC communities, and help keep these highly toxic products out of the waste stream and environment. Across the state there are examples of cities and counties supporting this goal by choosing to accept any skin lightening creams from vendors and users at their HHW or business hazardous waste collection sites at no charge or through a buyback program, ensuring proper disposal directly with one of the state's contracted mercury waste management vendors.

Skin lightening testing and product database

Over the past couple years, the MPCA purchased and tested additional skin lightening products for mercury. Any product with mercury emissions above one part per million (ppm) was added to a database on the MDH website. The purpose of the database is to track and communicate which products contain mercury and how much mercury. This allows vendors to identify unsafe products they should no longer sell, and helps consumers know which products they should not buy. MDH creates and manages announcements, including product photos, to raise awareness on the products listed in the database. The MPCA plans to continue purchasing more skin lightening products to test and intends to hyperlink the database and resources on the MPCA website as well.

Opportunities

Launch a statewide “Love Your Skin” campaign

The last Toxics and Pollution Prevention Evaluation Report referenced a research project completed by Hamline University students in collaboration with MPCA and MDH that developed and initiated a public awareness campaign, “Love Your Skin,” related to mercury-containing skin lightening products and skin lightening overall. The purpose of this collaboration was to develop a blueprint for both agencies to use in future outreach.

The students' strategy to reduce the demand for and use of skin lightening products by centering on beauty standards with messages of empowerment, confidence, and well-being – love your skin – is phenomenal. Also included is information on the human health and environmental risk of these products. They created outreach materials that target variety of platforms and identified channels for education and outreach to BIPOC communities where demand is the highest. With the provided materials from the Hamline University Students, MDH has already provided the general public their versions of the Love Your Skin outreach materials. MPCA will also be producing Love Your Skin outreach materials with minor alterations to include Household Hazardous Waste information for proper disposal.

Image 1. Love Your Skin hand-out



Secure funding to continue skin lightening program

The Minnesota Legislature approved \$200,000 for skin lightening grants in 2018, distributing \$100,000 to Local Public Health authorities and \$100,000 to non-profits. This additional funding was very beneficial in supporting and expanding efforts to educate the public and vendors for the purpose of removing the mercury-containing products from sale. However, additional funding is needed to continue these efforts once the original grants conclude in March 2022.

Another opportunity for additional funding is to help fund proper management and disposal at end-of-life for collected mercury-containing products. The non-profits and health authorities that received the skin lightening grants for education and outreach do not have sufficient funds to also pay for proper disposal of the products. The MPCA recommends the Minnesota Legislature secure additional funding to continue education and outreach, and establish funding to ensure proper collection, management, and disposal statewide.

Prioritize promotion of collection programs to impacted communities

As a part of program communications going forward, the MPCA and partners also plan to prioritize promoting collection options at HHW sites to immigrant, refuge, and BIPOC communities. For small businesses, we would promote the use of the Very Small Quantity Generator (VSQG) program from licensed local HHW programs as a cost-effective means of disposal, which can typically accommodate small business waste of up to 220 lbs. of hazardous waste per month. Without intentional and accessible promotion of these programs and locations (through fliers, advertisements, or direct community interaction), it is very difficult to know they exist and the services they offer.

Image 2. Mercury in skin lightening products hand-out

MANY SKIN LIGHTENING PRODUCTS CONTAIN MERCURY. DO NOT BUY OR USE.
 This is not a complete list. Many products tested in Minnesota had mercury and/or other chemicals.
 For more examples visit health.state.mn.us/topics/skin



STOP USING IT NOW
 If you have been using a product with mercury, stop using it now. Your body will naturally get rid of the mercury over time.



DEPARTMENT OF HEALTH
 625 Robert St. North
 PO Box 64975
 St. Paul, MN 55164-0975
 To obtain this information in a different format, call 651-201-4899. REV 05/2018

Mercury can affect memory, thinking, attention and success in school for babies and children. People who use skin lightening products can have kidney or nervous system problems and develop pain and rashes.




KNOW WHERE TO THROW
 Do not throw harmful skin products in the trash. It can harm others if it gets into the environment. Take the skin product to a household hazardous waste site. Find your local hazardous waste site at pca.state.mn.us



Green and safer product chemistry

Overview

The Green and Safer Product Chemistry Program began in the MPCA's Pollution Prevention Program in 2010, initially focusing on offering financial support to increase green chemistry and engineering capacity and participating in networks of Minnesota's green chemistry community of interest. [Green chemistry](#) and [green engineering](#) each involve a set of 12 principles of practice, which also apply to many other actors who bring safer products to market. Generally, the purpose of the principles is to guide design of chemicals, chemical and production processes, and commercial products in a way that avoids the creation of toxics and chemical waste and reduces demand on diminishing resources. The program is now moving to include the broader purpose of "sustainable chemistry" to improve the efficiency with which natural resources are used to meet human needs for chemical products and services, while reducing chemical burdens on the environment and humans. This includes both non-regulatory support for safer alternatives, and regulatory monitoring of product compliance.

In 2015, the MPCA, the Department of Health (MDH), and the Department of Commerce formed the CPIT to work more proactively to improve the chemical safety of products. This involves pooling resources to better coordinate:

- Monitoring of people's exposure to toxic chemicals, environmental monitoring, and monitoring of compliance with the State's currently 15 statutes restricting various product and chemical combinations.
- Educating companies in product supply chains about Minnesota requirements and opportunities to develop safer product chemistries.
- Educating residents about product chemistry issues and how to identify them, avoiding exposures, and picking products with safer chemistries to protect themselves and their families – particularly communities experiencing disproportionate health impacts due to income, race, and/or housing and working conditions.

Updates and accomplishments

Grants

Since 2011, the MPCA awarded several grants aimed at building Minnesota companies' capacity to improve product chemistry, including:

1. [Grants to fund summer green chemistry and engineering interns](#) at Minnesota host facilities (\$12,000/year, now in its sixth year).
 - 2018 – remooble™ – development of a less-toxic paint and ink remover
 - 2019 – Healthy Building Network – continued build-out of online free or low-cost tool to search and compare hazards of chemicals
 - 2020 – Sasya – development of fermentation biocatalysts that convert feedstocks into nutritional supplements for agriculture
 - 2021 – Claros – green chemistry-based improvements to desorption of per- and polyfluoroalkyl substances (PFAS) from their high-efficiency sorbent
2. [Grants to college faculty](#), through the MPCA's Environmental Assistance (EA) Program, to integrate green chemistry into classroom and/or laboratory curricula. The latest offering via a 2020 grant,

went to Augsburg University to develop green chemistry and toxicology as a unifying theme throughout the university's chemistry curriculum, including a new course on green chemistry and toxicology to serve as a capstone on this theme with communication to the broader community as a substantial component. Since the first award in 2011, the MPCA has provided eight grants (at around \$15,000 each) to seven colleges, reaching well over 2,200 students per year.

3. A \$50,000 grant to the Healthy Building Network, through the MPCA's 2020 EA grant round, to work with Inquilinx Unidxs Por Justicia (IX, United Renters For Justice) to educate property managers and residents in low-income multi-unit housing in Minneapolis neighborhoods on safer building materials and maintenance products to be used during upkeep. Lessons learned will be applied to other properties IX represents or will represent in the future to protect renters from needless exposures to toxic chemicals.

Green & Sustainable Chemistry Prize

In 2021, the MPCA also initiated a three-year pilot to offer a [Green & Sustainable Chemistry Prize](#) of \$10,000, rewarding one applicant in the Minnesota Cup technology competition and accelerator program at the University of Minnesota whose innovation best demonstrates green and sustainable chemistry attributes or effects.

The 2021 prize was awarded to Bright Planet Pet for its plant-based pet treats. Bright Planet Pet significantly reduces water, energy, and greenhouse gas emission impacts by removing meat from their product. Ingredients in their formulation, packaging, and production were selected for low-impact sourcing and sustainability. While this award leaned more towards broader supply chain sustainable chemistry benefits than use of the green chemistry principles within the product itself, the MPCA and its judging team hope to attract greater numbers of applicants across that spectrum of technology benefit in the future.

CPIT compliance monitoring

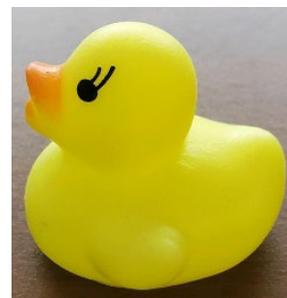
For the reporting period, CPIT conducted three product compliance monitoring projects.

Plastic products (2019-20) – CPIT tested plastic (especially vinyl) children's products for endocrine-disrupting orthophthalate compounds, three of which are on the Minnesota Toxic Free Kids Act [Priority Chemicals list](#) and restricted in children's products by the Consumer Products Safety Commission (CPSC).

Products purchased at 21 stores and online outlets included Halloween costumes, masks and novelties, balls and kids' baseball mitts, themed toy sets, animal figures, dolls, noisemaking toys, bath toys, squishy toys, bath and play mats, shower curtains, mattress pads and covers, colognes, boots and shoes, food containers (cups, bowls, storage), bibs, flooring, bottle nipples, pacifiers, teethingers, nasal aspirators, stickers, and water play inflatables.

Of 121 products screened and 11 sent to the lab, only one product was shown to contain illegal levels of a restricted phthalate (di-ethylhexyl phthalate, or DEHP): a set of miniature yellow rubber duck bath toys. The sample duck contained 370,000 ppm (37 percent) DEHP, 370 times the CPSC limit. While only one apparent violation was found, the other ten products tested by the lab also contained DEHP, from 97 to 400 PPM, usually along with another plasticizer. These are not CPSC violations, but they indicate DEHP is used in a variety of products, with unknown additive effect, particularly on children. The MPCA shared these results with CPSC and the EPA, and CPSC is investigating the apparent violation.

Image 3. Duck bath toy



Toys (2019) – Routine blood testing of children that finds elevated levels of lead is reported to MDH. Responding in 2019 to one such report on a Minnesota child, MDH screening found that some spinning battle toys in the child’s home might contain lead.

To investigate this possible connection, CPIT purchased 50 spinning battle toys from stores and online sellers, including name-brand Beyblade toys and off-brand toys, and sent the toys for lab testing. The results for several off-brand spinning battle toys showed dangerous levels of lead and cadmium, leading the Department of Commerce to ban their future sale and require recalls of these toys already sold in Minnesota. In response to the bans by Department of Commerce, one of the online platforms on which the toys were found, Amazon, also instituted a recall of 2,331 toys across the U.S. and Canada.

The name-brand spinning battle toys from Hasbro and TakaraTomy that were tested did not show concerning levels of lead or cadmium that would have prohibited children playing with them. CPIT published additional guidance for Minnesota families, including directions for parents to look for standardized UPC or SKU product numbers and bar codes that facilitate tracking when purchasing these spinning battle toys. Off-brands often have no or ad hoc numbering without a bar code.

This general advice could also be applied to products more broadly.

Children’s jewelry (2018) – After finding several cadmium violations and one lead exceedance in 2017, CPIT conducted a follow-up testing project on children’s jewelry given the acute and neurotoxic effects of these metals.

MPCA staff purchased 107 kid’s jewelry products from 20 stores and online sellers and screened them with an X-ray fluorescence (XRF) analyzer. Seventeen products indicated concerning cadmium and lead levels and were sent to a contract lab for further analysis. Total metals analysis, where the entire product component is dissolved and analyzed, showed 16 of the 17 products contained 53 to 92 percent cadmium in their base metal. Limits for exposed base metal are 10,000 times lower. Most of these product components were coated or painted, so follow-up testing using a 2-hour mild acid soak was applied, resulting in three exceedances.

To simulate actual events in which metallic jewelry had stayed in children’s systems (e.g., if the jewelry piece was swallowed) for several days, CPIT had the lab continue the soaking process and measure levels at 24 and 48 hours, and up to 72 hours for a few products. Some products never released cadmium or lead, but three products violated limits at two hours and then continued to increase cadmium levels for the remaining time they were measured. Four other products complied after two hours but showed violations and increases thereafter. CPIT followed up with investigations which led to several recalls and withdrawals from sale.

Expanded enforcement authority

To bolster CPIT’s scope and enforcement toolbox, the Department of Commerce followed a CPIT recommendation and sought expanded authority to enforce against violations of children’s product chemicals restriction laws. In 2021, lawmakers extended the Department of Commerce’s powers under Minn. Stat. § 45.027 Investigations and Subpoenas (subdivisions 1 to 6) and the Safe Toys Act Minn. Stat. §§ 325F.10 to 325F.12 (article bans, testing, and buybacks), and Minn. Stat. §§ 325F.14 to 325F.16 (toy

Image 4. Spinning battle toy



Image 5. Horse charm



seizures, access to premises and records, and misdemeanor penalties) to these product chemical restriction statutes:

- Minn. Stat. §§ 325F.172 to 325F.175 - bisphenol A (BPA) in children's products, covering bottles or cups to be filled with food or liquid, and containers of infant formula, baby food, or toddler food; Minn. Stat. § 325F.175 defines the characteristics of chemicals used to replace BPA.
- Minn. Stat. §§ 325F.176 to 325F.178 - formaldehyde in children's products (primarily personal care).

CPIT has monitored compliance with the formaldehyde in children's products statute in the past, but not the BPA restrictions. The team is planning to scale up new capacity in 2022 to screen a range of children's products for BPA and possible replacement chemicals.

CPIT will also be using the annual appropriation to the MPCA and MDH to implement the revised Minn. Stat. § 325F.071, which restricts organohalogenated (containing bromine and chlorine) flame retardants in kid's products, upholstered home furniture, mattresses, and window and wall coverings. This statute applied to manufacturers and wholesalers in 2021 and will apply to retailers in July 2022. As with the BPA statutes, restrictions also apply to chemicals used to replace restricted flame retardants.

Continued funding will be important as the MPCA and CPIT work to provide compliance monitoring and oversight of our chemical restriction laws.

Per- and Polyfluoroalkyl Substance (PFAS)

PFAS are used in a wide variety of industrial processes and commercial products. With more than 5,000 structures and over 9,000 identified chemistries, PFAS are present in the environment and will remain so for generations. Two of the most studied PFAS are perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

- PFOS was a key ingredient in the stain repellent, Scotchgard, and was used in surface coatings for common household items such as carpets, furniture, and waterproof clothing. PFOS was also included in fire-fighting foams used at airports, fuel refineries, and other facilities.
- PFOA was used in the production of many products, including but not limited to non-stick coatings for cookware, coatings for carpets and upholstery, coatings for clothing, floor wax, sealants, and even some dental flosses.

As PFOS and PFOA have been phased out, other PFAS have been used as substitutes.

PFAS have been detected in air emissions from industrial facilities, wastewater from industrial and municipal sources, soil and water surrounding firefighting training sites, groundwater surrounding landfills, and are sometimes found with no obvious source at all. There are gaps in understanding of the effects of many PFAS on human and environmental health, including a lack of toxicity studies available. Based on information available, however, MDH has developed health-based values for six PFAS (PFOA, PFOS, PFHxA, PFHxS, PFBA and PFBS). The MPCA announced in October 2020 new protective water and fish consumption values for PFOS in several Twin Cities metro water bodies.

As more research is published, concerns over the public health and environmental impacts of PFAS grow. Not to mention the persistence and mobility of most PFAS in the environment mean that once they are released, they will be difficult if not impossible to track and prohibitively expensive to clean up if needed. Pollution prevention approaches are therefore especially important for managing PFAS.

Working together, Minnesota state agencies developed [Minnesota's PFAS Blueprint](#) to support a holistic and systematic approach to address PFAS concerns in 10 key issue areas. One of the key issue areas is

the prevention of PFAS pollution, which outlines a more detailed discussion of past and current activities, along with future opportunities in this important area.

TSCA Program

Between 2017 and 2020, efforts in conducting risk evaluations of existing chemicals, approvals of new chemicals, public access to information, reporting requirements, and risk or action levels for specific toxic chemicals were notably reduced. Additionally, funding for TSCA Program implementation and the Safer Choice chemical alternatives review and labeling program was reduced.

- In 2021, the EPA under a new administration began to bolster work in this area. As previously noted, this also included the EPA leadership committing to restoring funding for the Safer Choice Program, a move supported by industry, state and local governments, and non-governmental organizations (NGOs). State and local governments are watching other developments in which the EPA is broadening the number of uses, including legacy uses, reviewed during risk evaluations of existing chemicals. While broader review of chemical uses may result in better environmental and health protection, under a different administration it could result in inappropriate determinations of “no significant risk” and preempt efforts by state and local jurisdictions to be more protective than the EPA.
- In addition, there is still uncertainty about how the EPA will conduct its review of additional uses, and whether they will evaluate additive (or multiple) exposure routes, particularly to vulnerable subpopulations and in sensitive environmental areas. Because of these uncertainties about the EPA’s long-term processes and decisions, state policymakers continue to enact restrictions and reporting requirements on product and chemical combinations. This has happened in Minnesota with trichloroethylene (TCE), and with PFAS in food packaging restrictions.

Opportunities

Maintain the Angel Tax Credit incentive

The Angel Tax Credit Program can help boost innovations based on green, safer, and sustainable chemistry. In June 2021, the Legislature and Governor renewed the tax credit at \$10 million for 2021 and \$5 million for 2022 for investors who support qualified startup companies developing new technology and products. In order to provide a more certain funding source for new technologists and investors, the MPCA recommends consistent and continued funding of the Angel Tax Credits.

Strengthen and expand statutes limiting lead and cadmium use

To eliminate potential lead and cadmium exposures of all Minnesotans, but most notably children, pre-teens, teens and susceptible adults such as women of child-bearing age, the MPCA and CPIT recommend strengthening and expanding Minnesota’s statutes limiting lead and cadmium in children’s toys and jewelry, and in other products with a history of high lead and cadmium levels.

Address concerns and current gaps in PFAS management

The Minnesota PFAS Blueprint outlines several gaps and opportunities to reduce the human health, environmental, and financial impacts of PFAS to Minnesota, which should continue to be implemented.

- In many cases, PFAS are not providing an essential or critical purpose and could be banned without significant impact to society. Minnesota should ban PFAS uses that are currently known to be non-critical and for which alternative technologies are available and feasible.

- Currently, many businesses and consumers are using PFAS-containing products but are unaware they are doing so or are unaware of the potential health risks and liabilities associated with them. Minnesota should consider proposals for mandatory labeling of PFAS in products, which will help business owners and individuals make environmental, health-conscious, and business-friendly purchases, while encouraging manufacturers to pursue alternatives to PFAS.
- Minnesota should provide technical and financial assistance to businesses to reduce PFAS pollution. Existing frameworks (e.g., MnTAP, Small Business Grant Program) can be expanded to implement PFAS reduction strategies.
- Government agencies and other groups using state purchasing contracts have significant spending power and can model environmentally friendly supply chain practices. Many materials purchased using these contracts contain PFAS. While some revision has already begun, Minnesota should over time remove from state purchasing contracts all products in which PFAS are serving a non-critical or substitutable use.

Product stewardship: electronics and solar panels

Overview

Minnesota developed a product stewardship policy in 1999 to take a new approach to conserving resources, reducing waste, and increasing recycling. While often characterized as a solid waste management strategy, product stewardship also presents an opportunity to pursue broad sustainability goals such as toxicity reduction, greenhouse gas reductions, and energy conservation. Well-designed product stewardship policies encourage manufacturers, retailers, and consumers to treat products at the end of their initial uses as resources rather than waste. Product stewardship means that everyone involved in designing, manufacturing, selling, and using of products takes responsibility for the environmental impacts at every stage of a product's life. In particular, product stewardship asks manufacturers to cover the financial and physical responsibility for recovering and recycling products when people are done using them.

Minnesota currently has a small variety of product stewardship laws enacted in the 1990's, accounting for rechargeable batteries, lead-acid batteries, mercury thermostats, and mercury displacement relays. More recently, Minnesota established end-of-life product stewardship programs for electronics and architectural paint. The current e-waste and paint product stewardship laws have been successful in diverting 432,400,000 pounds of e-waste and 18,534,164 pounds of paint recycled, with 6,681,642 pounds of paint reused. Minnesota was also a leader in discussions during the early 2000's to start a national voluntary carpet recycling agreement between the carpet industry and 17 states. It established the Carpet America Recovery Effort (CARE) in 2002, which set a ten-year goal to divert 40 percent of waste carpet generated by 2012. The effort fell far short of goals due to lack of sufficient funding and lack of collaborative decision-making.

Recognizing that disposal bans are insufficient to properly take care of the materials, the MPCA pursued product stewardship programs to address difficult to manage items. Current MPCA product stewardship priorities include solar panels, mattresses, packaging, and revisions for electronics and rechargeable batteries statutes.

Updates and accomplishments

Minnesota Electronics Recycling Act technical changes

The Minnesota Electronics Recycling Act was enacted in May 2007 to address the increase in the amount of electronics generated in Minnesota and the rising costs associated with properly managing electronics from Minnesota's households at the time. The law takes a producer responsibility approach that engages the manufacturers in the collection and recycling of certain electronic products. By internalizing the costs of end-of-life management, this more economically efficient approach to providing collection and recycling offers incentives for manufacturers to implement green design practices in the first place.

With the fixed manufacturer recycling obligation ending in fiscal year 2019 (program year 12), the Minnesota Electronics Recycling Act, sometimes referred to as the "e-waste law," needed revisions. In 2021, the MPCA proposed a technical update to the law to remove dates that have passed and to make minor clarifications that didn't change the original intent of the law. The following technical changes passed in the 2021 legislative session:

- Clarification of the Phase II recycling credit definition
- Requirement that retailers can only sell video display devices that are listed as registered on the MPCA website
- Clarification that manufacturers selling 99 or fewer video display devices into the state during the previous program year are required to pay a recycling fee if their obligation is not met
- Clarification that all excess non-metro pounds purchased receive a 1.5 multiplier when counted toward meeting a manufacturer's recycling obligation
- Removal of old dates that are no longer required
- Removal of language that sets obligation(s) for previous program years that was no longer applicable

Electronics collection and recycling reporting

Manufacturers report annually to the MPCA on how they met their recycling obligation, whether by purchasing Minnesota household pounds recycled by registered recyclers within the program year, using credits, or paying a recycling fee. A manufacturer can earn recycling credits for each pound of covered electronic devices (CED) it recycles beyond its assigned obligation from outside of the 11-county metropolitan area, and each pound of CEDs collected from outside the 11-county metropolitan area is counted as 1.5 pounds towards the recycling obligation.

Electronics collection

Registered collectors are public or private entities that receive CEDs from households and arrange for delivery to a registered collector or recycler. Collectors report annually on the total pounds of CEDs collected during the program year and where they were sent. While permanent collection sites account for 78 percent of the actual pounds collected, residents can also drop off devices at events or use pick-up or mail-back services. About 47 percent of the collection opportunities available in Greater Minnesota are offered by local governments.

Fiscal year 2021 (program year 14) saw 22.1 million pounds collected. Minnesota's per-capita collection rate of 3.88 pounds compares favorably with other leading states such as Oregon (3.36 pounds) and Wisconsin (3.70 pounds). Statewide, local governments collected 56 percent of CEDs in FY21 (program year 14), offering a mix of permanent collection sites, special events for residents and curbside recycling. Since 2010, the MPCA has granted approximately \$325,000 of e-waste funds to 24 Greater MN counties, resulting in CED collection of almost 700,000 pounds for recycling. The money also helped counties partner to obtain stronger contracts, lower recycling costs, consolidate weight and build infrastructure.

Electronics recycling

Registered recyclers are public or private entities that accept CEDs from registered collectors for the purpose of recycling. Some entities serve as both collectors and recyclers. Recyclers report annually on the total pounds received and recycled during the program year. The number of registered recyclers has gone down over the years, and reporting continues to indicate that a few firms handle most of the state's recycling, with the top five processing over 92 percent of the total weight recycled.

Video display devices (VDDs), which are televisions and monitors, continue to make up most e-waste collected at collection sites and recycled, but they have decreased from the historical 80 percent to 72 percent of CEDs by weight.

Table 8. Percent of VDD recycled in fiscal year 2020 (July 1, 2019 – June 30, 2020)

Total pounds of VDD recycled	14,459,371
Total pounds of CED recycled	20,147,457
VDD % of CED pounds recycled	72%

Since 2016, the pounds of recycled electronics have steadily decreased, to the point where the 2019 total for manufacturers’ recycling obligations was higher than the total pounds recycled in the state. Since fiscal year 2016 (program year 9) there has been a 44.1 percent total drop in weight recycled per year, or an annual decrease of 13.4 percent. Reasons for this could be the decreasing weight of new devices, cathode ray tube (CRT) devices starting to decline in the waste stream, increases in end-of-life management fees, and in the past couple of years COVID-19 pandemic restrictions.

Table 9. Minnesota Electronics Recycling Act program data

	PY9/FY16	PY10/FY17	PY11/FY18	PY12/FY19	PY13/FY20	
CED collected (pounds)	35.9 million	31.1 million	27.6 million	24.9 million	21.0 million	Supply
CED recycled (pounds)	36.2 million	28.7 million	26.6 million	24.0 million	20.1 million	
Recycled per capita, statewide (pounds)	6.6	5.2	4.7	4.3	3.5	
Conversion: program pounds*	41.6 million	n/a	n/a	n/a	24.2 million*	
VDD sales (pounds)	20.4 million	19.0 million	19.7 million	21.7 million	23.3 million	Demand
Manufacturer recycling obligation (pounds)	17.8 million†	25 million‡	23 million‡	21 million‡	21.7 million§	
Purchased: program pounds (and actual pounds)	27.4 million* (25.4 million)	21.6 million	22.1 million	18.4 million	21.1 million* (17.6 million)	
Net change in recycling credits available at program-year-end (new – used)	10.4 million	-3.1 million¶	-1.3 million¶	-2.9 million¶	-600,000	Credits
Total recycling credits available at program-year-end	80.2 million	77.1 million	75.8 million	72.9 million	72.3 million	

* For program years 9 & 13, program pounds reflect a 1.5x multiplier applied to pounds collected outside of the 11-county Metropolitan Area

† A 2015 amendment established a minimum recycling obligation of 16 million pounds for PY9

‡ A 2016 legislative change established minimum recycling obligations for PY10-12

¶ A 2016 legislative change established that no new credits would be created from for program years 10-12

§ A 2016 legislative change establish minimum recycling obligation for PY13 as the average weight of all video display devices collected for recycling during each of the three most recently completed program years, excluding the most recently concluded program year

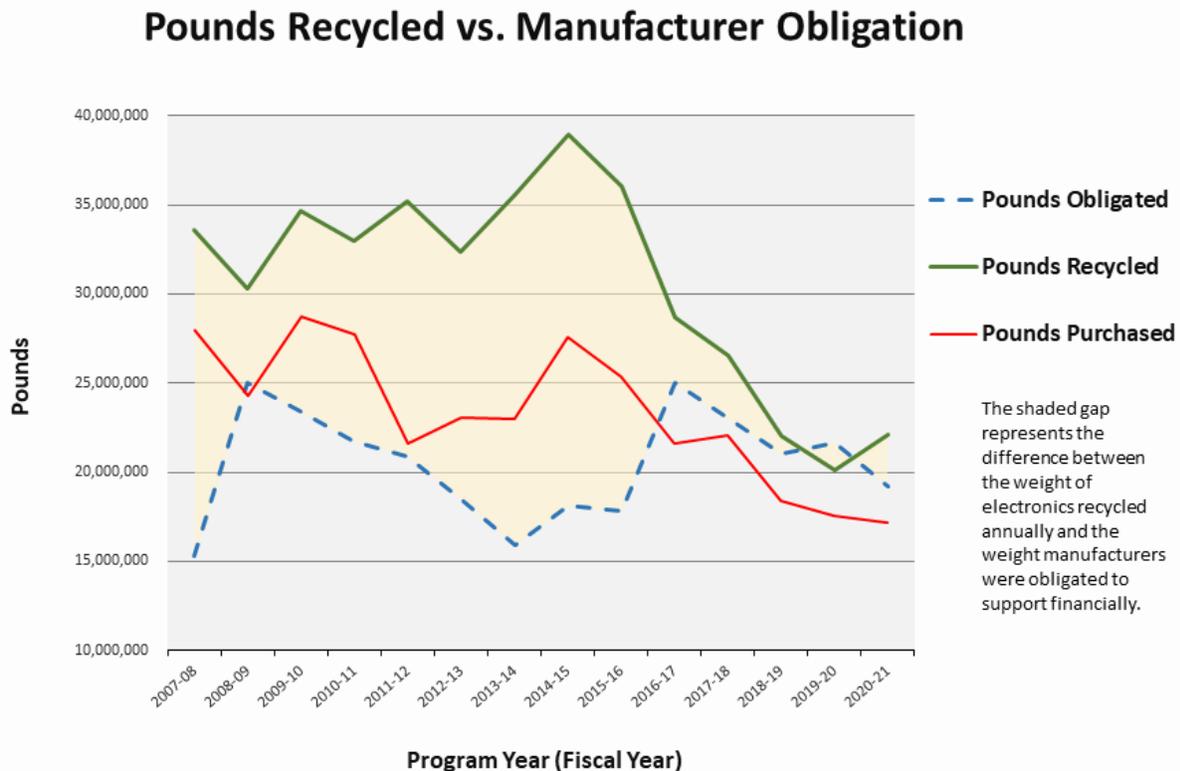
Challenges for the Minnesota Electronics Recycling Act

In the past the manufacturer’s recycling obligation was lower than the pounds recycled in the state, creating a gap of pounds that manufacturers were not paying to recycle. Manufacturers consistently purchased above and beyond their obligation, but the gap remained, and this created an excess of

credits for some manufacturers. With devices getting lighter, even if more were sold, the gap continued to increase.

Some counties charge solid waste tip fees or end-of-life fees to residents to help recover some of the cost of electronics collection and recycling, because the full costs are not being covered by manufacturers as intended. Therefore, the counties are currently in the process of creating new statute language that would ensure their collection, transportation and recycling costs are covered.

Chart 2. Pounds recycled vs manufacturer obligation



While the program has been successful in collecting and recycling millions of pounds, collectors are still raising concerns over the increased cost to manage the electronics, and recyclers have pointed out the decreased value in recovering materials, along with limited outlets for properly recycling CRTs and e-waste plastic. In response to the increasing costs not being covered by manufacturers, modifications were made to the Minnesota Electronics Recycling Act on July 1, 2016. The changes required manufacturers to cover the full cost of recycling and transportation for pounds purchased to meet their recycling obligation, and restricted recyclers from charging a collector for the transportation and recycling of CEDs used to meet a manufacturer’s recycling obligation, unless otherwise mutually agreed upon. Since then, however, the collectors’ cost to manage electronics has generally increased due largely to rising processing, recycling and transportation costs. Therefore, the MPCA proposed additional changes in 2018 to repeal the “unless otherwise mutually agreed upon” language, which, as written allows manufacturers to not cover the full cost of recycling and transportation. Without agreement among stakeholders, the language did not pass. Minnesota counties that manage e-waste have been studying other e-waste laws in the nation and are partnering with the MPCA to seek another solution to these problems.

E-waste Program compliance and enforcement

The MPCA continues to monitor compliance of manufacturers, collectors, and recyclers. Of the 208 collectors and 51 recyclers registered in fiscal year 2021 (program year 14), 98 percent of the collectors and 94 percent of the recyclers have submitted their required annual reports and registrations for the upcoming program year as of October 2021. With a greater understanding of reporting and quicker action by enforcement staff, the amount of time needed to register collectors and recyclers has decreased significantly. Since fiscal year 2018, the MPCA has issued a total 28 Alleged Violation Letters (AVLs) to manufacturers, collectors, and recyclers for late annual reporting.

MPCA staff also continue to educate potential electronics collectors and recyclers about regulatory requirements and best management practices on a one-to-one basis. These efforts include onsite visits, in-person meetings, and informational emails and phone calls. Since January 2019, the MPCA has conducted over 28 inspections of unregistered and registered facilities. The inspections ranged from technical assistance to compliance determinations. The inspections resulted in five official enforcement actions, which included compliance schedules and corrective actions. Due to COVID-19, however, routine onsite inspections have been limited, but complaint inspections remain a priority.

Broader issues with electronics

Flame retardant plastics

E-waste plastic can contain flame retardants linked to a myriad of health effects impacting mental and physical development, reproductive development, and potentially resulting in cancer. If sent for recycling, the e-waste plastic containing these flame retardants can be reincorporated into products like cookware and children's toys, leading to unsafe exposure of chemicals. Flame retardant plastics have historically been exported to other countries for recycling end markets. However, with increased awareness of the chemical risks, there have been recent crackdowns on "dirty" plastic being exported including plastic waste amendments to the Basel Convention restricting international plastic shipments, effective January 1, 2021.

In real world practice, not all material derived from eligible electronic devices may or should be recycled. For this reason, repairing and reusing electronics is often the best option to reduce the environmental impacts of devices and reduce end-of-life management demands. However, once electronics have entered the waste stream through collection, it is important to consider the material toxicity of what is being managed. Recognizing this and in an attempt to prevent flame retardant plastics from being reincorporated into products that increase the potential for human health and environmental risks, the MPCA is allowing some flame retardant plastics to be managed via disposal. Material that is collected as part of the state's e-waste program may still be eligible to count toward a manufacturer's recycling obligation even if it is deemed "not recyclable" after processing if it meets the criteria developed by the MPCA. As of July 1, 2021, if a recycler can demonstrate to the MPCA that it has made a reasonable effort to separate flame retardant plastics (or other "sink" plastic from sink/float sorting systems or other sorting methods) from recyclable materials, the weight of these materials sent for disposal can be counted towards a manufacturer's obligation, as long as the total weight of any materials sent for disposal does not exceed 15 percent of the total CEDs recycled. If these criteria cannot be met, a request must be sent to the MPCA Commissioner who must confirm the material will not be accepted anywhere before allowing its possible disposal (Minn. Stat. § 115A.95 Recyclable Materials).

Solar panel stakeholder process update

The 2017 Toxics and Pollution Prevention Evaluation Report discussed the increase in solar panel installations in Minnesota and the need to be prepared for their end-of-life management. The MPCA set

a goal to analyze the issue and present policy options. Therefore, the MPCA worked with the Minnesota Solar Energy Industries Association (MnSEIA) and the Department of Commerce to create a statement to initiate the stakeholder process, stating the goal to “collaborate to develop and implement photovoltaic (PV) panel end-of-life management policies and programs that conserve resources, protect health, promote renewable energy, and support PV panel recycling infrastructure and technology.”

MPCA staff published a white paper that included projections of panels coming out of service, a recycling overview, and types of panels. The MPCA introduced the paper at the first public stakeholder meeting in June 2019, which included a range of individuals interested in solar and renewable energy representing businesses, associations, NGO’s, educational institutions, state and local government, energy advocacy groups, consultants, and researchers. The MPCA also made several presentations at the Department of Commerce’s bimonthly Solar MN meetings and at MnSEIA meetings.

Following the initial meeting, the stakeholder process included six additional webinars focusing on national and regional overviews of solar panels, forecasts of PV module installation and removal from service, information from manufacturers and recyclers, a product stewardship overview, EPEAT updates, local government challenges, and discussion on solar panel end-of-life management and disposal and the circular economy. Policy ideas that were broadly expressed through webinar conversations and written comments include:

- Requirements for reuse and recycling in conjunction with a landfill disposal ban.
- Manufacturers should be tied to end-of-life management, which can catalyze product design and material choice improvements.
- Costs should be internalized to the project or developer (permittee).
- There should not be costs that disproportionately impact a specific involved party.
- The approach should be consistent and predictable for everyone.
- The approach should apply to all installations, from residential to utility scale.

Initial research found reuse infrastructure and reuse options for solar panels are currently limited. Most panels being removed from service at this time are damaged or no longer functional, and therefore only suitable for recycling. Original manufacturer warranties and electrical code requirements also limit reuse in U.S. grid applications at this time, but do not appear to limit reuse off-grid in the U.S. or applications outside of the U.S. SEIA, representing solar panel manufacturers and the industry as a whole, is working with Underwriters Laboratories to develop standards for solar panel reuse. Working panels have value and represent a significant amount of embedded energy used in manufacturing, in comparison to the cost of recycling and the minimal value of recovered materials, with most embedded energy lost when panels are recycled. For financial and resource conservation reasons, the focus should be on extending panel life and potential panel value through reuse and minimizing the significant expense and embedded resource losses associated with end-of-life recycling. Even if the monetary value of used panels is low, that value is still higher than the cost of recycling, and the used panels have significant potential for generation in their remaining life.

To conclude the two-year stakeholder process, MPCA staff created four policy models for the stakeholders to comment and vote on. The policy models include:

- The Department of Commerce/Public Utilities Commission (PUC) decommissioning model extended to solar facilities under 50 megawatts (MW) (individual permittee responsibility)
- Product stewardship model
- Rate payer funded/statewide program model
- Permittee funded/statewide program model

All these models are permittee-funded except for the rate payer model. The permittee statewide model and the product stewardship model both would charge an upfront fee to operate a single statewide program, but who manages the program differs. In the product stewardship model, manufacturers would be required to form a product stewardship organization that would plan and implement the program with public oversight. The permittee statewide program could be managed by the solar industry or a hybrid public/private partnership that would plan and implement the program. . In the Department of Commerce/PUC decommissioning model, the permittee would have individual responsibility to pay for the panel management through their decommissioning financial assurance when the panels are removed from service. Discussions with stakeholders and views expressed during the two-year stakeholder process indicate a preference for a permittee funded program statewide, applying equitably to all installations from residential to utility scale, involving manufacturers to influence panel design, and including a disposal ban and requirements for reuse and recycling. Based on this assessment of stakeholder views and further discussions of the four options with the Department of Commerce, county representatives, MnSEIA, and SEIA, the MPCA determined that the product stewardship model was the best fit for all the factors. The MPCA developed and circulated draft legislation based on the product stewardship model and is currently receiving and reviewing feedback from stakeholders.

Opportunities

Improve funding for collectors under the Minnesota Electronics Recycling law

The intent of the 2016 legislative changes was to have manufacturers fully cover the costs of transportation and recycling and that recyclers could not charge for transportation and recycling. The “unless otherwise mutually agreed upon language” was included to allow for extra services. However, it is being used to allow charges to continue for basic transportation and recycling expenses. Therefore, the MPCA attempted to remove the “unless otherwise mutually agreed upon language” in 2018. The law needs to be revised so consumers and collectors (e.g., local units of government) are not covering recycling and transportation costs, rather manufacturers cover them as intended under the 2016 law changes.

Update Minnesota’s Electronics Recycling law for flame retardant plastic screening

As previously noted, flame retardants are linked to a myriad of health effects. The Minnesota Legislature acknowledged these risks and restricted the entire class of organohalogen (primarily brominated and chlorinated) flame retardants in kid’s products, furniture, wall and window fabrics, and mattresses to no more than 1,000 ppm, fully effective in 2022). This class of flame retardants and others have been commonly used in electronics plastics as well. The percentage of flame retardants in plastic is widely-variable, but virgin or first-use electronic equipment plastic can typically range from 0.1 percent by weight (1,000 ppm) to 30 percent (300,000 ppm)¹ and even higher.²

As a first step to applying the full costs of toxic chemical management to those who make them, the MPCA recommends adding a requirement in 115A.1310 (electronics recycling). The new requirement

¹ Department of Ecology, State of Washington, 2015. Flame Retardants: A Report to the Legislature.

<https://fortress.wa.gov/ecy/publications/documents/1404047.pdf>

² U.S. Environmental Protection Agency, 2014. An Alternatives Assessment for the Flame Retardant Decabromodiphenyl Ether (DecaBDE), https://www.epa.gov/sites/production/files/2014-05/documents/decabde_final.pdf

should state that manufacturers must within two years develop and fund capacity to screen and segregate, to the greatest extent possible, collected (past) products containing organohalogens in excess of 1,000 ppm concentration by weight, and implement that screening technology in the collection system in Minnesota. Some recyclers already have this equipment; however, the expectation going forward would be that all recyclers implement up-to-date screening technology as electronics composition evolves.

Ban organohalogens in newly manufactured electronic products

As a companion step to better screening for flame retardants in electronics plastic at end-of-life, the MPCA also recommends banning organohalogens restricted by Minn. Stat. § 325F.071 in newly manufactured regulated electronic products, with appropriate exceptions, for example where companies can demonstrate an organohalogen is the only technical solution available to meet specific fire safety standards.

This model of incorporating toxics reduction policy more explicitly into product stewardship for electronics should be considered for other product types as well.

Develop a Solar Panel Product Stewardship law

Reuse and recycling of solar panels should be supported through a Minnesota Solar Panel Product Stewardship law. It should establish a program where manufacturers are responsible for establishing a more sustainable approach for solar panel management when they are removed from service. Currently there are not statewide requirements or funding for management of end-of-life solar PV modules for installations less than 50 megawatts. The legislation will require funding to be set aside for reuse or recycling of solar panels, and not include end-of-life fees assessed for participation in the program.

Product stewardship: architectural paint

Overview

The Architectural Paint Product Stewardship law requires paint manufacturers, individually or through an organization, implement and finance a statewide product stewardship program that manages architectural paint by encouraging reuse and recycling, reducing paint waste generation, and providing for negotiation and execution of agreements to collect, transport, and process the architectural paint for reuse and end-of-life recycling. The program is funded by a stewardship assessment, or fee, paid by consumers on the sale of architectural paint.

PaintCare is a 501 (c)(3) non-profit organization whose Board of Directors consists of eleven representatives of architectural paint manufacturing companies. PaintCare employs two staff located in Minnesota and work full-time on the state's architectural paint product stewardship program.

The product stewardship approach to managing architectural paint in Minnesota has:

- Significantly expanded the number of recycling collection locations for paint and increased the amount of paint recycled
- Created an incentive for retailers to collect paint, particularly smaller entities
- Transitioned from government funded collection and recycling programs to one funded by consumers and manufacturers
- Allowed the paint industry, through the stewardship organization PaintCare, to operate the program and lead consumer education
- Supported local economic development of paint recyclers

Updates and accomplishments

Expanded collection locations for paint

Prior to the implementation of the Architectural Paint Product Stewardship Program there were fewer than 40 paint collection sites in Minnesota, nearly all of which were county or municipal HHW sites. Following the inception of the program, the number of collection sites rose rapidly, with 218 by the end of fiscal year 2015 and 246 by the end of fiscal year 2016. Currently there are approximately 256 permanent collection sites in Minnesota, including 199 retail locations, 52 HHW collection facilities, three Habitat for Humanity ReStore locations, one transfer station, and one paint recycler. Other temporary options for paint collection over the past couple years include 17 seasonal HHW sites, 158 collection events held at HHW sites, and 44 direct large volume pick-ups that serviced 41 different locations.

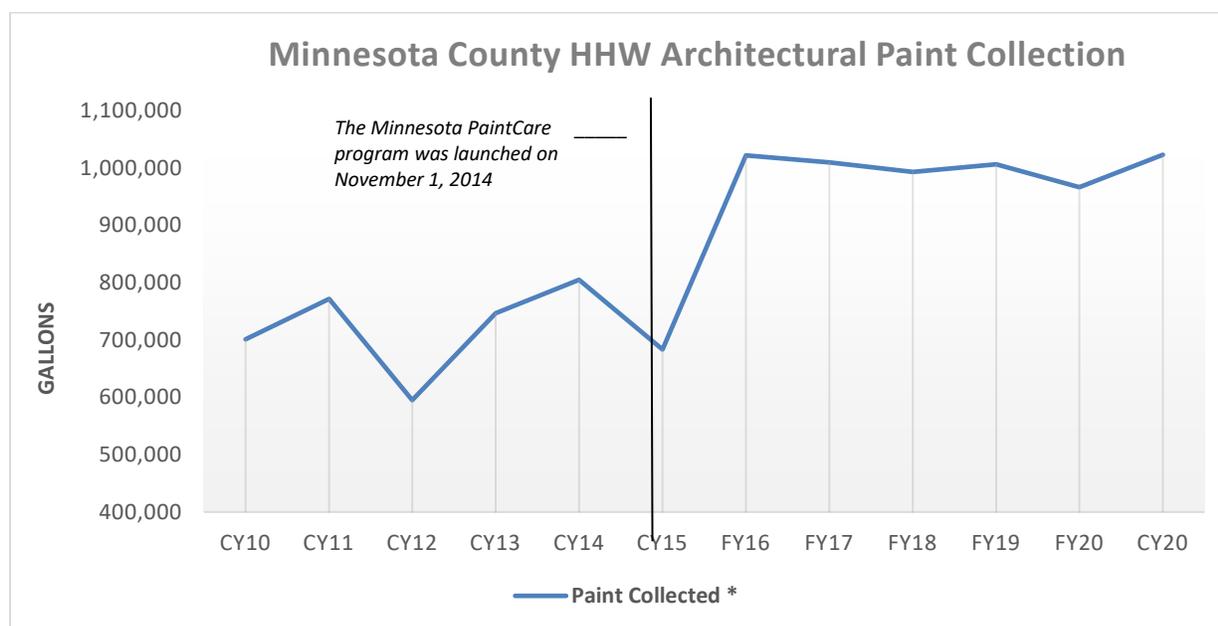
Between permanent collection facilities, seasonal collection facilities, collection events, and partnerships with other counties, nearly all of the 87 Minnesota counties offer some form of paint collection. The increase in number of sites as well as their wide distribution resulted in 93.1 percent of Minnesota residents living within 15 miles of a year-round collection site, and 96.9 percent of residents live within 15 miles of a site when supplemental sites and events are included.

Incentives for retailers to collect paint

The number of retail sites offering paint collection through the Architectural Paint Product Stewardship Program has grown to 199 retail locations at the end of 2020. While there haven't been formal studies looking at the sales impact of program participation, it is likely that offering collection services creates an added incentive for potential customers to visit stores, helping drive return visits from larger volume customers such as painters and independent contractors.

Partly due to the widespread availability of collection sites, the total amount of paint collected and recycled since the launch of the program has also increased. An estimated 691,000 gallons of paint were collected in Minnesota in 2013, whereas just over one million gallons were collected in 2017 and 2018. Collection amounts have remained consistent since those years, averaging around one million gallons per year. 2020 statewide collection totaled 1,023,304 gallons. For latex paint collected in that total, approximately six percent was reused, 41 percent was recycled, and 52 percent was counted as beneficial use for landfill cover. For oil-based paint, approximately four percent was reused, 69 percent was diverted to energy recovery, and 26 percent was disposed of via incineration. A total of 607,422 gallons have been reused and 1,684,924 gallons of paint have been recycled in Minnesota since the product stewardship approach was adopted statewide. As shown in Chart 3, architectural paint collection has greatly increased since the 2014 implementation of a statewide paint stewardship plan.

Chart 3. Minnesota county HHW architectural paint collection

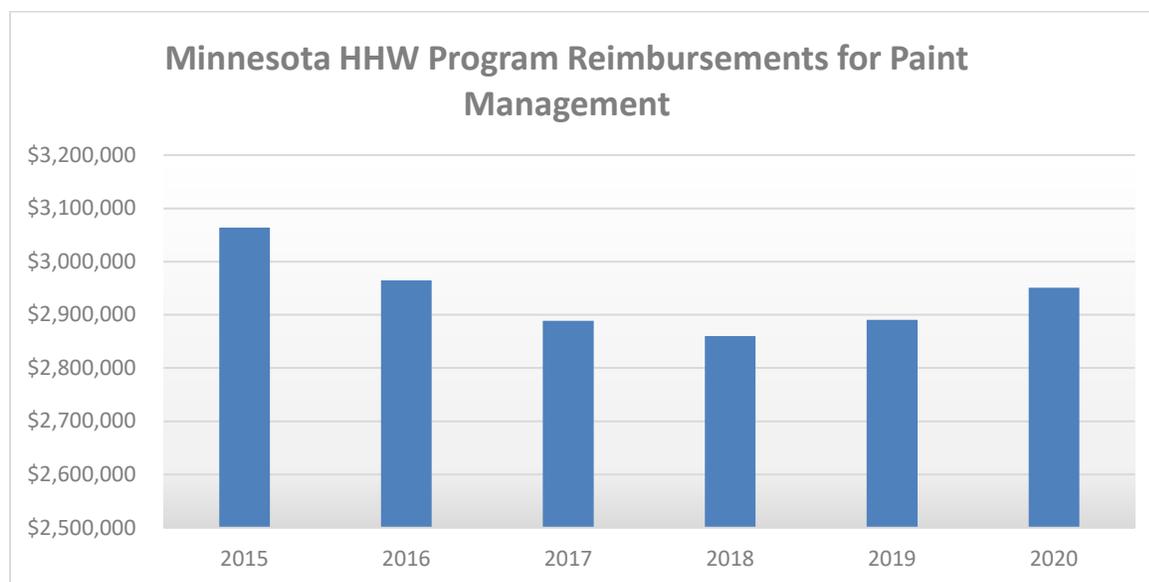


** Prior to the Architectural Paint Product Stewardship Law, county HHW paint collection data was reported by calendar year. After program implementation data was reported by fiscal year, until 2020 when PaintCare elected to transition its reporting cycles back to calendar year.*

Program funding

The paint stewardship fee, paid by consumers when they purchase paint, enabled PaintCare to cover the management costs for every HHW program and participating retail location in Minnesota. Since late 2014, Minnesota counties and regional groups participating in the program have been reimbursed more than \$17 million for their paint management costs. Without the fee and partnership with PaintCare, these costs would have been covered by funding from governmental revenue streams.

Chart 4. Minnesota HHW program reimbursements for paint management



Temporary increase in paint stewardship fee

On November 14, 2016, PaintCare formally requested MPCA approval to increase the Minnesota paint stewardship fee due to their budget deficit in Minnesota as collection volumes were higher than projected while sales were lower. This resulted in higher than expected costs without the revenue to match it.

After a public comment period and acknowledgement of the original projection inaccuracy, the MPCA approved the fee increase on March 6, 2017, for a period extending through June 30, 2019. This approval included a requirement that by April 1, 2019, PaintCare would submit a review of the financial impact of the fee increase and, if necessary, submit a proposal to MPCA requesting continuance of the increased fee. The MPCA anticipated that two years of operation with the requested increase would enable PaintCare to overcome its budget deficit and build a small reserve. The MPCA’s approval also underscored the need for regular review of the fee levels to ensure the needs of the program are being met, without the program inadvertently over- or under-collecting to fund it. Retailers and PaintCare ultimately implemented the increase on September 1, 2017.

Table 10. Architectural paint stewardship fee comparison

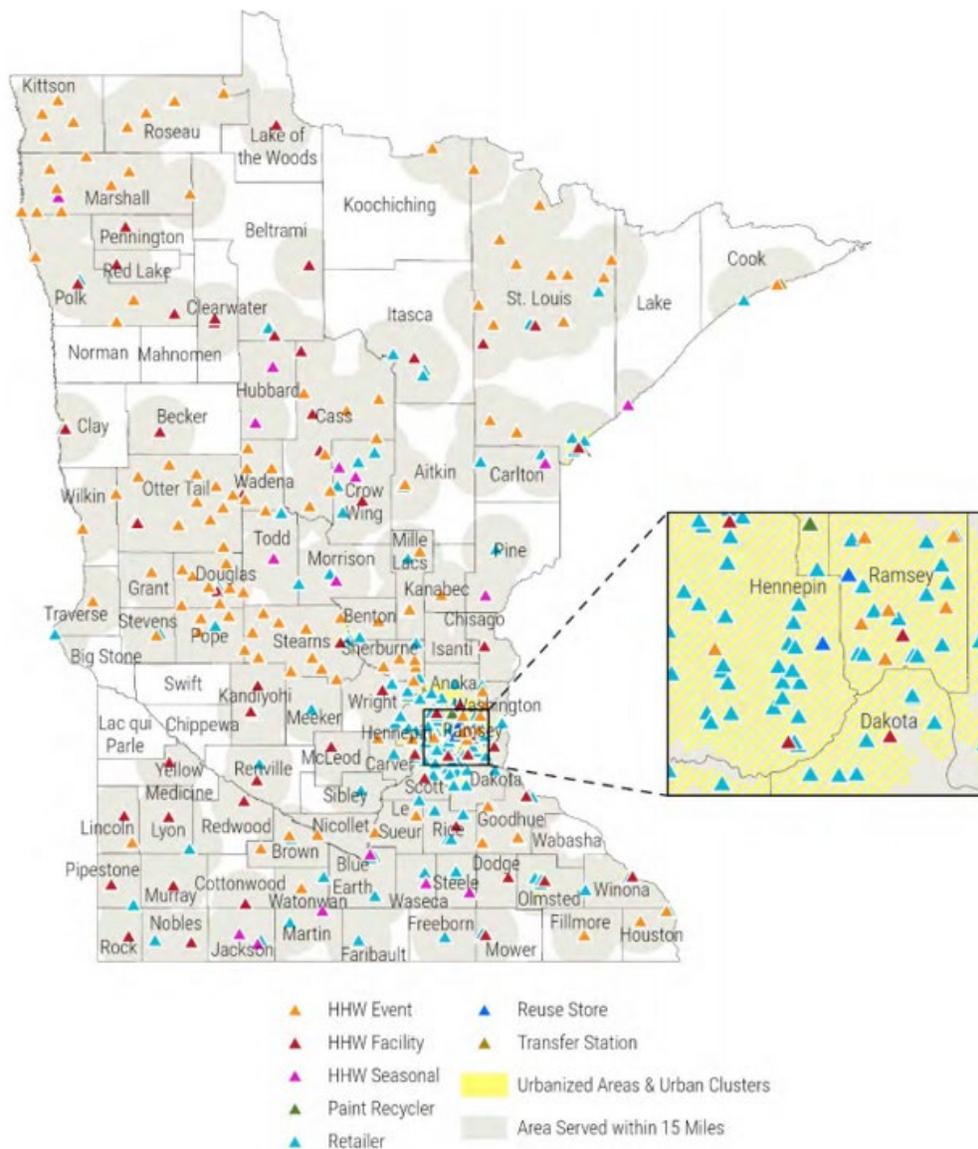
Container size	Fee before increase	Fee after increase
Half pint or smaller	\$0.00	\$0.00
Larger than half pint and smaller than 1 gallon	\$0.35	\$0.49
1 gallon up to 2 gallons	\$0.75	\$0.99
Larger than 2 gallons up to 5 gallons	\$1.60	\$1.99

Since initial approval by the MPCA, PaintCare has completed financial reviews and requested fee continuances in 2019 and 2021. Upon review of financial data and program solvency both requests to maintain the fee levels were temporarily approved by the MPCA. PaintCare is no longer operating with a deficit and its operating reserve stood at 67 percent of annual expenses at the end of 2020.

In PaintCare’s most recent financial review submitted to the MPCA on March 1, 2021, they cited the potential effects of COVID-19-related disruptions on paint collection and processing in 2020 as the

primary driver of expected increased paint collection and costs in 2021. As a result, PaintCare requested a continuance of the current fee levels through December 23, 2023, at a minimum, pending a financial review submitted to the MPCA by March 31, 2024. They also expressed a desire to maintain an operating reserve of 75-125 percent of its annual expenses. On December 21, 2021, the MPCA granted partial approval to PaintCare’s request after a public comment period. In its response, the MPCA requested a subsequent financial review from PaintCare by April 1, 2022, as it should reveal the effects, if any, of COVID-19 disruptions on 2021 program operations. The MPCA also established 75 percent of annual operating expenses as the maximum acceptable reserve level and noted that, if exceeded, PaintCare must reevaluate the fee levels to ensure the financial needs of the program are being met without collecting more funds than are necessary to maintain the financial health of the program.

Figure 2. Minnesota year-round and supplement paint collection sites



Source: 2020 PaintCare Minnesota Annual Report

Emerging issues

End markets – Over 50 percent of the latex paint collected in Minnesota is used for landfill cover. Although landfill cover may be counted as a beneficial use of the material, reuse and recycling provide considerably more environmental benefits and should be maximized. Because of current market conditions, the latex paint is shipped to Oklahoma before being manufactured into a landfill cover material that is used in that state. The MPCA, PaintCare, and counties have discussed ways to maximize reuse and recycling, and improve local end markets for the lower quality latex paint that can't be made into new paint. The MPCA and PaintCare have committed to undertaking pilot projects within Minnesota to determine the best management practices of managing latex paint. PaintCare recently completed a pilot study on the environmental and economic feasibility of diverting some waste paint to waste-to-energy facilities in Minnesota, though formal presentation of the results is not expected until early 2022. Together with the counties that currently collect waste paint, the MPCA expects these pilot projects to continue to examine several options that may reduce the life cycle impacts of managing waste paint, and ideally prioritize efforts higher on the waste hierarchy.

Impacts of COVID-19 – Safety efforts taken to reduce the spread of COVID-19 caused notable disruptions in the management of waste paint in Minnesota. Through spring and early summer of 2020 especially, HHW facility closures, collection event cancellations, and limited access to retail collection points reduced paint collection by upwards of 50 percent relative to historical levels. However, the effects proved temporary as late summer and fall of 2020 saw record high collection levels that ultimately led to overall 2020 collection remaining consistent with previous years. Due to the unprecedented nature of program disruption, it was believed by some that the impacts may last into 2021 and perhaps beyond, though preliminary indications suggest the impacts on collection were largely temporary and any lingering effects into 2021 have been marginal. As reuse is a preferred management method, a potential longer-term concern is the decrease in the reuse rate of waste paint in Minnesota, which dropped from 11 percent in 2019 to just over six percent in 2020. Despite the drop, this same trend was experienced in many PaintCare states and Minnesota continues to have the highest reuse rate of all PaintCare states. While that remains a success of the program, it is not yet known whether reuse rates will ultimately rebound to pre-COVID-19 levels.

Opportunities

Update the Architectural Paint Product Stewardship law or Program Plan to cover aerosol paints

PaintCare does not currently cover the costs of collecting and processing aerosols in any state. Within Minnesota, the HHW Programs that do currently collect waste aerosols spend a considerable amount of time and money each year to manage them. Aerosols are the highest cost waste stream to manage in HHW programs next to electronics and the architectural paints currently covered by PaintCare. The MPCA has been engaged in discussions with PaintCare since 2013 to investigate the possibility of expanding the list of covered products to include aerosol paints. Because aerosol cans need to be managed differently from cans of paint, more information is needed to understand costs, baseline volumes, and any additional infrastructure or policy needs. The paint program fee is not currently assessed on aerosols, though the MPCA recommends that aerosols should ultimately be an item that is covered by the PaintCare Program.

Product stewardship: design, repair, and extended producer responsibility

Overview

Minnesota's product stewardship policy was developed with the intent to create partnerships between government and industry to reduce the environmental impacts of manufactured products throughout their life cycles in an economically efficient and environmentally beneficial manner. When manufacturers share the costs of recycling products, they have an incentive to design products more sustainably, with fewer resources and toxic materials, increase reparability or reuse to extend the life of products, incorporate recycled materials in new products, and ultimately account for environmental concerns in the earliest phases of product design.

Updates and accomplishments

While the electronics and architectural paint programs are doing what was intended as far as having manufacturers share the costs of recycling products, there has been little evidence yet that manufacturers are taking steps to design products more intentionally. Not to mention simply paying the costs imposed for end-of-life management does not fully reflect or account for the true cost. A new approach that focuses on encouraging product redesign is warranted.

In addition to ensuring manufacturers design products that are less toxic and easier to recycle, a critical step to keeping products out of the waste stream for as long as possible and reducing the environmental impacts of their full life cycle is designing for easier disassembly, repair, and parts replacement. However, manufacturers currently employ a variety of strategies to limit who can provide repair services, from withholding or limiting access to service information and diagnostics, limiting availability of replacement parts or designing products to require special tools to repair that are only distributed to authorized providers. This affects everyone from cell phone owners to farmers trying to repair tractors and has led to the introduction of various "Right to Repair" bills in Minnesota and elsewhere. On July 9, 2021, President Biden signed the 'Executive Order on Promoting Competition in the American Economy,' which addresses Right to Repair. This was followed by a unanimous vote of the Federal Trade Commission to enforce Right to Repair on July 14, 2021.

The Environmental Council of the States (ECOS, the national association of state and territorial environmental agency leaders) recently approved an updated version of Resolution 12-5 "PRINCIPLES OF EXTENDED PRODUCER RESPONSIBILITY AND THE DEFINITION OF PRODUCT STEWARDSHIP." The updated version stresses the producer responsibility for lifecycle impacts, including the need for producer responsibilities related to chemical ingredient disclosure and right to repair so that product users can take full advantage of the product's lifecycle performance and attributes. The revised ECOS Resolution also recognizes that extended producer responsibility (EPR) legislation alone does not result in design and materials changes, and benchmarks for design and materials are appropriate and necessary in both policy and legislation. Manufacturers have largely chosen to pay some costs required for end-of-life management or set up fee-based programs under current product stewardship laws, rather than invest in product redesign. Along with the obvious tool of product and chemical restrictions, consumer demand and public concerns remain powerful drivers for product redesign, such as the push to redesign water bottles that contained Bisphenol A or the backlash faced by Water Gremlin for their improper management of trichloroethylene that spurred other manufacturers to seek safer alternatives. Going

back further, when the TRI was first established, a significant amount of progress was made in reducing toxic chemical releases as the public started to gain awareness of what the manufacturers in their communities were using and generating as waste.

The EPA TSCA maintains an inventory of chemicals produced in the U.S. and estimates there are about 84,000 chemicals in commerce in the U.S. In 2020, an analysis³ of 22 chemical inventories from 19 countries and regions found over 350,000 registered chemicals for commerce, although not all in active use, of which the full identities of some 50,000 to 70,000 are claimed as confidential. While not every one of those chemicals is toxic, the majority of them have little to no toxicity data available at all. To avoid a growing proliferation of bans and restrictions on individual chemicals or categories such as PFAS, motivating design change is critical. This suggests rethinking product stewardship as simply a means for sharing the costs of end-of-life management and viewing it more as an instrument for broader chemical policies that encourage the use of safer chemicals in product design and manufacturing processes.

Opportunities

Pass Minnesota's Right to Repair law

Even though there are efforts initiated at the federal level, the MPCA recommends the Minnesota Legislature support increasing reuse and repair of electronics through a Minnesota Right to Repair law. This legislation not only protects human health and the environment through reduced resource demands and pollution through the life cycle of short-lived electronics, but also has the potential to boost the local economy through repair jobs.

Develop an umbrella product stewardship policy

Minnesota should develop a product stewardship policy around a statement for toxicity reduction and chemicals of concern that need to be eliminated from use. It should include a common restricted substances list developed for manufacturers to reference and require a third-party provide independent verification that products are free of the chemicals of concern. Under this policy, manufacturers would not be allowed to use these chemicals. However, if safer alternatives are unavailable and the chemical is needed to perform an essential function, the manufacturer would be allowed to use the chemical but must develop a product stewardship plan to manage the product at end-of-life. For example, although flame retardants have been widely used in computer housings, they may not be necessary in housing but may be needed in other product components. If so, the manufacturer could phase out the use in housings and would be required to establish a stewardship program for components where the flame retardants continue to be present.

As noted in the introduction of this report, the options available for addressing waste and toxic chemical contamination are to prevent or avoid them, manage them, or clean them up. Manufacturers have a choice to make. The first option is to continue paying the costs for ongoing monitoring of chemical regulations, compliance, and waste management, or worse, spend millions on legal settlements to clean up contamination caused by their product design choices. The second option is to place a greater emphasis on minimizing the total environmental impacts and resource use of materials over their entire life cycles using a sustainable materials management approach. This second path is the one Minnesota

³ [Toward a Global Understanding of Chemical Pollution: A First Comprehensive Analysis of National and Regional Chemical Inventories | Environmental Science & Technology \(acs.org\)](https://www.acs.org/pressroom/2021/04/20210421-toward-a-global-understanding-of-chemical-pollution)

needs to take in order to meet the charge established 30 years ago in the Minnesota Toxic Pollution Prevention Act:

“To protect the public health, welfare, and the environment, the legislature declares that it is the policy of the state to encourage toxic pollution prevention. The preferred means of preventing toxic pollution are techniques and processes that are implemented at the source and that minimize the transfer of toxic pollutants from one environmental medium to another.”

Conclusion

MPCA programs working on toxics, pollution prevention, and sustainable materials management have numerous successes to highlight in reducing exposure to toxic chemicals and pollution. Our product stewardship programs for electronics and paint are helping to ensure those products are managed properly at end of life. Our grant programs are helping companies develop new products and universities develop new curriculum based on green chemistry principles. Similarly, the formalization of the state's Sustainable Purchasing Program has contributed to state agencies making significant strides in reducing the environmental impacts of their products purchased and services received with over half of state contracts prioritized for sustainability having reached "100 percent sustainable" status. These actions and intentional use of the state government's influence can help drive the market and industry towards offering more sustainable products and services across Minnesota.

However, as seen throughout this report, there are many challenges and clear opportunities for improvement that remain. While there are many individual businesses taking advantage of our technical assistance partnership with MnTAP each year or working on their own to make progress in pollution prevention, progress statewide has stalled, and the amount of toxic chemicals generated and released by Minnesota facilities has become increasingly concentrated among a few, which may allow for more targeted pollution prevention assistance to be offered.

Minnesota's environment and its residents are too often unknowingly exposed to toxic chemicals through the products they purchase, sometimes in highly dangerous amounts. Residents have the reasonable expectation that the products they find on store shelves or order online are "safe," but we know that is not always the case, as shown by the work our toxics in products and toxics in packaging staff have done. Simply put, our manufacturing industry as a whole must make better choices during design and manufacturing about the chemicals and materials used in the products they create.

Minnesota's Toxic Pollution Prevention Act does not require companies to implement pollution prevention activities, but only that the state encourage toxic pollution prevention. Nevertheless, the challenges described in this report are not something that can be addressed by MPCA alone. It will require cooperation and coordination among all elements of government, industry and the public. The recommendations made here are steps that can be taken within the next four years to continue the progress we have made while developing new strategies for making significant progress in pollution prevention.

Toxics and pollution prevention recommendations

Toxics and pollution prevention recommendations are included in individual report sections with additional context and summarized below. Each recommendation in this list is labeled with the following labels to indicate whether they are a legislative or agency action, and to identify their impact area(s). Recommendations may have more than one label.

- Recommendation for new authorities provided by the Legislature: **LEGISLATIVE**
- Recommendation for MPCA and/or partner action: **MPCA**
- Recommendation to allocate funding: **FUNDING**
- Recommendation aligns with MPCA strategic plan goals:
ENVIRONMENTAL JUSTICE **COMMUNITY ENGAGEMENT**
- Recommendation aligns with various toxics reduction methods:
RESTRICTION / BAN **END-OF-LIFE MANAGEMENT**

Sustainable government purchasing

1. Secure funding to repeat the state government spend analysis

FUNDING

Funding is needed to repeat the state government spend analysis to help the program identify gaps, additional high impact contracts, high impact individual products (even if the contract is not identified as a priority), and realign program priorities with broader agency and enterprise focuses.

2. Hire LCA-trained staff to expand agency modeling

FUNDING

Funding is needed to hire staff trained in LCA modeling and analysis to better support the Sustainable Purchasing Program comparing products and materials and ensure the most sustainable options are included on contracts. This will also support expanded reporting capabilities to summarize and highlight the program's impact and success.

3. Grow the Sustainable Purchasing Program team to strengthen reporting and outreach

FUNDING

COMMUNITY ENGAGEMENT

Funding is needed to hire new staff for the Sustainable Purchasing Program for reporting and outreach, including training. With a fully staffed team, more focus could be placed on creating resources and training videos, and offering in-person presentations and information sessions. The success of this program is not only based on modifying contracts to be more sustainable, but also ensuring those contracts are being used frequently and consistently.

Toxics in packaging

4. Update Minnesota's Toxics in Packaging law

LEGISLATIVE

RESTRICTION / BAN

The Minnesota Toxics in Packaging law should be revised to incorporate the changes in the updated TPCH Model Legislation, which includes the addition of the class of perfluoroalkyl and polyfluoroalkyl substances (PFAS) and ortho-phthalates as regulated chemicals. A full

description of the Model Legislation is available at [Packaging Legislation | Toxic Packaging Model Legislation \(toxicsinpackaging.org\)](#)

Lead in consumer products: tackle and ammunition

5. **Educate Minnesotans about lead free tackle and ammunition, and work to expand availability**

MPCA

COMMUNITY ENGAGEMENT

The MPCA will continue to work with partners through the Get The Lead Out! and Hunter's Choice grant programs to educate Minnesotans about the availability, performance, and safety of lead-free alternatives for fishing tackle and ammunition. Additionally, the agency will work with manufacturers and retailers to expand availability and visibility of non-lead products.

Mercury in consumer products: lighting and dental

6. **Fund a mercury bounty program**

FUNDING

COMMUNITY ENGAGEMENT

END-OF-LIFE MANAGEMENT

Funding is needed to establish and adequately staff a mercury bounty program to recover bulk mercury and products statewide with the payment of a nominal bounty and promote the program to help motivate people to remove mercury and mercury products, safely manage them at end-of-life, and prevent them from entering the waste stream and subsequently the environment.

7. **Explore options to improve access to retail collection and recycling support for mercury lamps**

MPCA

COMMUNITY ENGAGEMENT

The MPCA will work with partners to identify opportunities to ensure that households and small businesses throughout the state have convenient and free access to year-round collection programs for mercury lighting.

8. **Update messaging using the U.S. FDA dental mercury Safety Communication**

MPCA

ENVIRONMENTAL JUSTICE

COMMUNITY ENGAGEMENT

The MPCA will consult with the Minnesota Dental Association to update its messaging to and activities with dentists and patients to incorporate the U.S. FDA recommendation that dental mercury amalgam not be placed in children, especially under age six; women who are pregnant, nursing, or of childbearing age; or individuals with impaired kidney function, neurological issues, or a known sensitivity or allergy to mercury or other components of dental amalgam.

9. **Initiate a cremation mercury emissions pilot project**

FUNDING

ENVIRONMENTAL JUSTICE

COMMUNITY ENGAGEMENT

END-OF-LIFE MANAGEMENT

Funding is needed to develop a pilot to measure mercury crematory emissions without controls, and then install controls and measure emissions with the use of control equipment currently commercially available. The MPCA has worked with two crematories located in the Twin Cities area that have indicated a willingness to engage in research and pilot projects on this topic to demonstrate the industry's commitment to understanding the issues and taking the appropriate actions to address mercury emissions.

Mercury in consumer products: skin lightening creams

10. Launch a statewide “Love Your Skin” campaign

FUNDING

ENVIRONMENTAL JUSTICE

COMMUNITY ENGAGEMENT

Funding is needed to launch a statewide mercury and skin lightening campaign in support of current outreach and programming, maintaining the same tone and focus of the original “Love Your Skin” campaign developed by Hamline University students and now managed by MDH. In addition to policy changes, one of the best strategies to reduce the demand for and use of skin lightening products is engagement with the general public, especially communities of color where demand is the highest. It is important to not only provide information on the human health and environmental risks of these products, but also continue shifting communications around beauty standards with messages of empowerment, confidence, and well-being – love your skin.

11. Secure funding to continue skin lightening program

FUNDING

ENVIRONMENTAL JUSTICE

COMMUNITY ENGAGEMENT

END-OF-LIFE MANAGEMENT

Additional funding is needed to continue the skin lightening grant funding to continue supporting and expanding efforts to educate the public and vendors on the risks of mercury in skin lightening products. If enough funding is secured, it could also help fund proper collection, management, and disposal at end-of-life for collected mercury-containing products. The non-profits and health authorities leading education and outreach do not have sufficient funds to also manage the necessary disposal resources and systems.

12. Prioritize promotion of collection programs to impacted communities

MPCA

ENVIRONMENTAL JUSTICE

COMMUNITY ENGAGEMENT

END-OF-LIFE MANAGEMENT

The MPCA will work with local units of government involved with skin lightening program communications to incorporate more promotion of collection options at VSQG and HHW sites to immigrant, refugee, and BIPOC communities. Without intentional and accessible promotion of these programs and locations (through fliers, advertisements, or direct community interaction), it is very difficult to know they exist and the services they offer.

Green and safer product chemistry

13. Maintain the Angel Tax Credit incentive

LEGISLATIVE

FUNDING

The Angel Tax Credit Program should be maintained with consistent and continued funding at or above levels requested by DEED in order to provide a more certain funding source for new technologists and investors. The Angel Tax Credit Program can help boost innovations based on green, safer, and sustainable chemistry.

14. Strengthen and expand statutes limiting lead and cadmium use

LEGISLATIVE

ENVIRONMENTAL JUSTICE

RESTRICTION / BAN

Minnesota’s statutes should be updated to further limit lead and cadmium in products to eliminate potential exposures of all Minnesotans, but most notably children, pre-teens, teens, and susceptible adults such as women of child-bearing age. Potential changes include increasing the ages of children protected, establishing more protective testing standards, and guarding against the use of products which are marketed to older or multiple ages but can appeal to children.

15. Address concerns and current gaps in PFAS management

LEGISLATIVE

FUNDING

ENVIRONMENTAL JUSTICE

COMMUNITY ENGAGEMENT

RESTRICTION / BAN

Legislative action is needed to give agencies new authorities and additional resources to fill information gaps and narrow PFAS uses to prevent their release and reduce the related human health, environmental, and financial impacts.

- Minnesota should ban PFAS uses that are currently known to be non-critical and for which alternative technologies are available and feasible.
- Mandatory labeling of PFAS in products should be considered, which will help business owners and individuals make environmental, health-conscious, and business-friendly purchases, while encouraging manufacturers to pursue alternatives to PFAS.
- Minnesota should provide technical and financial assistance to businesses to reduce PFAS pollution. Existing frameworks (e.g., MnTAP, Small Business Grant Program) can be expanded to implement PFAS reduction strategies.
- Minnesota should remove from state purchasing contracts all products in which PFAS are serving a non-critical or substitutable use.

Product stewardship: electronics and solar panels

16. Improve funding for collectors under Minnesota's Electronics Recycling law

LEGISLATIVE

END-OF-LIFE MANAGEMENT

Minnesota's Electronics Recycling law should be updated to ensure consumers and collectors (e.g., local units of government) are not covering recycling and transportation costs for electronics, and instead have manufacturers cover the costs as intended under the 2016 law changes.

17. Update Minnesota's Electronics Recycling law for flame retardant plastic screening

LEGISLATIVE

END-OF-LIFE MANAGEMENT

Minnesota's Electronics Recycling law should be updated to add a requirement under the Waste Management Act that manufacturers, currently captured by 115A.1310 (Electronics Recycling), must within two years develop and fund capacity to screen and segregate, to the greatest extent possible, collected (past) products containing organohalogen in excess of 1,000 ppm concentration by weight, and implement that screening technology in the collection system in Minnesota.

18. Ban organohalogen in newly manufactured regulated electronic products

LEGISLATIVE

ENVIRONMENTAL JUSTICE

RESTRICTION / BAN

As a companion step to better screening for flame retardants in electronics plastics at end-of-life, organohalogen restricted by Minn. Stat. §325F.071 should be banned in newly manufactured regulated electronic products, with appropriate exceptions (e.g., when companies can demonstrate an organohalogen is the only technical solution available to meet specific fire safety standards).

19. Develop a Solar Panel Product Stewardship law

LEGISLATIVE

END-OF-LIFE MANAGEMENT

Reuse and recycling of solar panels should be supported through a Minnesota Solar Panel Product Stewardship law. This legislation should establish a program where manufacturers are responsible for establishing a more sustainable approach for solar panel management when

they are removed from service. Currently there are not statewide requirements or funding for management of end-of-life solar PV modules for installations less than 50 megawatts. The legislation will require funding to be set aside for reuse or recycling of solar panels, and not include end-of-life fees assessed for participation in the program.

Product stewardship: architectural paint

20. Update the Architectural Paint Product Stewardship law or Program Plan to cover aerosol paints

LEGISLATIVE

END-OF-LIFE MANAGEMENT

The list of covered products under the Architectural Paint Product Stewardship law should be updated to include aerosol paints. Aerosols are the highest cost waste stream to manage in HHW programs next to electronics and the architectural paints currently covered by PaintCare. Because aerosol cans need to be managed differently from cans of paint, more information is needed to understand costs, baseline volumes, and any additional infrastructure or policy needs.

Product stewardship: design, repair, and extended producer responsibility

21. Pass Minnesota's Right to Repair law

LEGISLATIVE

END-OF-LIFE MANAGEMENT

Reuse and repair of electronics should be supported through a Minnesota Right to Repair law. This legislation not only protects human health and the environment through reduced resource demands and pollution through the life cycle of short-lived electronics, but also has the potential to boost the local economy through repair jobs.

22. Develop an umbrella product stewardship policy

LEGISLATIVE

ENVIRONMENTAL JUSTICE

RESTRICTION / BAN

END-OF-LIFE MANAGEMENT

An umbrella product stewardship policy should be developed around a statement for toxicity reduction and chemicals of concern that need to be eliminated from use. It should include a common restricted substances list developed for manufacturers to reference and require a third-party provide independent verification that products are free of the chemicals of concern. Under this policy, manufacturers would not be allowed to use these chemicals. However, if safer alternatives are unavailable and the chemical is needed to perform an essential function, the manufacturer will have to develop a product stewardship plan to manage the product at end-of-life.