

Waste and Recycling Programs

in

Hancock and Houghton, Michigan

and

Michigan Technological University

Review and Recommendations



Sociology of the Environment Class
Graduate Program in Environmental and Energy Policy
Michigan Technological University

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Purpose of this Review and Assessment

The purpose of this report is to describe and assess waste and recycling programs available to residents of Hancock, Houghton, and at Michigan Technological University. We aim to bring together information from multiple sources about how waste and recycling are handled so that decision makers and community members can make informed decisions. We also seek to update a similar review and assessment that was created by a team of students at Michigan Tech in 2002.¹

Too often participants in decision making processes find that the background information they need is not readily available. As a result, they consume much of their time coming up to speed on the issue. In the end, only people who already know a lot about the issue become involved. This report provides information to potential decision makers about how we manage waste and implement recycling programs in Houghton, Hancock, and at Michigan Tech with the context they need to ask insightful questions and explore alternative options. Also included are several recommendations that our team believes would strengthen the existing waste and recycling programs in Houghton, Hancock and at Michigan Tech.

Who Performed this Review and Assessment?

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We sincerely thank the many people who have provided information and helped us to collect and understand the information included in this report. These include Shawn Taisto (K&W Landfill) who gave us a tour of the landfill and helped us to understand how we manage garbage; Jim Whittinghill (Sales Manager, *Eagle Waste & Recycling*) who gave us a tour and willingly answered our multiple questions; Bob Tervonen (Utilities Manager, City of Ironwood) and Brad Austin (Director of Marquette County Solid Waste Management Authority) who shared data and expertise; Eric Waara (Manager, City of Houghton), Glenn Anderson (Manager, City of Hancock), Scott MacInnes (former Manager, City of Houghton), Bill Marlor (Director of Public Works, City of Hancock), Kerri Sleeman (Director of Facilities, Michigan Tech University), Kristi Hauswirth (Director, Finance & Purchasing, Michigan Tech University), Quincy Higgins Arney (Master Gardener, Michigan Tech University), and Eric Forsberg (Administrator, Houghton County) who answered our questions and provided data; Professor Hugh Gorman and the students of the Environmental Decision Making class at Michigan Tech University in Fall 2002 who wrote the first version of this Review and Assessment giving us a starting point and for sharing meaningful data and experiences; David Hall (member of the Copper Country Recycling Initiative) who came along on our landfill and recycling center tours, asked important questions and took photos that he has allowed us to share; and Suzanne Van Dam, Susan Burack, and Evan McDonald (Copper Country Recycling Initiative) who inspired this report and who shared information and helped us to understand the state and local context of recycling and waste management.

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Disclosure

This report was written by a group of graduate students studying environmental sociology and environmental policy over the course of one semester. We are not experts in the waste management industry. Please direct any questions regarding technological details of managing waste and recycling, specific waste and recycling oriented policies, and changing markets and economics of solid waste management to waste management professionals.

We also would like to recognize that we have not had the opportunity discuss waste and recycling issues with *Waste Management*, which serves as the primary waste service provider in the local area. Despite repeated efforts at contacting local managers, our multiple calls were never returned and an in person visit resulted in very limited information because the manager was on vacation. This is unfortunate, as we would have liked to have been able to provide additional information and to make sure that we understand the perspectives of all interested parties prior to publishing this report.

Executive Summary

Managing municipal solid waste is a key task for municipalities, organizations and businesses, and households given the hundreds of millions of tons of waste we generate in the United States each year through our consumptive activities. Managing waste is expensive in terms of time, money, and environmental impacts. Garbage collection and disposal programs cost the City of Hancock about \$27,409 a month, including \$7,200 each month in landfill disposal fees which are allocated on a per tonnage basis. This means that the more garbage produced that needs to go to the landfill, the greater the cost to the city and residents. Garbage collection and disposal costs the City of Houghton about \$12,401 per month, including about \$5,700 in tipping fees for disposal.

The best way to reduce all of these impacts is to reduce the amount of waste we generate through source reduction programs such as less packaging, designing smarter and smaller products that require fewer resources, using re-usable items rather than disposable ones, and reducing consumption. Composting, recycling, and other waste reduction programs also help residents reduce the amount of solid waste they send to local landfills, especially organic materials or materials that are recyclable or potentially hazardous. The programs and systems available currently to residents of Hancock, Houghton, and at Michigan Technological University include:

- A curbside recycling program in City of Hancock. The city collects recyclables from bins on the curb on the last Thursday of every month. Hancock residents can also bring their recyclables to the drop-off site at the city garage (Hancock Department of Public Works) located at 1601 Tomasi Dr. during business hours free of charge.
- A drop-off recycling site at the *Waste Management* transfer station on Enterprise Dr (off Sharon Ave) in Houghton where anyone can drop off recyclable materials (see Appendix A for a complete list and hours of operation) for a charge of \$4/vehicle.
- A new cardboard recycling program at the Houghton County Transfer Station (opening Dec 2015) where residents, business, and other organizations can drop off any form of cardboard. There will be no fee for a typical household, but businesses or other organizations dropping off a large volume will be charged a small fee.
- A recycling program at Michigan Tech where people can place recyclable materials in bins across campus. These materials are then picked up by *Waste Management* and eventually taken to *Eagle Waste & Recycling* in Eagle River, WI for sorting and processing.
- Michigan Tech composts its yard waste and a small amount of food waste. However, the brown and green wastes are not currently combined and maintained in a well-functioning compost pile that could fully feed Tech's gardens. The Master Gardener's goal is to instate this for 2016.
- Some yard waste composting in Hancock & Houghton. Hancock collects material during Spring and Fall Cleanup in biodegradable bags available for purchase from the city. At other times of the year, residents can drop off their compostable yard waste at the city garage. Houghton offers a similar drop off program for yard waste during Fall Cleanup at the city garage.
- The diversion of special wastes such as e-waste, appliances, tires, batteries, and oil from household trash. These services are available through a variety of private systems around the community that collect and recycle or safely dispose of these wastes.
- A state-sponsored bottle deposit system that collects and recycles aluminum beverage cans and glass bottles. Although the purpose of this system is to reduce litter, it does facilitate some materials recycling.

Hancock is the only community in Houghton or Keweenaw Counties to offer curbside recycling. Houghton County is recognized by the Michigan Department of Environmental Quality as one of the 58 counties in the state that does not have access to convenient recycling opportunities. Recycling rates in Houghton and Hancock are about 5% of the waste stream and Michigan Tech recycles about 14%, which is below Michigan's state average (15%) and even more below the US national average (34%). Recycling rates are well known to increase dramatically when regular curbside collection programs are in place. Moreover, not all drop-off programs are created equal- those located in less convenient locations, with less convenient hours of operation, and/or greater fees are less likely to be utilized as much.

Beyond the fact that only limited recycling opportunities are offered in Houghton County, major gaps in the current solid waste management plans are limited attention to composting and diverting organics and that there is no easy way to dispose of hazardous wastes such as pesticides, solvents, and other chemicals in Houghton County.

Environmental Benefits, Economic Incentives, and Motivation

Even in small, remotely located cities such as Hancock and Houghton, recycling and waste management programs produce environmental benefits. Those benefits include reducing the amount of energy required to extract and process raw materials, reducing pollution associated with landfills (leachate and methane emissions), reducing carbon emissions that contribute to global climate change, conserving resources for future generations, and encouraging the development of systems and technology for using resources efficiently.

But collection programs do not always generate enough profit to be driven by the private sector. Many of the benefits are diffused throughout society and not easily captured for profit, particularly when the same firms who operate in recyclables have a larger economic interest in managing garbage. Whether recycling programs generate profit in the private sector depends upon variable markets, differences between different types of materials and their market value, fuel costs, and transportation requirements, and existing levels of investment into infrastructure and systems that ultimately increase efficiency and reduce costs. *Waste Management*, for example, currently has little financial incentive to encourage greater participation in recycling programs because it makes more money from its garbage and landfill operations, it incurs transportation costs moving the materials to sorting/processing facilities and markets, market rates for plastics and other recyclable materials are variable and currently low, and because it has not invested in the infrastructure or design work at the transfer station to efficiently handle recycling. Municipalities, businesses, and households do have economic incentive to recycle, compost, and otherwise reduce waste. Any such program will reduce the amount of waste that goes into the landfill and the associated tipping fee charges for its disposal. Tipping fees in the western Upper Peninsula are relatively high at \$76/ton, but are negotiable by contract to organizations bringing garbage in bulk to as low as \$38.65/ton for Houghton County. Tipping fees provide an economic incentive to reduce waste by increasing the cost of disposal. Given that drop-off fees for recyclable materials under the current contracts range from \$40/ton for Michigan Tech to \$70/ton for Hancock, the lower cost of recycling and its ability to divert waste from the garbage stream could save money in tipping fees. Other service providers may charge less for recycling drop off and sometimes even pay to purchase recyclable materials depending on markets and programs, which would provide further economic incentive to increase the

ratio of recyclables to garbage in the waste stream. Businesses can also typically save money on garbage fees by recycling, especially if they generate a large volume of higher valued recyclable materials such as cardboard. Households also save by needing to purchase fewer city-approved garbage bags. The city loses some revenue due to lower bag sales, but that loss is offset by the drop in disposal fees paid to *Waste Management*.

The average costs incurred for garbage and recycling are summarized in the table below for Hancock and Houghton and they are compared to a peer community with a different program (Ironwood, MI). This comparison offers a sense of the range of expenses associated with these services across the western Upper Peninsula. Similar data are included for Michigan Tech on p. 16, later in this report.

Cost Comparison for Garbage and Recycling in Hancock, Houghton, and Ironwood, MI

MCD	Service Provider	Households	Garbage tonnage	Recycle tonnage	Costs per HH/month		
					Garbage	Recycle	Total
City of Hancock	City/Waste Management	1,830	94	5.0	\$15.00	\$0.62	\$16.00
City of Houghton	Waste Management	1,156	92	n/a	\$11.00	\$4.00	\$15.00
City of Ironwood	Eagle Waste	2,400	n/a	n/a	\$10.16	\$1.58	\$11.74

Sources: Personal Communications with City Managers and Utilities Managers from Cities of Hancock, Houghton, and Ironwood (Fall 2015).

Just as residents are generally willing to pay for the added convenience of garbage collection, many are also willing to pay the relatively modest cost for the convenience of having curbside recycling collection. Curbside collection saves households time and money in having to transport materials themselves. Most people who participate in recycling programs are not motivated by direct economic benefits. Rather, they participate to reduce the impact they have on the environment and out of pride for their community.

Recommendations

Hancock, Houghton, and Michigan Tech all currently provide some useful recycling and waste reduction programs, with Hancock's recycling and composting programs being the most comprehensive. These have social and environmental benefits worth sustaining. However, current recycling efforts in Hancock, Houghton, and at Michigan Tech have been minimal and local recycling rates are among the lowest in the State of Michigan and across the country. But, several recent developments suggest that **now could be a very good time to institute new (or revised) programs:**

1. People are demanding more convenient recycling access, as evidenced by: a 2011 survey of Houghton residents, increasing tonnage collected by the City of Hancock program through 2015,

and by ongoing community critique of a newly instituted \$4/vehicle fee for recycling drop-off at the *Waste Management* transfer station (instituted in August 2015).

2. A new highly efficient and large capacity recycling sorting and processing center opened in Eagle River, WI in 2013 with the goal of service northern Wisconsin and the Upper Peninsula. This has reduced transportation costs and introduced a new regional service provider with a strong economic interest in promoting recycling.
3. The 2014 Michigan Recycling Plan of Action at the state level is providing resources in the form of grant money and expertise to help institute programs and political will and leadership promoting the importance of recycling.
4. Current garbage/recycling contracts for both City of Hancock and Houghton will expire in summer 2016 and both cities have expressed some interest in collaboration.
5. Instituting enhanced recycling programs may not add any additional cost to residents or the university and could possibly save money.

Given that official encouragement, convenience, and financial incentives are major motivators in the success of any voluntary recycling and waste reduction programs, we recommend that the City Councils for Houghton and Hancock and the leadership at Michigan Tech University make recycling and waste reduction a clear priority. More specifically, we recommend the following actions (please see section IX.ii in the report that follows for more specific details on each of these recommendations). Action might be taken by municipalities, business organizations, Michigan Tech University leaders, or by an organized group of local citizens. The cities will need to take a clear leadership role, but Houghton County, the Copper Country Recycling Initiative, Michigan Tech, and/or other organizations should also be engaged.

1. **Institute programs that make recycling simple, easy, and cheap.** Recycling should be the easiest option for residents. This is our first and most important recommendation. It could most likely be achieved by expanding the current curbside recycling program in Hancock and instituting a new curbside program in Houghton and by expanding the current drop-off sites to more additional and more convenient locations with longer hours.
2. **Local municipalities should partner with one another** to support mutual goals and achieve economies of scale. Current contracts for both the City of Houghton and the City of Hancock expire during summer 2016. The cities could coordinate contract periods and request coordinated Requests for Proposals that would ensure a service provider a larger market. Alternatively, the cities might work together by sharing trucks or otherwise coordinate a shared system of garbage and/or recycling collection informally or more formally through establishing a joint solid waste management authority that might expand to include more local villages. At minimum, we recommend that the cities work together to discuss, compare, and jointly address the similar opportunities and challenges facing each community. Coordination between Houghton County and its various municipalities and townships could also greatly improve local services and help to ensure that the needs of all of our local communities are met. The county and its municipalities could, for instance, work together to implement a policy whereby any haulers are required to use the Houghton County Transfer Station as an initial drop site for materials collected.
3. **Work with businesses and schools.** Businesses and other community-based organizations (like schools, hospitals, etc.) should be included in solid waste planning and recycling programs. These organizations have economic incentive to reduce their own waste, they could partner in source reduction programs (such as charging customers for disposable plastic or paper bags and/or offering bulk purchasing opportunities), and/or they could host drop-off recycling bins at high-traffic local business locations where people go anyway, such as Walmart or local grocery stores.
4. **Encourage composting.** Composting is a key way to divert up to 50% of materials (yard and food wastes) from the household waste stream and to convert these materials into

useful fertilizer and its easy to do in a small space in your own backyard, saving costs of transportation and service provision. transportation an. Composting at home, or close, eliminates transportation and service costs. The Cities and/or Michigan Tech should implement a composting drive where they bring composting bins to town in a mass shipment and offer them to residents and groups at reduced costs and in prime locations around the community, or offer an immediate rebate program to local businesses who already sell compost bins. A drive like this in conjunction with information campaigns and block leaders championing the cause in their neighborhoods could greatly increase participation through leadership and facilitation. Similarly Hancock could better promote its composting program and consider opening it to Houghton residents as well, and Michigan Tech could expand its composting program on campus.

5. **Hazardous & E-waste information campaign and drop-off sites.** Hazardous wastes should not go into the landfill, but currently local residents have few opportunities for appropriately disposing of household hazardous wastes. An information campaign informing people of what materials are hazardous and where to dispose of them is important. Michigan Tech should develop an e-waste collection center on campus to make e-waste drop-off more convenient. The cities should offer biannual hazardous waste clean-up periods where residents can drop off hazardous wastes.
6. **Recycling advocates should engage in waste reduction and recycling discussions** with community and university leaders. Community and university leaders communicated to our research team that if there were more pressure from community members, they would be more inclined to pursue waste reduction and recycling opportunities. Residents who would like to advocate for more waste reduction and recycling programs should attend city council meetings and raise the issue, organize together to work toward clearly defined, attainable, and well-research goals, raise awareness and generate public pressure.
7. **Reduce, Reuse and Share.** Municipalities and businesses can create environments that encourage reuse in multiple ways, such as adding water bottle refill stations, allowing for bringing your own mug, and instituting policies such as plastic bottle-free campus (see <https://www.banthebottle.net/>) or otherwise removing disposable options. Individuals and purchasing units can: Buy used items rather than new; look for products that use less packaging and buy in bulk, which can both reduce packaging and save money; buy reusable over disposable items; choose items that include recyclable material; and trade and share with neighbors and friends through clothing swaps, tool sharing programs, and similar systems.
8. **Michigan Tech should serve as a community sustainability leader.** Promoting sustainability is part of Michigan Tech's vision and mission statements according to the Strategic Plan. But currently, the university has not developed clearly defined sustainability goals nor does not keep and publish data on sustainability metrics. Michigan Tech's recycling rate is about 14%. This is below the state of Michigan's (low) average and embarrassingly low for a university. The university could increase participation on campus through structural changes combined with leadership and information programs. In addition, Michigan Tech should envision itself as a sustainability leader not only on campus but also as a community partner that helps local municipalities to meet their waste reduction and recycling goals.

I. Waste Reduction and Recycling

The average American produces over four pounds of waste each day, including the everyday items we throw away such as packaging, bottles, food scraps, newspapers, grass clippings, old appliances, batteries, and paint. The waste we generate has increased from about 2.68 pounds per person each day in 1960 to a peak of 4.74 pounds in 2000, and dropped slightly to 4.4 pounds in 2013. Altogether, Americans generate about 254 million tons of waste each year. This amount has steadily increased since 1960, with faster increases during the 1980s and 1990s as consumption increased and disposable products increased in popularity, and levelled off somewhat since about 2000, due in part to the impact of the economic recession.²

Our waste is primarily composed of paper (27%), food scraps (15%), yard trimmings (14%), plastics (13%), metals (9%), and rubber, leather and textiles (9%). It is possible to compost or recycle about 80% of our waste. We actually do recycle or compost about 34%.³ The remainder of the waste is taken to landfills or incinerators for disposal.

Between the Cities of Houghton, Hancock, and Michigan Technological University, we generate about 273 tons of garbage that goes to the landfill each month. Between Hancock, Houghton, and MTU, we recycle about 20 tons per month, for a recycling rate of about 8% of our waste stream.

Modern landfills are well-engineered facilities that must comply with federal regulations and are regularly monitored by state agencies. They must be designed to protect the environment from contaminants in the garbage. Still, they do produce some negative social and environmental impacts, including the following.

- Landfills produce hazardous leachate (liquid formed as waste breaks down and water filters through garbage). Leachate must be monitored, collected, and treated into perpetuity. Tens of thousands of gallons of leachate are produced each day from a typical landfill. The leachate is collected and then transported to a wastewater treatment facility for treatment. This is one of the highest costs of operating a landfill.
- Despite the well-designed features, landfill liners leak, which can cause groundwater and/or surface water contamination.^{4a} These leaks are not always rapidly detected and fixed. Moreover, leaks can also occur in leachate pumping systems or be related to leaks in landfill covers. There are environmental risks and landfill management that must continue in perpetuity.⁵
- Landfills release methane gas which contributes to global climate change. Methane accounts for about 10% of all greenhouse gas emissions from human activities⁶ and landfills account for about 18% of human-produced methane emissions in the US.⁷ Methane is important for climate change because its pound for pound comparative impact on climate change is more than 25 times greater than CO₂ over a 100-year period.⁸ Altogether, landfills are responsible for about 2% (in CO₂ equivalent units) of all US greenhouse gas emissions (about 115 million metric tons) that contribute to climate change.⁹
- People prefer not to live near a waste disposal site because of the associated odor, noise, reduced property values and neighborhood disturbance. It can be difficult, especially in more urban areas, to find places to site new landfills or expand existing ones.

Reducing the amount of waste we generate to begin with, composting, and recycling waste are all ways to reduce environmental risks and to save the social and economic costs associated with managing our waste

^a There is a large body of research on identifying where leaks occur and how to fix them, which is difficult when they are covered with several feet of garbage. Our team found over 4,000 peer reviewed articles published since 2011 in a search for “landfill leaks”. Yeneigul et al. (2013) call landfills “one of the most common human activities threatening the natural groundwater quality” (p. 1761). Yeneigul, NB, AMM Elfeki, C van den Akker, and FM Dekking. 2013. “Optimizing groundwater monitoring systems for landfills with random leaks under heterogeneous subsurface conditions.” *Hydrogeology Journal* 21: 1761-1772.

daily and into perpetuity. The most effective way to reduce waste is to not create it in the first place. Specific benefits of reducing and reusing include: pollution prevention because there is no need to harvest new raw materials, energy savings and decreased greenhouse gas emissions (and in turn climate change mitigation), financial savings, and reduced amount of waste that needs to be recycled, stored in landfills, or burned in incinerators.¹⁰ Reducing and reusing will make a much greater environmental difference than recycling, and these factors should be key parts of any waste reduction strategy. However, this point largely contradicts the new state-level Michigan agenda to double the state municipal recycling rate over the next 2 years. The reason for this contradiction is likely that recycling has greater economic incentives that meet multiple agendas (both environmental and economic) than does reducing consumption.

Recycling does have environmental benefits and it helps create new well-paying jobs in the recycling and manufacturing industries in the United States.¹¹ The recent *"More Jobs, Less Pollution: Growing the Recycling Economy in the US"* study provides evidence that improving the United States' recycling and composting strategies can help address national priorities like climate change, job creation, and improved environmental and human health. The national goal outlined in this study is to achieve a 75 percent diversion^b rate for municipal solid waste (MSW) and construction and demolition debris by 2030^c. Benefits to this will include creation of jobs, reduced greenhouse gas emissions and overall pollution, and immeasurable benefits derived from reducing use of nonrenewable resources, conservation within materials economy, and economic resilience through increasing the number of stable and local jobs. It is estimated that increasing the recycling rate in Michigan from the current level of 15% to 30% would mean adding 7,000 to 13,000 jobs.¹² Calculating the precise environmental benefit of recycling, however, is difficult. For example, doing so would entail calculating the energy and material costs required to transport and process recyclable materials and then comparing that amount with the cost of extracting, transporting, and processing raw material.

Reducing, reusing and recycling have indirect benefits as well. For example, many benefits go to future generations, not today's consumers. These benefits include the continued availability of inexpensive raw materials and reduced future costs associated with constructing, maintaining, and regulating landfills. In addition, high levels of recycling increase the incentives that firms have to invest in new recycling technology and systems, which is crucial to further progress in the development of profitable recycling systems. Such systems are important if our society is to develop in a sustainable fashion.

Recycling is not free of environmental impacts or social costs, but it is usually cheaper than landfills or incineration in the short term, as well as the long term. Recyclable materials must be collected, sorted, transported, and reprocessed. All of these activities have associated costs. In the short term, depending on fluctuating global markets for recyclable materials, recycling sometimes and for some materials pays for itself or generates income. Other times and for materials with less demand, recycling is not an income-generator, but instead may simply cost less than disposal costs in a landfill.

i. Motivation

For Individuals: Research shows that individuals participate in voluntary recycling programs mainly out of pride for their communities and out of concern for the environment. Participation rates generally increase if recycling is easy and simple (single stream or limited presorting, curbside collection at least every other week with a special bin that all households are given makes a big difference), if there is economic incentive (need to purchase fewer garbage bags), if it is an established and accepted norm in

^b Diversion is defined as diverting materials from waste disposal (in landfills or incinerators) to other uses or processes including "waste reduction, reuse and remanufacturing, recycling and composting."

^c Industrial waste is not included in this report.

the community, and if community leaders encourage residents to participate.

For Municipalities: At the municipal level, recycling and waste reduction programs are generally motivated by three factors:

- State or federal regulations that mandate action
- Significant community support
- Practical economic and health-related reasons

No Michigan or federal law mandates recycling at the municipal level. The state, however, does encourage counties to prepare a Solid Waste Management Plan that strives for a 20 to 30 percent recycling rate. Detailed economic analysis comparing costs of landfills to recycling may find that municipalities would spend less on waste management if they can increase recycling rates by reducing tipping fees/tonnage fees for landfill disposal. In general the American public supports and demands access to recycling programs. This is also true locally. Hancock's curbside recycling program was created mainly due to community support. A recent survey of Houghton residents (2011) indicates strong demand from residents for a curbside program there as well.¹³

For Private Collection Firms: Whether or not there is economic incentive for private firms to get into the recycling business varies depending on markets and demand for recycled materials and products, transportation costs, investments that a firm has made (or not) in infrastructure to support an efficient recycling program, and the amount of recyclable materials available in a local area. In more urban areas, there are generally proximate markets for selling material, a large amount of recyclable material available in the local waste stream, firms who have invested in efficient processing strategies, design, and technologies (such as a high-tech material, recovery facility or MRF), and general economies of scale. These factors are more challenging in more rural and remote areas such as the Upper Peninsula.

In the case of *Waste Management's* current local operation, recycling is offered as a service to provide the county with some level of recycling. However, its recycling-related activity is not prioritized component of the facility's business in the region, which is primarily focused on garbage collection and landfills. Historically, *Waste Management* transported recyclable materials from Houghton County to its own processing facilities in Menasha, WI (PGI Paper Valley, near Green Bay which is 243 miles each way from Houghton) or to recycling centers in the Milwaukee area. This required long distance travel and high transport costs.^d

In 2013, a new high-tech recycling sorting and processing facility was opened in Eagle River, WI at *Eagle Waste & Recycling*, which is 103 miles each way from Houghton. This facility reduces travel time and transport costs considerably (by about 140 miles each way or even more if comparing to Milwaukee area). Given that the landfill is 41 miles from Houghton, transport to this newer recycling facility is about 62 miles farther each way than it would be to transport all materials to the landfill. For these reasons, *Waste Management* recently changed its strategy and now collects recyclable material in the Houghton area and transports it to *Eagle Waste & Recycling*.

Eagle Waste & Recycling's economic interests are in line with recycling as much as possible. Under the relatively new ownership, the company decided to invest heavily in recycling infrastructure and to make recycling a key strategy in its business plan. In 2014, the company invested about \$5 million in a state-of-the-art material recovery facility (MRF) that is more like what you would find in a major urban area with the goal of serving as the regional recycling center for northern Wisconsin and the Upper Peninsula of Michigan.¹⁴

^d Despite repeated efforts, we were not able to make contact with local managers at Waste Management. The information in this paragraph is based primarily on the prior 2002 report and interpretation and extrapolation based on other facts, including Waste Management's websites.

ii. Federal Policies

The United States has no federal law that mandates recycling and as recently as 1973 no American municipalities had curbside recycling. The Resource Conservation and Recovery Act (RCRA) of 1976 gives recycling program initiation and regulation authority to state and municipal governments while the Environmental Protection Agency's (EPA) only provides waste program policy and technical guidance for all levels of government. Amendments to the RCRA include the 1984 Federal Hazardous and Solid Waste Amendments, which increased the EPA's standing regulatory authority over the generation, transportation, treatment, storage, and disposal of hazardous waste, and increased the focus on reducing waste, ending land disposal hazardous waste, and remediation. The EPA Office of Resource Conservation and Recovery (ORCR), a subsection of the Office of Solid Waste and Emergency Response (OSWER), implements the RCRA.

In the United States, over 75 percent of the national Municipal Solid Waste (MSW) stream (waste stream for short) is comprised of only five materials: paper and paperboard, yard waste, food scraps, plastics, and metals. Organics alone made up 64 percent of the total MSW in 2008. Increased recycling helped decrease the rate at which waste was entering landfills and incinerators in the 1970s, and recycling tonnage increased in the 1980s and 1990s, but has leveled off since 2000. The U.S. Environmental Protection Agency (EPA) waste stream recommendations follow the reduce, reuse, and recycle model, and states "The most effective way to reduce waste is to not create it in the first place." However, while the EPA provides evidence and public information about how and why reducing production and reusing products are "the most effective ways you can save natural resources, protect the environment, and save money", the national agenda is overwhelmingly more focused on recycling.

iii. State Policies

Background: In the late 1970s Michigan became a model of environmental responsibility for other states when it led the charge to reduce litter by instating a 10-cent refund on most bottles and cans¹⁵. As a direct result of the Bottle Bill, Michigan residents now recycle up to 97% of plastic and aluminum deposit containers, compared to the national average of less than 50%. By 2005, Michigan also had well-established, local Household Hazardous Waste (HHW) programs that kept pesticides, mercury, electronics containing heavy metals, cleaners, and oil-based paints out of landfills and incinerators. Despite these successes, Michigan continues to have one of the poorest recycling programs of the Great Lakes states and one of the lowest recycling rates in the nation. Michigan's residential recycling rates are as low as 15 percent¹⁶ (30th among all 50 states) for materials like plastic, metal, glass, and paper. As a result, over \$435 million in recyclable materials enters Michigan landfills every year. Recycling these materials would reduce landfill space, contribute to the state economy, and decrease environmental impacts associated with waste disposal.¹⁷

In 2005, the Michigan Department of Environmental Quality (DEQ) pointed out several downfalls and gaps in the state's recycling programs and policies in their report titled "Recommendations for Improving and Expanding Recycling in Michigan." For example, although the HHW programs were successful, they were only reaching about half the state and therefore need to be expanded in order to reach more residents. In addition, Michigan had no formal system or requirement for data collection surrounding Municipal Solid Waste (MSW) recycling programs. This lack of data collection impedes the state's ability to handle, collect, transport, and market recyclable materials. As early as 1996 the DEQ developed a plan to collect comprehensive and standardized recycling data that is comparable to other states (as recommended by the EPA), but the state legislature did not act on this recommendation and nothing happened. An obvious program was the lack of dedicated funding to support recycling programs. In 2005 Michigan allotted a

mere \$200,000 to state-level efforts focused solely on recycling. These funds supported only two salaried positions that focused on statewide residential recycling, composting, electronic recycling, and industrial and commercial recycling programs for their entire state. This was by far the smallest recycling budget allotted to any Great Lakes state (see Table 1) and the program ranked 41st out of 48 states who reported their annual budgets. Despite the increase in funding in the last couple of years within the state of Michigan, its recycling budget remains substantially lower in 2015 than other Great Lakes states.

Table 1. Great Lakes States' Recycling Budgets in 2005 and 2015 (2005 Budget Source: MI DEQ)

State	Annual Budget 2005	Annual Budget 2015
Pennsylvania	\$66,000,000	\$47,618,000 ¹⁸
Wisconsin	\$29,000,000	\$15,000,000 ¹⁹
Minnesota	\$14,200,000	\$24,276,000 ²⁰
Ohio	\$12,000,000	\$4,535,500 ²¹
Illinois	\$6,500,000	\$4,758,700 ²²
Indiana	\$3,200,000	\$1,853,000 ²³
Michigan	\$200,000	\$1,000,000 ²⁴

Economic Incentives and Markets for Recycled Materials: Public Sector Consultants²⁵ released the report "Expanding Recycling in Michigan" in 2006 that summarized the performance of Michigan's municipal solid waste (MSW) programs for the Michigan Recycling Partnership.²⁶ They reported that Michigan has over 2,000 businesses in the recycling and reuse industry that generates \$11.6 billion, \$42.1 billion in payroll, \$490 million in state and local taxes, and employs over 60,000 people. The recycling industry in Michigan (including direct, indirect, and induced economic activity) was estimated to provide over 164,000 jobs. However, the 2005 DEQ report outlining recommendations for improving and expanding recycling in Michigan highlighted the fact that Michigan still has unused potential for markets that require recycled content. Since businesses could not access a steady stream of post-consumer, recycled materials from within Michigan, they were importing these materials from other states or countries. State economic incentive programs can be used to attract recycled product manufacturers to site their facilities within appropriate states, but there are no such incentives in Michigan. Without standardized data collection about the location, amount, and type of recyclables throughout the state, Michigan cannot even provide information to public and private sectors and therefore cannot promote the sale and use of these materials. Recycling is a global industry that experiences fluctuations in price and demand for products like plastics based on market changes in other parts of the world. Nevertheless, the state could take steps to support recycling markets that still benefit the state, such as providing tax incentives to businesses that use recycled materials to create their products, or helping communities establish collection programs.

Michigan's Residential Recycling Plan: In February 2014 the DEQ presented their Proposed Plan of Action on Recycling, the result of over two years of meeting with conservation groups, waste service providers, recycling experts, retailers, and local governments in order to discuss what a successful recycling program in Michigan could look like, and outline this in a collaboratively produced plan of action. Components of this recycling plan included the recommendation that a statewide comprehensive recycling plan include reliable measurement, tracking, and reporting, leveraging of existing education,

outreach, and assistance programs, convenient access, market development, current county solid waste planning processes, and state-level leadership. Specifically, the DEQ proposed increasing the number of counties with convenient access to residential recycling from only 25 in 2014 to 29 in 2015, 45 in 2016, and 83 in 2017, with the ultimate goal being to increase Michigan recycling to above the average of all Great Lakes states by December 2017. The DEQ has attributed low residential recycling participation rates with a weak market for recycled materials, lack of public awareness, lack of convenient access to recycling, and "a historic lack of leadership to solve the problem". Only 25 of Michigan's 83 counties currently have "convenient access" to recycling, which the DEQ defines as:

- Each resident living in a residence of four households or less must have access to recycling through ordinance, public/private partnerships, private-hauler contracting, or a publicly managed program.
- Each community with 10,000 or more people must provide each resident access to curbside recycling.
- In a community without curbside recycling, there must be at least one drop-off location per 10,000 people.

In April 14, 2014 Michigan Governor Snyder released "Michigan's Residential Recycling Plan", which outlines 11 broad strategies for doubling the state's residential recycling rate within 2 years. The strategies focus on prioritizing recycling through establishing meetings, organizations, and data and best practices sharing opportunities, as well as offering grants to local governments to start and/or expand programs (Community P2 incentive grants described below). The Governor's office also created an advisory board of stakeholders who guide the new state recycling plan and made a \$1 million appropriation to the DEQ budget, specifically for implementing the recycling initiative on June 16th, 2015 for the fiscal year (FY) 2016.

In March 2015, DEQ hired four new regionally based recycling specialists whose first tasks are to provide technical assistance to communities and businesses as they work to increase access to curbside and drop-off recycling programs. The specialist for the northern half of the Lower Peninsula and the entire Upper Peninsula is Brian Burke who is based out of Bay City, MI, burkeb@michigan.gov, (517) 243-3904.

Incentive Grants: Community Pollution Prevention (Community P2) grants are meant to help grow recycling at the local level. A round of initial Community P2 grants were awarded in 2014 to collect data on: recycling rates, recycling accessibility, high performing or model recycling programs, the composition of municipal solid waste currently put into landfills and incinerated, and the economic value of this material. The first resulting benchmark study ("Measuring Recycling in the State of Michigan") was released in May 2015.²⁷ The 2015 Community P2 grant program continued with the goal of enhancing local and regional recycling programs that would help increase the statewide recycling rate.^e A total of \$635,500 was awarded to 14 separate projects and will support the development of recycling infrastructure, start-up programs, program enhancement, and outreach and education. Houghton County was awarded one of the largest of these grants, with the purpose of starting a cardboard recycling program at the Houghton County Transfer Station. The Copper Country Recycling Initiative wrote this grant and is currently working to implement it, but the grant is administered officially to Houghton County.

For 2016, the DEQ is consolidating its recycling related grant opportunities under their sustainability grants program. Grants included in this program will include the scrap tire grants, the Community P2 grant, and a new Residential Recycling Grants that is still in the early development stages but is expected to award approximately \$400,000 in 2016.

^e Note: The Copper Country Recycling Initiative applied to this grant program and was awarded ~\$92,000 in funding for Houghton County recycling programs.

iv. Houghton County Solid Waste Management Plan

The State of Michigan requires all counties to prepare a solid waste management plan. Typically, these documents include plans for:

- Disposing of household garbage that cannot be recycled or composted
- Diverting yard wastes (and other compostable material) from landfills
- Diverting special and hazardous materials from landfills and incinerators
- Recycling material that can be recycled

In Houghton County, responsibility for these tasks is split across municipalities (cities and villages) and the county government that covers most of the townships. The Houghton County Solid Waste Management Plan covers all of these municipalities. The plan was created by the Houghton County Solid Waste Planning Committee and approved by the Michigan DEQ in 2001. It addresses the generation, transfer, and disposal of Houghton County's solid waste. Houghton County outlined a system of two transfer stations to collect and transport solid waste to two private landfills sites (located at K&W Landfill in Ontonagon County and Wood Island Landfill in Alger County). The Houghton County Selected System authorized importation of solid waste from Keweenaw, Baraga, and Ontonagon Counties. Finally, Houghton County planned to implement waste reduction measures through (1) source reduction, (2) volume reduction, and (3) resource recovery tactics- namely recycling programs.

II. Garbage Programs

Garbage collected across Houghton County, including any waste material that is not recycled, composted, or disposed of in a special manner ends up in the K&W landfill located in Ontonagon County, Michigan that is operated by *Waste Management*. Before going to the landfill, most waste is handled at either the Houghton County Solid Waste Transfer Station in South Range or the *Waste Management* (Peninsula Sanitation) transfer station in Houghton. Transfer stations are facilities where municipal solid waste is unloaded and briefly held while it is reloaded onto larger, long-distance transport vehicles for shipment to landfills.

Approximately 1,800 Hancock, 1,200 Houghton households, and 8,000 students, staff, and faculty from Michigan Technological University place their garbage in waste receptacles that eventually get transferred to the K&W landfill. Curbside pick-up of waste at households in Houghton is conducted by *Waste Management* while residents of Hancock have their garbage collected by the City of Hancock Department of Public Works. The city owns a garbage truck and uses its spare one to pick up recycling. Hancock will be due to purchase a new garbage truck soon. All waste collected from households in Hancock and Houghton as well as dumpsters located on Michigan Tech's campus are taken to the *Waste Management* transfer station located on Enterprise Dr. (off Sharon Ave) in Houghton before it is transferred to the K&W landfill.

i. Economics of Garbage

Hancock households produce an average of about 94 tons of garbage each month, for which the City of Hancock is charged \$76.36 per ton for disposing of the waste at the *Waste Management* transfer station. Houghton households produce an average of 92 tons of garbage each month that is collected curbside, for which they are charged \$61.66 per ton plus an additional \$5.82/household per month for hauling charges. Altogether the costs amount to about \$15 per household/month in Hancock for garbage and almost \$11 per household/month in Houghton. Michigan Tech is charged a weighted average of \$68.86 per ton of garbage, plus dumpster costs and produced 915 tons of garbage in FY 2014/15. See Table 2.

In both Hancock and Houghton, the cities pay the fees and recover the costs by charging residents a set fee for garbage collection services on their water bill. The solid waste programs for both cities are also paid for through the sale of garbage bags that must be used when households place their garbage on the curb for pick up. The use of a bag-fee system provides an economic incentive to reduce the amount of garbage that households generate. It is a strategy that should support waste reduction.

Table 2. Garbage Disposal Costs (Monthly)²⁸

	Units ^f	Cost/ton	Avg tonnage	Hauling fees	Total cost	Cost per unit
Hancock	1,830	\$76.36	94.3	\$20,208	\$28,903	\$14.98
Houghton	1,156	\$61.66	92.0	\$6,728	\$12,401	\$10.73
MTU ^g	8,810	\$68.86	83.2	\$12,000	\$17,729	\$2.01

^f Units reported for cities are the number of household pickup stops. For MTU this is approximate number of students, faculty, and staff who come to campus on a given day. The MTU figures here are more of a combination of some residential impact (students living in dorms) and some place-of-business/school impact. MTU is added here because, the amount of solid waste it generates/collects is similar to the municipal household load, it operates in many ways similar to a local municipal body, and it contributes significantly to the local solid waste volume.

^g The cost/ton and average tonnage for MTU are based on a weighted average to account for the multiple types of garbage picked up.

Citizens of Hancock and Houghton may also drop off garbage at the Houghton County Transfer Station. The Houghton County Transfer station is located in Atlantic Mine in 2012 at a cost of \$2.065 million. This was paid for by the Rural Development loan which was approved by the county. The county still owes more than half of the construction costs which are paid for by the disposal services the Transfer Station provides to the county. A charge of \$75.00 per ton or \$1.00 per 13-gallon bag, \$1.50 per 30-gallon bag, or \$2.00 for garbage bags over 30 gallons are assessed when dropping off garbage at the Houghton County Transfer Station. Construction waste is charged at a rate of \$85.00 per ton. Houghton County collects the garbage locally and then transports it to the K&W landfill where it has a negotiated contract to dispose of waste for a charge of \$38.85 per ton. In addition, it collects oil and metal scrap in separate containers. Its address is 17808 Erickson Drive, Atlantic Mine, MI, 49905. Its service hours are 8:00 a.m. to 4:00 p.m., Monday to Friday. On Saturday, it opens from 8:00 a.m. to 2:00 p.m.

ii. The K & W Landfill

All household garbage collected in Houghton County ends up in the K&W landfill which is located in Greenland Township, Ontonagon County about 41 miles distance from Houghton. The facility is privately owned by *Waste Management* and serves 5 Midwestern U.P. counties (Baraga, Gogebic, Houghton, Iron, and Ontonagon) as well as several other locations located in Northern Wisconsin.

Charges: The landfill charges a gate based tipping fee of \$76/ton. Through contracts fees charged to specific organizations who deliver garbage in bulk. For instance Houghton County is charged \$38.65/ton for the material they deliver. These fees vary slightly each year, depending on fuel prices and other costs, but have remained within a couple of dollars difference over the last few years.²⁹

Across the United States, average gate tipping fees at landfill gates were \$50/ton in 2011. In Michigan, the average gate tipping fee was slightly less at \$47/ton and ranged from \$25/ton at the least expensive landfill to \$88/ton at the most expensive.³⁰ The survey used to calculate these fees has not been conducted since 2011 data. Current tipping fees (2015) at other Upper Peninsula landfills (both municipally owned and managed) are \$43.50/ton at Marquette County Landfill³¹ and \$57/ton at Delta County Landfill near Escanaba.³²

Capacity: The K&W landfill was built in 1988 and currently has a footprint of approximately eight acres. Each year an average of 60,000 tons of waste are sent to the landfill, with the most ever received in a single year being 90,000 tons. The capacity of the landfill is 2,700,000 tons.

The landfill has plenty of room to expand to fill demand. Depending on how much solid waste is received, they request permits for and build additional cells. A new cell costs \$3.5 - 4 million and, at current rates, typically last approximately 7 years. With the new cells, the landfill has a lifespan of about thirty to forty more years. Even after four more cells are added to the current landfill site, *Waste Management* owns property that has the potential for cell siting. However, at that time, they will have to apply for another permit.

Classification: The Michigan Department of Environmental Quality rates this facility as Level II facility, which means that it can accept municipal solid wastes; contaminated soils below a certain threshold, such as soils lightly contaminated from leaking underground fuel tanks; demolition wastes, sludge from paper mills, ash from boilers, and asbestos.

The landfill does not accept the following materials: compost, hazardous waste, impacted soils that exceed the threshold, appliances (such as refrigerators, dryers, washing machines, freezers), waste

containing hazardous liquids (such as car batteries, paints, biohazardous medical materials), and non-residential fluorescent lamps. Tires are banned from disposal in landfills in the state of Michigan. Still, hazardous materials of these types may sometimes make their way into the waste stream unidentified.

Construction: Each cell at the landfill is protected by two plastic liners. These liners prevent water from seeping through the landfill and reaching the surrounding watershed. Without the liner system, contaminants within the landfill could leach into the surrounding watershed and cause considerable environmental damage and contaminate drinking water. The liners used at the Ontonagon landfill have a 300 year life expectancy. However, liner systems do fail and demand patching when this occurs.

Directly above the primary layer is a thick layer of sand and a collection system that pumps out any liquid that accumulates there. Below that liner is another layer of sand and another collection system. The landfill also has an underground monitoring system as an added safety feature in detecting potential leaks in the liner system.

All of the collected water (leachate) is pumped into a transportable storage tank that holds 500,000 gallons. Two 10,000 gallon trucks transport the leachate forty-four miles to the Portage Lake Water & Sewer Authority, which charges \$0.025 per gallon of leachate to be processed, from 2-6 times per day. In 2001, the landfill shipped a total of five million gallons of leachate. The primary source of leachate is organic waste accumulation in the landfill. A major problem occurs every spring when the treatment plant cannot accept leachates due to flooding.

The K&W Landfill is in good standing with regards to meeting state and federal environmental and reporting standards. According to Michigan Department of Environmental Quality records, it has not been cited with any violations since 2004. In 2004, the landfill was cited with a violation for “failure to respond to statistical increase,” but this issue was resolved and closed in 2006.

III. Recycling Programs

Across the state of Michigan, about 61% of all households have access to convenient (at least biweekly) curbside recycling and 34% have access to curbside composting. Highest access is in the southeast part of the state (79% of households) and lowest access in the Western Upper Peninsula region (including Houghton/Hancock) which is the only region where 0% of households have convenient curbside access to recycling.³³ Figures 1 and 2 show that the Upper Peninsula of Michigan is behind the rest of Michigan in terms of offering convenient curbside or drop-off recycling options. There are only 4 of the 15 counties in the Upper Peninsula that are defined as having convenient recycling options. These counties are Alger, Chippewa, Marquette, and Schoolcraft.³⁴

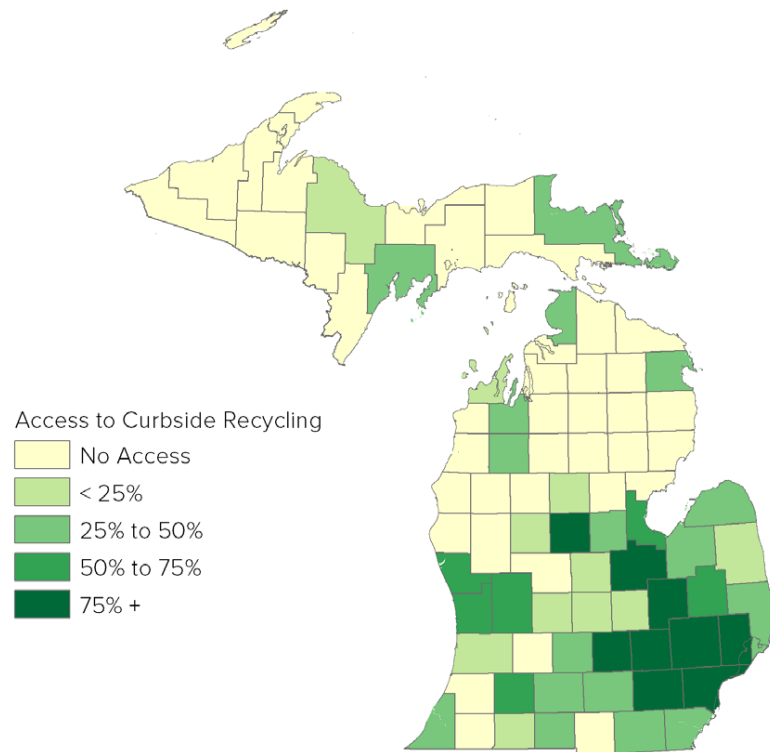


Fig.1 Access to Curbside Recycling by County³⁵

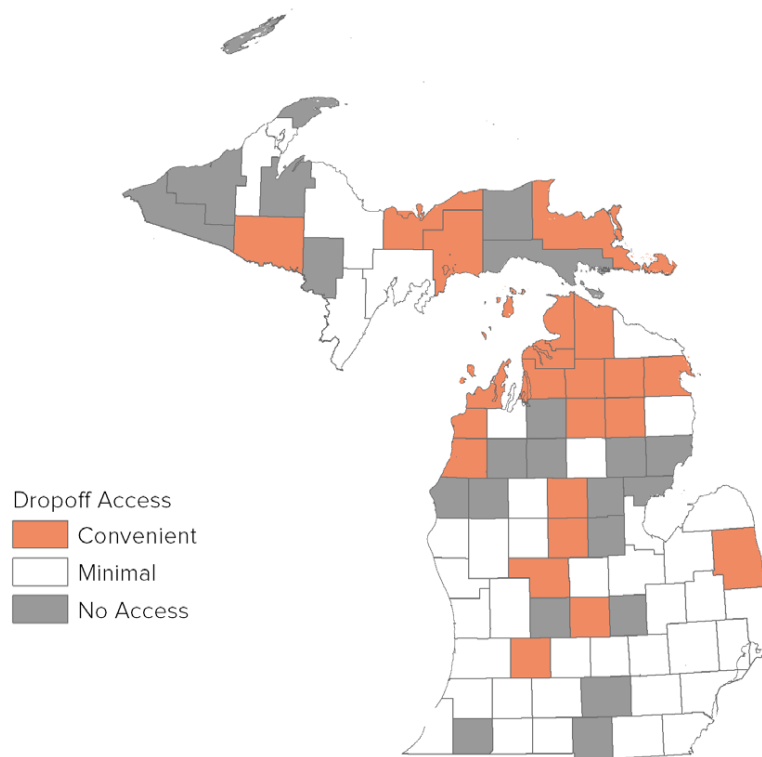


Fig. 2 Access to Drop off Recycling by County³⁶

i. Local Recycling

Recyclable materials collected in Hancock, Houghton, and at Michigan Tech are brought to the *Waste Management* transfer station in Houghton where they are stored temporarily and then transported to *Eagle Waste & Recycling* in Eagle River, WI for sorting, processing, and marketing. See Appendix A for lists of acceptable recyclables, locations, and recycling alternatives.

Hancock

Since 1996, Hancock has given residents access to a monthly curbside recycling program. On the last Thursday of every month, Hancock residents can leave their recyclables on the curb to be picked up by the City of Hancock. All material is brought to *Waste Management's* transfer station, which also serves as a drop off station. Another drop off station for Hancock residents is the City Garage, located at 1601 Tomasi Dr. in Hancock during business hours Monday - Friday from 9:00am to 3:30 pm.³⁷ The City is now beginning to partner with Hancock Schools with a recycling dumpster there as well. Hancock is the only municipality in Houghton County to have curbside recycling.

Curbside recycling pick-up is the last Thursday of every month. All acceptable materials may be mixed. They must be in a reusable bin with a lid, without plastic bags. Clean all containers in order to stop contamination. Remove the paper clips and staples. Cardboard must be broken down and flattened. This is a change from the previous program where all recyclables were required to be in a clear plastic bag. If recyclables are placed in a bag in the new program they will not be picked up.

McGann Building Supply and Ristos Hardware are stocking recycling containers. McGanns offers three sizes, a standard 13 gallon tote for \$18.99, a 34 gallon container with wheels for \$23.99, and a 48 gallon container for \$69.99. Ristos offers two sizes, a 32 gallon round container for \$27.99 and a 34 gallon container with wheels for \$29.99.

Houghton

Citizens of the City of Houghton are required to take their recycling to *Waste Management's* building in Houghton at 1108 Enterprise Dr. As of July 6, 2015 *Waste Management* increased their costs of drop-offs to \$4/vehicle.³⁸ *Waste Management's* Recycling hours are as follows: Monday, Tuesday, Wednesday, and Friday from 9am-3pm, Thursdays from 9am-7pm.

All recycled materials MUST be emptied out of trash and paper bags. *Waste Management* requests that cardboard boxes be flattened to leave room for other materials and for all containers to be washed to stop any contamination.

In a 2011 survey of Houghton residents that achieved a 44% response rate and a representative sample, residents strongly supported the statement: 'Houghton should offer curbside recycling.' In fact, they rated this statement highest among unmet needs in terms of city services.³⁹

Michigan Tech

Michigan Tech currently provides one large recycling bin to each department as well as provides some bins around each of the buildings and residences on campus. Smaller, individual bins can be requested with a Maintenance Direct order for a small departmental charge. Once the work order is processed a custodian will deliver the bin to the requesting party. *Waste Management* comes on an on-call basis only, so they may not come at all one month and multiple times a week another month.

Cardboard Recycling and the Copper Country Recycling Initiative

A new cardboard recycling program at the Houghton County Transfer Station is scheduled to open December 15, 2015. Residents, business, and other organizations will be able to drop off any form of cardboard. Cardboard dropped off at the transfer station will be stored, baled, and marketed. There will be no fee for a typical household, but businesses or other organizations dropping off a large volume will be charged a small fee. This start-up of this program was funded by a grant from Michigan Department of Environmental Quality, which was written by the Copper Country Recycling Initiative and submitted by Houghton County. It is expected that once operational, the program will pay for itself through receipts from selling the cardboard, which is one of the highest valued recyclable materials.

The Copper Country Recycling Initiative Task Force (CCRI) organized in 2014, based out of the Houghton County Planning Commission's decision to focus its attention on recycling programs and with the intention of submitting a grant proposal that would help to fund a new recycling program in Houghton County. CCRI applied for a recycling grant from the Department of Environmental Quality's Pollution Prevention Fund and Houghton County was awarded a \$92,000 grant (one of the highest values awarded) focused on cardboard recycling. The CCRI established goals to increase cardboard recycling at the Houghton County Transfer Station from 0% in 2015 to 50% in 2016, and 75% in 2017. Additional components to the grant include funding to create a satellite drop-off center in Chassell, Michigan and conduct an educational outreach recycling campaign.

Business Recycling

Several businesses in the local area recycle limited items. Most of the larger businesses that generate a large volume of cardboard, bale their cardboard and contract with a provider (such as *Badger Recovery*, see p. 29 for more information) who picks up cardboard bales and takes them to market.

In addition to recycling cardboard boxes, Walmart also accepts used grocery bags from its customers. However, customers can't bring and recycle other recyclable products like milk bottles. Walmart also has an e-waste recycling policy.⁴⁰ SHOPKO recycles cardboard boxes and plastic.

Likewise, Econo Foods recycles cardboard, besides providing a recycling facility to the customers. In conjunction with the bottle bill, Econo and other grocery stores in the area have several machines for collecting beverage cans and bottles and reimbursing people who bring them in. Econo goes one step further than other grocery stores by offering, in the same room, drop-off opportunities for used grocery bags, and larger milk bottles, etc.

Applebee's Grill and Bar recycles bottles and cans. Its liquor vendor collects empty bottles. Burned, used cooking oil is collected by some individuals. Trading of this used oil is free of cost to both sides. Although the purpose of collecting used oil, in this case, is unknown, generally it is used for bio-fuel, which is relatively clean, with low carbon content. Applebee's trashes food waste.

These are just a few example of how local businesses handle waste and recycling. Overall, businesses tend to recycle valuable waste like cardboard because it saves them money. In terms of providing recycling opportunities to the customers, Econo Foods offers a limited amount. In a cold location with several snowy days, Econo Foods looks like a one-stop solution for grocery and for recycling. This kind of set-up could be expanded to offer somewhat more at Econo and at other grocery stores and businesses such as Walmart or SHOPCO.

ii. Recycling Participation

Measuring participation is an important step for gauging the success of current and future recycling programs and for measuring success toward reaching a specific goal. Measurements allow programs a chance to improve and they provide important information for potential recycling-based business start-ups. Unfortunately it is time consuming and expensive.⁴¹ During the FY14 alone there were three separate grants awarded (totaling \$250,000) to measure recycling rates and access to recycling programs across the state of Michigan.⁴² Currently there is no clear commitment to recording participation in local recycling programs, aside from the data collection on number of participating households and tonnage collected by the City of Hancock which began in relation to this project in July 2015.

Across the State of Michigan, participation rates vary from less than 1% of eligible households participating in some programs to over 95% participation in others. On average, about 38.5% of Michigan households participate in recycling.⁴³ Participation rates indicate the proportion of households or individuals who participate. Recycling rates, however, are about the proportion of waste that gets recycled and are generally calculated following the EPA formula of taking the recycled tonnage divided by the total of garbage plus recycled tonnage.

Tables 3 and 4 illustrate the participation and recycling rates for Hancock and Michigan Tech. No data are available for Houghton, in part because we were unable to get information on recycling tonnage gathered at the *Waste Management* transfer station drop-off site. The tables show that Hancock's participation rate at 15.7% is much lower than the state's average participation rate of 38.5%. There is still room for Hancock to greatly increase participation. The recycling rates of 4.08% and 14% for Hancock and Tech respectively are well below the national recycling rate of 34%. In order to meet Governor Snyder's goal of a 30% recycling rate by 2017 Hancock and Tech would need to increase its participation rates and increase the proportion of waste recovered.

Table 3. Recycling Tonnage for Hancock (2015)^h

Month	Tonnage	# of stops	% participation ⁱ	% total waste ^j
July	3.36	251	13.7%	3.4%
August	3.17	288	15.7%	3.3%
September	3.39	337	18.4%	3.5%
October	5.16	275	15%	5.2%
November	5.00	146 ^k	N/A	5%
Average	4.02	288 ^l	15.7%	4.08%

Table 4. Waste Tonnage for Michigan Tech^m

Month	Total Recycling (tons)	Total Garbage (tons)	% Waste Recycled
July 2014	18.4	No Pick-up	N/A
August 2014*	6.91	54.35	11.3%
September 2014	10.05	87.15	10.3%
October 2014	15.16	99.49	13.2%
November 2014	14.93	89.2	14.3%
December 2014*	13.14	87.23	13.1%
January 2015*	17.21	70.52	20%
February 2015	7.83	73.86	9.6%
March 2015	13.38	75.42	15%
April 2015	11.67	69.23	14.4%
May 2015*	16.75	93.32	15.2%
June 2015	3.09	115.43	2.6%
Yearly total	148.52	915.2	14%

*denotes a move in or move out month for the school

^h These numbers are based on reported numbers from the city of Hancock

ⁱ Based on 1830 customers reported by Waste Management in Hancock

^j Based on the average monthly tonnage of 94.29 tons/month in Hancock + the recycling tonnage

^k The number of stops was affected by Thanksgiving changing the pick-up day. But people took their recycling to the drop off station, so tonnage was still high.

^l Excludes the month of November because of Thanksgiving changes

^m These numbers are based on the reported numbers from Michigan Tech

iii. Economics of Recycling

Hancock

Hancock is currently paying \$54/ton plus a \$16/ton environmental surcharge for *Waste Management* to receive their recycling for a total fee of \$70/ton. *Waste Management* also has the option to charge a fuel surcharge but has not done so recently. The residents of Hancock had been generating approximately 3.3 tons/month in recycling up through September 2015, but this volume increased to about 5 tons/month in October and November 2015 after *Waste Management* instituted a \$4/vehicle recycling drop-off charge. This creates an average of 4.02 tons/month in recycling between July and November.

Table 5. Cost of Waste Management in Hancockⁿ

Hancock	Garbage	Recycling	Savings from Landfill
Cost/ton	\$76.36	\$70	\$6.36
Avg. Tonnage	94.29	4.02	4.02
Totals	\$7,199.98	\$281.40	\$25.57

Houghton

The City of Houghton does not have a recycling contract. Instead, individuals pay \$4/vehicle for drop-off recycling. Because of this and because our teams calls and questions to *Waste Management* have not been returned, we don't know how much in total dollars Houghton residents pay for this service. If the average household makes one trip per month to drop off recycling, they would pay \$4.00/month.

Michigan Tech

There are multiple accounts for both recycling and garbage on Michigan Tech's campus. There are 3 recycling accounts that have all been combined under Facilities management. There are also two garbage accounts, one for compacted waste and the other for traditional loose waste. For this reason Table 6 is based on a weighted average of tonnage and cost of the individual recycling and garbage accounts. The average cost per month is approximately \$12,000 for the trucks to come to campus and empty out the dumpsters. This truck cost covers both garbage and recycling.

Table 6. Cost of Waste Management at Michigan Technological University

MTU	Garbage	Recycling	Savings
Weighted Cost/ton	\$68.86	\$39.81	\$29.05
Avg. Tonnage	83.2 ^o	12.37	12.37
Totals	\$5,729.15	\$492.45	\$359.35

ⁿ These numbers do not include the cost of labor, maintenance, or hauling fees. They are all based on the monthly averages from Table 2 and Table 3.

^o Based on 11 months, because there was no garbage pick-up in July 2014

IV. Local Waste and Recycling Service Providers

i. *Waste Management*

Hancock, Houghton, and Michigan Tech all currently contract with *Waste Management* for waste disposal and recycling services. Houghton and Hancock have both been contracting with *Waste Management* for over twenty years. During this time neither city has put out a formal request for proposals for contracts, but rather has continued to extend current contracts.

Currently, *Waste Management* contracts with *Eagle Waste & Recycling* in Eagle River, WI to process the recyclables it collects. The pricing for bringing recycling varies with the market ranging from *Waste Management* being paid by *Eagle Waste & Recycling* for the recyclables (up to \$20/ton) and *Waste Management* having to pay to deposit recycling with *Eagle Waste & Recycling* (up to \$20/ton). The primary costs *Waste Management* incurs for handling recycling are for hauling fees (truck fuel and maintenance) and labor.

Waste Management is a transnational corporate waste management and recycling service provider headquartered in Houston, TX, and currently serving over 27 million residential, industrial, municipal, and commercial customers in the United States, Canada, and Puerto Rico. The company operates 367 collection operations, 346 transfer stations, 293 landfills, 16 waste-to-energy plants, 146 recycling plants, and 111 landfill gas projects. They currently employ 39,800 people and revenue in 2015 has thus far exceeded \$14 billion.⁴⁴

Nationally, *Waste Management* is a leader in e-cycling (electronics recycling), and operates roughly 150 e-cycling centers through a subsidiary, *Recycle America*. They have also helped develop technology to reuse and recycle organic waste and construction debris, and several *Waste Management* landfills utilize technology that harnesses naturally-occurring landfill gas and convert it into liquefied natural gas (LNG) that then powers a fleet of garbage collection vehicles, substantially lowering carbon emissions.⁴⁵ The company has several joint ventures that invest in and operate over 150 landfill-gas-to-energy production facilities that use innovative technologies to produce fuel and renewable energy from municipal solid waste.

Waste Management owns and operates the only municipal solid waste landfill in the western half of Michigan's Upper Peninsula- K&W landfill near Ontonagon. They also own and operate landfills near Munising (Wood Island) and Menominee (through subsidiary Michigan Environs). The only other municipal solid waste landfills in the central Upper Peninsula are the Marquette County Landfill and the Delta County Landfill, both of which are municipally owned. Neither county landfill accepts waste from outside their county jurisdiction. This means that *Waste Management* essentially has a monopoly on municipal solid waste disposal across the central and western Upper Peninsula.

Waste Management also owns and operates Peninsula Sanitation, a hauling and transfer station in Houghton. These facilities provide waste disposal and limited recycling services for much of the western UP. Neither e-cycling or other innovative recycling services are offered at these sites. The only local recycling service *Waste Management* provides is standard single-stream recycling drop-off at Peninsula Sanitation for \$4 per vehicle.⁴⁶

Waste Management's current contract with Houghton expires in June 2016, its contract with Hancock expires in August 2016, and its contract with Michigan Tech expires in 2019.

ii. Eagle Waste & Recycling, Inc.

Eagle Waste & Recycling is a family owned and operated company founded in 2005, based in Eagle River, Wisconsin, that provides residential, commercial, and industrial waste disposal and recycling services for communities in northern Wisconsin and the Upper Peninsula of Michigan. They are a family-owned business with strong ties to rural communities, and provide valuable recycling services in areas that are not generally a high priority for larger companies. *Eagle Waste & Recycling* currently contracts with more than 50 cities, villages, and townships in northern Wisconsin and the Upper Peninsula of Michigan⁴⁷. In 2013, they opened a Material Recovery Facility (MRF), a state-of-the-art single-stream recycling facility in Eagle River, WI, that serves as a regional recycling sorting and processing center. The MRF is able to sort and process 18-24 tons of material per hour, eliminating the inconvenience of sorting and separating recyclables prior to drop-off at the facility⁴⁸. In addition to over 50 employees throughout the company, the new facility created 15 full time jobs paying over \$10 per hour with health benefits in Eagle River when it expanded its recycling activities in 2013.

Recyclable materials collected in Houghton County and taken to the *Waste Management* transfer station (Peninsula Sanitation) in Houghton are transported to *Eagle Waste & Recycling* for sorting and processing.

iii. Additional Providers and Programs

In addition to operators currently providing waste and recycling services to Hancock, Houghton, and Michigan Tech, other private companies also provide municipal solid waste services within the Upper Peninsula and northern Wisconsin.

Great American Disposal: serves the central Upper Peninsula with locations near Negaunee, Munising, and Kingsford, MI.⁴⁹ They operate several transfer stations, a landfill, and a solid waste processing facility in the region. In addition to waste and recycling services, *Great American Disposal* also offers hazardous waste disposal to customers in Dickinson County, in Michigan's Upper Peninsula. They provide free collection on the second Tuesday of every month from 9-10am at their facility in Quinnesec, MI.⁵⁰ Proper hazardous waste disposal is essential to prevent dangerous chemicals from harming the environment.⁵¹

Advanced Disposal: is another provider operating in northern Wisconsin serving the Rhinelander and Minocqua areas. They are currently the 5th largest waste management company in the U.S., operating in 18 states and providing non-hazardous solid waste collection and recycling services to residential, commercial, industrial, and construction customers.⁵²

Badger State Recovery, Inc.: is a provider operating across 10 states from Michigan to Montana. They currently provide a myriad of non-hazardous, recycling services to several businesses and hospitals in these areas. Badger State Recovery mainly operates out of New Auburn, WI, but has three regional offices in Wisconsin and South Dakota to provide timely services to customers.⁵³ Services extend to several cities in Michigan's Upper Peninsula.

Municipal Programs

Marquette and Delta counties operate county-level municipally owned and operated waste and recycling programs with their own landfills and recycling centers. These two counties are the only counties west of Sault Ste. Marie with convenient access to curbside recycling, according to the Michigan DEQ.

Marquette County: Marquette, Michigan, is the largest city in the Upper Peninsula, and Marquette County provides an alternative model of waste management. Waste management decisions are made by the

Marquette County Solid Waste Management Authority (MCSWMA), a seven-member board representing the interests of Marquette County residents.⁵⁴ Municipalities in Marquette County contract with private companies (such as, *Waste Management* or *Great American Disposal*) to provide residential waste and recycling curbside pick-up service. Agreements between MCDs and the County stipulate that any service provider operating in the county must haul to the county landfill which is owned and operated by the MCSWMA.⁵⁵ The County owns the processing facility and landfill, which facilitates collaboration among MCDs and allows the County more control over the waste that enters the landfill. Services offered include compost and yard waste collection and drop-off, e-cycling services, hazardous waste disposal, and household rubbish drop-off in addition to their standard garbage and recycling collection services.⁵⁶ The County asks residents to separate “fiber” recyclables (paper, cardboard, etc.) from “rigid” recyclables (plastics, tin cans, etc.) within their households. In the City of Marquette, fiber is picked up one week and rigids the next. The MCSWMA stores and further sorts these materials at their facility. Rigid materials are transported to *Eagle Waste & Recycling* for further sorting and marketing. MCSWMA direct markets fiber materials to paper mills in Wisconsin.⁵⁷

Delta County: The Delta Solid Waste Management Authority (DSWMA) operates a similar waste management model in Delta County, which includes the city of Escanaba. The DSWMA owns and operates the Delta County Landfill and the Delta Wide Recycling and Compost Site.⁵⁸ Similar to Marquette County, municipalities in Delta County contract with service providers that haul their waste and recycling to the facility owned by the DSWMA.

Neither MCSWMA nor DSWMA currently accept waste from outside their counties, but focus on covering their own costs and meeting the needs of their county’s citizens.

V. Recyclable Materials

The primary materials collected in any recycling program are paper products, plastic, glass, and cans. This section summarizes the practical uses and economics associated with recycling each material.

i. Paper

In the United States, paper products are the single largest component of landfills. The Environmental Protection Agency estimates that paper comprised 27% of all waste in 2013, most of which is a usable resource. Almost all of the paper material in local waste can be recovered and used in the production of new materials. Paper has been one of the most widely recycled products of municipal solid waste. More than two thirds of the paper materials were recovered from municipal wastes in 2013. The market value of recycled paper has decreased significantly in the last year. The market value of recycled corrugated cardboard dropped from \$115 per ton in April 2014 to \$70 a ton in February 2015.⁵⁹ Products currently being produced from recycled paper are: new paper, molded pulp products such as egg cartons, animal bedding, paper mulch, packaging cushioning material, and wallboard panels. Recapturing this material also saves tipping fees paid to the landfill.

History of Paper Recycling: When concerns associated with limited landfill area first emerged, paper became a prime target for recycling because so much of it was entering landfills. Between 1983 and 1991, twenty-five states enacted laws mandating that local communities make provisions for recycling.⁶⁰ At the time, manufacturers did not have enough facilities in place to utilize this recovered resource. The resulting increase in the supply of recycled paper led to a 'glut' in the early 1990's. This trend was the most dramatic in the Northeast and upper Midwest where collection programs were most widespread. However, the low market prices created by this situation encouraged the paper industry to look more in-depth at recycled fiber as an inexpensive material resource. By 1993, the pulp and paper industry had announced more than 140 major mill projects related to the expansion of existing mills or new mill sites for the use of recycled fibers.

To help stimulate the utilization of recycled paper, some states also enacted laws for the use of recycled paper products. Between 1989 and 1992, twelve states passed minimum mandatory recycled content for newsprint (an average mandate of 40% recycled content).⁶¹ In 1986 recycled paper was less than one quarter of the fiber input in the U.S. pulp and paper industry. By 1994 this had increased to over one third, with over 37 million tons of paper and paperboard being recycled each year.⁶² Similar laws have been enacted in some states pertaining to production of telephone directories. Voluntary agreements exist in thirteen other states. At the federal level, President Clinton ordered federal agencies to purchase office paper with a minimum recycled content (20-50%, depending on the grade).⁶³ Twenty-eight states also passed tax legislation that encouraged the development and use of recycling technologies.

Contamination: Problems with the contamination of recovered products accounts for some of the costs associated with using waste paper at mills. Contamination refers to the presence of foreign objects in the material to be recycled. Examples commonly encountered are the wrong type of paper mixed in with the desired type, such as cereal boxes with plastic liners or junk mail with plastic windows. The extent to which contamination is a problem depends on the type of paper product being manufactured and the technology available at the manufacturing facility.

The Future of Recycled Paper: The demand for waste paper is expected to rise. One reason is due to increasing pressure on managers of public land to change their land management practices. Significant

changes could cause a rise in the price of virgin fiber, which would result in an increase in the demand for recycled fiber.⁶⁴

New production technology is also likely to better handle contaminants in waste paper and bring down the cost of processing that material. Incentives from the government for recycling would also help either through tax credits or minimum recycled content laws or something similar. These factors should all help the infrastructure and markets of recycled paper to grow in the future, resulting in higher monetary rewards for the collection of used paper.

ii. Plastics

More than 20,000 facilities produce plastic materials, products, and equipment. In 1994, these facilities produced over 85 million metric tons of plastics, of which the U.S. consumed about 21 million tons. By weight, plastic represented 9.5% of the municipal waste stream in the United States. By volume, plastic represented 24% of that waste stream. In 2013, this increased to 12.8% by weight.⁶⁵

Some plastic products are not easy to recycle. For example, in 1992, the average American car contained 300 pounds of plastic made from about 60 different resins. That plastic is difficult to reclaim. However, plastic containers can be easily recycled. For example, in 1995, the U.S. recycled 41% of its soft drink bottles and 18% of all its plastic bottles and containers. Plastic recycling is continually increasing. From 2012 to 2013, recycling of plastic bottles increased by 4.3% to improve to a 30.9% recycling rate of all PET bottles, the most valuable recyclable plastic, in 2013.⁶⁶

Types of Plastic: Different types of plastic are made from different types of resins. Plastic recycling codes are used to identify the type of resin used to manufacture a particular plastic product. Each resin has unique properties and is suitable for a particular class of applications. For example, milk jugs are manufactured from High Density Polyethylene (HDPE), which is identified by a #2 recycling code. The complete list of product codes is as follows:

- #1 PET (Polyethylene Terephthalate): Soda bottles; bottles containing cooking oils
- #2 HDPE (High Density Polyethylene): Detergent and shampoo bottles; milk and water jugs; industrial cleaning supplies; bulk food and dairy containers; grocery bags
- #3 PVC (Vinyl/Polyvinyl Chloride): Some shampoo, oil, and cosmetic bottles; plumbing pipes; some film packaging
- #4 LDPE (Low Density Polyethylene): Stretch/pallet wrap; shrink/bubble wrap; dry cleaning bags; most trash bags; food packaging and grocery bags
- #5 PP (Polypropylene): Medical products such as saline bottles; some syrup, ketchup, and dairy containers; some shampoo and cosmetic bottles
- #6 PS (Polystyrene): Styrofoam; food service trays; foam deli containers; meat/produce trays; some dairy tubs; CD boxes; foam protective packaging
- #7 Miscellaneous (Polycarbonate, Nylon, Polyurethane, etc.): Cookware; automotive trim; computer housings; textiles

Markets for Recycled Plastics: Plastic recycling has become an established national industry, albeit one that is still experiencing growing pains. The number of companies handling and reclaiming post-consumer plastics as of July 2015 was nearly 18,000, nearly 11 times greater than in 1999 (1,677) and 58 times greater than in 1936 (310).⁶⁷ Although the industry continues to face challenges, the American

Plastics Council believes that the recycling of plastics will become a more efficient and mature segment of the national economy.

Similar to most other recyclable materials, the market value of recyclable plastics has dropped. The market value for baled PET has decreased from \$20 per ton in June 2014 to \$13 per ton in February 2015.⁶⁸ Despite the drop in value, markets for recycled plastics are still relatively stable in most areas and expanding in many others. The American Plastics Council lists over 1,300 plastic products with recycled content in the Recycled Plastics Products Source Book. The development of new end uses for recycled PET bottles (like coating for corrugated paper and other natural fibers to make waterproof products like shipping containers) will fuel the demand for more post-consumer plastics in the future. For HDPE, a similar situation exists for recycled-content landscape and garden products, including everything from lawn chairs to garden edging.

The plastic lumber industry is also beginning to hit its stride, with new ASTM (American Society for Testing and Materials) standards and test methods paving the way for use of these materials in structural applications. Even recycled plastic railroad ties and marine pilings are being field-tested. For many products the switch to plastic means longer life and less maintenance, which translates to lower cost over the life of the product.

Recycling Trends: New applications for plastic packaging are growing so fast that it has caused the supply-demand dynamics for raw material to get out of balance.⁶⁹ The supply of the raw material that feeds the industry--recycled plastic bottles from household-- is a limiting factor. Programs serving major communities, representing about 63% of the population, usually include #1 PET and #2 HPDE plastic bottles in their collection programs. These materials are used to manufacture 95% of all plastic bottles.

Despite an annual increase in the number of pounds recycled, the recycling rate for plastic bottles is dropping. New packaging is rapidly converting their packing from traditional materials to plastics. For example, many manufacturers of grocery products (such as beer, mayonnaise, and applesauce bottles) are adding plastic packaging as an option. However, many of these new packages contain products that are frequently consumed on the go, so fewer containers are making it to the recycling bin.⁷⁰ According to the American Plastics Council, increased awareness and education are required to change this behavior and to avoid the disposal of these recyclable materials.

iii. Metal Containers

There are two general types of metal containers in the municipal solid waste stream: tin-coated steel cans and aluminum cans. Aluminum cans are typically used to hold beverages such as soft drinks and beer. Steel cans are used for a wide range of products, including fruits, vegetables, soups, sauces, meats, juice, pet food, cleaning products, paint, shoe polish, adhesive bandages, and coffee.

Recycling of Tin-Coated Steel Cans: Recycled steel is an important component of the steel industry, saving up to 75% of the energy needed to make steel from virgin materials. Specifically, every ton of steel recycled saves 1.5 tons of iron ore, 0.5 tons of coal, and 40% of the water required in production.

Steel cans be extracted magnetically from refuse, which facilitates collection in larger cities. In the U.S., 81% of all types of steel available for recycling are actually recovered—the highest recovery rate of all materials. Steel cans, including food, paint and aerosol cans, were recycled at a rate of 58% in 2000, which increased to 70% in 2013.⁷¹

After steel cans are separated using the magnetic belt, they are typically compressed and shredded. The shredded materials are re-melted and used again. In the past, a detinning process was performed before steel cans were re-melted. With a drop in tin prices and a declining percentage of tin in the mix, detinning has fallen out of favor.

The value of recycled cans depends mostly on the distance to a steel mill. In 2001, recycling processors were paid between \$0 and \$30 a ton for baled tin cans. As of December 2015 the market value of aluminum is \$0.60 per pound.⁷²

Recycling of Aluminum Cans: In 2013, nearly seven of every ten aluminum beverage cans were recycled in the U.S. In all, 1.72 billion pounds of aluminum or 60.2 billion aluminum cans were diverted from landfills. The system for recycling aluminum is so efficient that recycled aluminum cans may be back on store shelves as new cans in 60 days or less.⁷³ This saves energy, reduces litter, and conserves natural resources.

In Michigan, most aluminum cans get recycled indirectly. All major brands of beer and most soft drinks are sold in aluminum cans. Michigan's bottle bill, implemented in 1978, requires that consumers pay a ten-cent deposit on these containers. Only by returning the containers to a store can they reclaim their deposit. Although the deposit law was passed to reduce litter, it also facilitates recycling. Distributors recycle the aluminum cans they collect.

iv. Glass Bottles

Theoretically, glass is a great product to recycle because it is 100% recyclable. All of the materials that went into the first glass bottle can be re-made directly into another market-quality glass bottle. Because recycled glass melts at low temperatures, recycling glass uses less energy than making new glass from raw materials. Using recycled glass also reduces emissions, is less corrosive to the melting furnace and, of course, reduces landfill space. However, the market for glass is the most volatile of all the recyclable materials due to its low value and high transportation costs. This typically makes local uses of recycled glass the best option, especially in rural areas.

Clear glass commands the highest price because it is used the most commercially. There is a greater demand for clear glass because American consumers prefer to buy things in containers in which they can see the product. Green glass has a low market price because most green glass in the US is imported, and thus its market is small.⁷⁴

Contamination: A major challenge in glass recycling is preventing contamination. Suppliers want quality glass, and many feel that recycled glass is most likely of lesser quality because of the high probability of contamination.⁷⁵

The actual process of recycling glass is relatively simple. First, the bottles are crushed into small pieces called cullet; the cullet is melted down with soda ash, limestone, and sand to create new glass. If the waste glass is contaminated and not suitable for use in glass manufacturing, it can be used as road base, aggregate substitute (glassphalt), sandblasting abrasive, fiberglass, and fractionators. However, these uses significantly lower the revenue potential for recycled glass.⁷⁶

The most common type of contamination is color contamination. It is very important that recycled glass be sorted by color. Having only one bottle of a different color in a load of glass can spoil the whole load. Color contamination is easier to stop at the source. Having residents sort the glass at the curb or in their homes greatly reduces the risk of contamination.⁷⁷

Other types of contamination are metal, gravel, and dirt (which produce surface flaws in the glass); ceramics (which produce cracks in the glass); and non-container types of glass like window panes and heat resistant glass (which create bubbles in the glass because different types of glass melt at different temperatures). Recycling processors run the cullet through many steps to remove any dirt or metal or ceramics, but it is still extremely important for people involved in all aspects of the recycling process to be very careful, using the highest standards in quality control to ensure contamination does not occur.⁷⁸

Low-Value Uses of Waste Glass: Increasingly, firms are experimenting with ways to use crushed glass in applications that don't require any further processing of the glass. Some manufacturers have mixed crushed glass in with asphalt. Glass used in this way has no market value, but delivering waste glass for free (or even paying a small fee) is preferable to paying per ton to dump the glass in a landfill. Furthermore, contamination is much less of a problem. For example, glass that is brought to *Eagle Waste & Recycling* for recycling is used for road construction. Another use of crushed glass is to use it as a covering for landfills.

Recycling of Glass in Hancock: Hancock does not currently have glass recycling. The low price and high risk for contamination is a big problem for recycling companies in the Houghton/Hancock area. For example, the first recycling company in the area, Tasco, had a 23 ton load of glass rejected for contamination, and the truck returned to Houghton. After this incident, the glass processing facility no longer accepted glass from Tasco, and Tasco was forced to stop accepting glass from residents. Now the high cost for *Waste Management* to transport glass to the recycling facility in Eagle River, WI makes glass recycling uneconomical for them.

Recycling of Glass in Houghton: Houghton residents do not currently have access to glass recycling through *Waste Management*. Like Tasco, *Waste Management* has experienced many problems with contamination and overflowing of bins in the past. *Waste Management* now has the same disincentives to collect glass for recycling in Houghton as they do to receive glass from Hancock.

VI. Composting and other Special Materials

Much of the material that residents throw away does not fit neatly into simple categories such as plastics, cans, paper, and glass. Some wastes contain a variety of materials that cannot be easily separated from one another. In residential areas, compostable materials can also represent a significant component of the waste stream and should be recycled locally. Other materials should be kept out of most landfills not for their value but because the hazards they pose to collection crews and to the environment in general. Finally, some material such as carbonated beverage containers require a deposit and are expected to be returned to the retailer. This section summarizes the systems in place for the recycling and disposal of these types of residential wastes.

i. Compostable Materials

Composting is the process through which organic material (leaves, lawn clippings, and tree clippings) is transformed through the process of decomposition into a soil-like material called compost. This form of recycling takes place naturally, facilitated by invertebrates and microorganisms that digest the organic matter.

Composting is an invaluable recycling practice that reduces the amount of material entering landfills. Leaves, lawn clippings and tree trimmings account for up to 30% of the material being dumped into landfills today.⁷⁹ Keeping this organic material out of landfills can help in two ways. First, it saves on landfill tipping fees and reduces the amount of material entering landfills. Second, it reduces the amount of methane (a common greenhouse gas) and acidic leachates produced at landfills. Methane gas and acidic leachates are two by-products formed by the decomposition of organic wastes. Methane gas is a major contributor to climate change. If large quantities of these by-products are produced in landfills, they become a problem. Leachate from landfills has to be monitored and later treated to minimize the amount of methane gas being released into the atmosphere. The transportation and treatment of leachate is the biggest expense associated with routine landfill maintenance. Reducing the amount of compostable materials entering landfills may therefore benefit everyone: the owners of landfills by reducing leachate treatment costs, consumers using the landfill by paying for less weight to be disposed of, and the environment by reducing methane gas emissions that contribute to climate change.

About 200 communities in the United States provide curbside compost pickup.⁸⁰ Composting can also easily be done by individual households or multifamily units in their own backyards, which eliminates transport costs.

Backyard composting can be done using three essential ingredients: “Browns,” “Greens,” and water. The browns are leaves, shoots, branches, and wood pieces. Fruits and vegetables waste are greens. Grasses and other food waste, like tea and coffee, can also be used. Besides, water is also required, and the quantity of water depends on the type of green waste. Highly green waste requires less water, and too much water can slow composting. A composting unit for a typical residential home requires a small area (5-6 square feet), to keep a compost bin or pile. The composting spot should be dry and in the shade. In the bin, browns and greens are collected and mixed. The larger pieces of woods are chopped. This is followed by adding soaked dry materials. On this pile, grass and greens waste are added, and they are mixed together. Under about 10 inches depth of this mixture, fruits, vegetable, and raw ingredients are buried.⁸¹ The composters are available at Walmart and other stores. Their cost varies with the sizes. The cost range is about \$30-\$100.

Disposal of Compost in Hancock: The City of Hancock encourages its residents to keep compostable materials out of the solid waste stream. Hancock does not pick up compostable materials (leaves, twigs, grass clippings) with the regular garbage pick up. To dispose of compostable materials, residents can:

- Take advantage of Spring cleanup. During Spring cleanup, which begins in May and ends in early summer, city crews pick up from the curbside any leaves in biodegradable bags and any branches set aside. City crews usually pick up materials starting on Thursdays and ending on Saturdays. The schedule changes from year to year.
- Bring compost to the city garage. Residents can bring their compostable debris to the City Garage, which is located at 1601 Tomasi Dr., at no charge. If bags are used, they must be clear, biodegradable bags. The city has a large compost pile on this site. Citizens are allowed to take as much soil as they want from the broken down compost materials. There is also no limit on how much compostable material the city will take. Residents with questions regarding compost can contact the City Garage at (906) 482-1480.

Residents can purchase biodegradable bags at the City Hall. The cost is five dollars for 10 bags.

Disposal of Compost in Houghton: There is a self-serve fall clean-up in the City of Houghton at the City Garage on corner of Technical Avenue and Gundlach Road. In 2015, fall clean-up drop off was available from October 2nd to November 1st. Compostable materials that are accepted are leaves, small branches, and yard clippings. They also take some construction material. There is no fee for using the service.

*Composting at Michigan Technological University*⁸²: Michigan Tech diverts its yard wastes from the garbage stream. Shredded leaves are composted in a pile near the cemetery to generate leaf mold that feeds the university gardens. Green material collected from weeding, etc. is taken to a separate pile near the golf course and is slowly composting there. Currently, Michigan Tech does not combine and maintain compost areas that could provide more “food” for the organic gardens on campus, and so supplemental materials (beyond the leaf mold) must be purchased to feed the gardens.

Most of the food waste generated on the Tech campus goes into the garbage waste stream. During the summer months, some food from the Wadsworth Dining Hall is composted for use in the Wadsworth gardens. This is mostly coffee grounds and egg shells. It is a new and fairly limited program that could be expanded.

The university maintains about 3 acres of organic gardens. These gardens need compost to thrive. The University Gardener’s goal for winter 2015/16 is to create a true compost initiative that combines the brown (leaf mold) and green (weeding and food wastes) into a compost area that is well maintained and serves all of the needs for feeding the Tech gardens.

ii. Mixed Materials

The phrase *mixed materials* refers to a broad category of products that contain a variety of materials that cannot be easily separated from one another. Examples include household appliances, refrigeration units, automobiles, tires, electronic products and construction debris. Because most of this material cannot be put out with the regular garbage for collection, residents are responsible for transporting these wastes to the Houghton County Transfer Station or pay a private firm to have the material collected and transported.

Although the technology exists to recycle most of these materials, recycling markets for each material need to be available in order for the material to be recycled. Except for household appliances and

refrigeration units, there are no readily available markets for recycling mixed materials in the Houghton-Hancock area. Some programs exist, however, that target specific electronic products and components.

Household Appliances (Ovens, Washers, Dryers, etc.): Most discarded household appliances (sometimes referred to as "white goods") end up in metal shredders. While no laws in the state of Michigan prohibit the disposal of these products in landfills, regulations mandate that they be stored in off the ground containers. The size of these units makes such storage impractical and most garbage haulers refuse to accept them. These items can be brought to the Houghton County Transfer Station and taken for a 10-dollar fee. Depending on the appliance, some can be scrapped at local metal scrap yards.

Refrigeration Units (Refrigerators, Freezers, Air Conditioners, etc.): Like household appliances, refrigeration units must be stored off the ground, which can create problems due to the size of these units. An additional obstacle to the disposal of refrigeration units is that they contain Freon, a hazardous substance. Like other hazardous substances, any Freon that is not recycled needs to be sent to a hazardous waste landfill. Refrigeration units can be shredded as long as the Freon is first removed. Several local businesses collect and transport used refrigeration units to Iron Mountain, where they are shredded and turned into recyclable steel. Some require that the Freon be removed prior to handling any unit, while others are licensed to remove Freon, but charge a fee. Neither the Houghton County Transfer Station nor *Waste Management* accepts refrigeration units.

Tires: In the United States, 240 million tires are discarded each year. There are an estimated two billion unusable old tires around the country. These old tires present several hazards. One problem is that they "float" to the surface of landfills and can break through the surface liner. They also present potential fire (which can spread underground) and health (they are breeding grounds for mosquitoes and diseases) hazards.

An alternative to disposing of tires in landfills is to burn them. Tires have 50% more energy content than coal, so burning them as fuel in high temperature cement kilns, pulp and paper plants, and electric power generating plants is common.⁸³ Open burning of tires is not allowed, however, because it creates air pollution and related health problems. In addition to using them as fuel, scrap tires can also be treated chemically to recover raw materials. The tire industry used to reclaim scrap tires and reuse the rubber (which was half of the tire, by weight). However, synthetic rubbers and steel-belted radial tires are harder to break down. The increased use of these newer types of tires means that less rubber can be recovered through chemical treatment.

Another option is to use scrap tires in various engineering applications. Tires can be used to stabilize embankments; line channels; build offshore reefs, road bases and highway crash barriers; and attenuate sound. While some scrap tires are also exported for use, most are incinerated, landfilled, or stockpiled.⁸⁴

Residents of Houghton County can dispose of scrap tires by dropping them off at various local businesses--such as tire retailers--for a fee ranging from \$1.50 to over \$20 (depending on the size). The most common option is to pay a tire disposal fee when purchasing a new set of tires. In this area, tires are stockpiled until they can be loaded onto semi trucks and transported to Traverse City, where they are shredded and landfilled. In Michigan, firms that transport at least ten thousand tires must have a special permit.

Automobiles: When automobiles have outlived their usefulness, almost all of them (over 94%) are taken to scrap yards for reclamation of useable parts.⁸⁵ What is left after the useable parts are removed is either shredded or compacted. This material, consisting primarily of metals, is then recycled back into other products such as appliances and automobiles. However, that still leaves over three million tons of paint, glass and plastic each year that require disposal. The increasing tendency to replace metal with plastic

components reduces the percentage of the automobile that can be recycled and increases the costs of landfilling the non-reusable components.

In this area, old cars can be taken to a local scrap dealer such as Julio's Contracting or Ed's Used Parts. Alternatively the National Kidney Foundation's Kidney Cars program accepts donations of used cars in any condition and will pick them up free of charge from just about anywhere in the United States. These cars are sold as either scrap metal or used cars, depending on their condition. They can be contacted at 1-888-319-2277. If a used car is still in good condition, it can also be donated to another charitable organization or sold to a used car dealer.

Electronic Products: There is a great need for electronics disposal facilities in the United States. Over 12 million computers are disposed of annually, yielding 600 million pounds of equipment.⁸⁶ These numbers may underestimate the amount of used electronic products due to the millions of electronic parts and equipment not classified as monitors or televisions. In addition, these figures are only expected to increase given the rapid obsolescence of electronic equipment and the findings of studies which suggest that as much as 75% of obsolete products remain in storage. This is cause for concern because computers and electronic equipment account for close to 75% of the heavy metals (often toxic substances) found in landfills. While valuable materials can be recovered from electronic products, the collection, transportation and disassembly of these produces can pose significant costs.

Despite these costs, the abundance of used electronic equipment has led many companies to specialize in the recovery and resale of electronic equipment and components. For example, IBM's Asset Recovery Center in Endicott, New York, which opened in 1994, was recovering 35 million pounds of computers and computer parts annually within three years of opening. Components are resold to vendors and some machines are repaired and resold as used equipment. IBM's computer recycling program is available to home computer owners and businesses. IBM will send a UPS shipping label to anyone who wants to recycle any manufacturer's product, not just IBM computers. For details about the IBM program one can call (888)746-7426.

Construction Debris: Approximately 8,400,000 cubic yards of construction and demolition (C&D) waste are generated yearly in Michigan. 1,300,000 cubic yards comes from residential construction. An equal amount is generated in commercial/industrial construction. The remainder is demolition waste generated from activities such as road construction and rebuilding. C&D waste typically consists of materials such as drywall, aluminum siding, vinyl siding, bricks, concrete, asphalt, shingles, wood, metal, glass, corrugated cardboard, soil, rock, trees, insulation, and other building materials.⁸⁷ Not all landfills in Michigan accept C&D debris. However, many of these materials have recycling markets. The Michigan Recycled Materials Market Directory lists these markets.

In this area, there are currently no local markets for construction debris other than copper. Construction debris can be taken to the Houghton County Transfer Station. The fee is \$85 per ton and the material is taken to the K&W landfill in Ontonagon County. (Residents of Houghton can drop off some construction materials at the Houghton city garage at no cost during fall clean-up.)

Copper: A material often used in construction, and for which recovery can be profitable, is copper. Copper can be found in wire and wire products, tubing and brass. It is used in architectural hardware, clocks, watches, bearings, coins, batteries, bronze casting, saws, ammunition, automobile radiators, air conditioners, heat exchangers, fungicides, wood preservers and catalysts.

Much of the copper used in these products is lost as solid waste. Recycled copper makes up 25% of current copper consumption in the United States. A problem for the recovery of copper is that it is used

in long-lived products such as appliances, vehicles and structures. In addition, the disassembly of these products to recover the copper is often not economical.

In this area, Peninsula Copper Industries buys and imports products that have a recoverable copper content. The copper is extracted and introduced into the production process of a copper chemical. Products that they buy include: scrap copper, scrap wire from utilities, number one (or 100%) copper products from plumbing and building contractors, and scrap circuit board.

Furniture and Miscellaneous: Mattresses, furniture, and other items can be taken to the Houghton County Transfer Station. The fee for disposal is based on the weight and type of the material for most items. Mattresses have a flat fee, depending on the size. If the items are still in good condition, one can contact charitable organizations to see if they can use them. (Residents of Houghton can drop off their material at the Houghton city garage at no cost.)

iii. Hazardous Household Wastes

Most people regularly use products that are potentially hazardous, such as paint, paint thinner, pesticides, fertilizers, windshield wiper fluid, antifreeze, motor oil, brake fluid, adhesives, batteries, furniture polish, drain opener, and oven cleaner. These products are potentially hazardous because they contain chemicals that are corrosive, explosive/reactive, ignitable, or toxic. When these products are no longer usable or wanted, they become household hazardous wastes. Household hazardous wastes make up only a small percentage of household waste, but they are a serious problem.

On average, each person in the United States disposes of about four pounds of hazardous wastes every year. When disposed of improperly, these wastes pose a threat to sanitation workers and the environment. Household hazardous wastes discarded in the trash may ignite or explode in the collection truck. Trash haulers have been injured from fumes and splashing chemicals. In the landfill, these wastes can leach into surface waters and groundwater - the sources for our drinking water. In septic systems, hazardous wastes can kill the organisms that make the system work. This may cause untreated wastes to drain into the soil and eventually seep into the groundwater.⁸⁸

Because of the dangers they pose, household hazardous products require special handling and disposal. Because these products are in everybody's home, it is important for everybody to learn how to dispose of them properly.

Identifying Hazardous Wastes. How does one identify a potentially hazardous product? In addition to obvious materials, such as used motor oil, products that have these warning words contain potentially hazardous materials:

- *DANGER* means a product is highly toxic, flammable, or corrosive. *POISON* means the product is highly toxic.
- *WARNING* means moderately toxic. *CAUTION* means slightly toxic.

However, not all products containing hazardous materials are labeled. For example, old household thermometers contain small amounts of mercury and should be kept out of landfills.

Houghton County: Residents can recycle oil and transmission fluids at the Houghton County Transfer Station. However, residents have a difficult time disposing of most other hazardous household wastes because there is no general curbside pick-up and no place to drop off most of these wastes.

To minimize the amount of hazardous wastes generated, residents should be encouraged to:

- Avoid buying products with labels containing words such as caustic, corrosive, danger, explosive, flammable, poison, toxic, volatile, or warning--and to use safer products whenever possible.
- Buy household hazardous products only in the amount needed for the job at hand and use the recommended amount.
- Share what cannot be used with a friend, neighbor, local business, or organization.
- Remove covers from cans of paints and similar products and allow the contents to harden before throwing the cans away.

The lack of any drop-off service for household hazardous wastes is a significant gap in the waste disposal services available to the residents of Houghton County.

iv. Batteries

Batteries are becoming increasingly important with the rise of portable computers, remote data monitors, cellular phones and cordless power tools. Every year, nearly three billion batteries are used and thrown away in the United States. The precautions that homeowners are expected to take depend on the type of battery involved.⁸⁹

In general, batteries contain heavy metals, acids, and compounds that are dangerous if they enter the air or reach groundwater or surface water. The extent of potential contamination depends on the method of disposal. The most polluting method of battery disposal is by incineration. For example, any mercury in batteries is extremely volatile and vaporizes during combustion. Almost all the vapor is emitted into the atmosphere and falls to the ground.⁹⁰

Batteries discarded in landfills also pose potential problems. All batteries eventually corrode, allowing their contents to leak out. If liquids that seep to the bottom of the landfill are not properly collected and treated, some contaminants will reach the groundwater and possibly migrate toward a surface body of water. Nevertheless, most experts agree that disposal in a well-designed landfill involves fewer contamination problems than incineration. However, recycling batteries that can be recycled is the best way to help prevent the release of hazardous constituents into the environment.⁹¹

Types of Batteries and their Disposal: There are two general types of batteries: primary and secondary. Primary batteries are those that are used until the power is drained out and then thrown away. These include:⁹²

- *Carbon-Zinc.* The most popular and cheapest primary battery used in flashlights, toys, and remote controls; has average performance and good storage life; low energy density; low cost. Numerous sizes and shapes available. No mercury is contained in these batteries.
- *Alkaline-Manganese.* Gaining in popularity. Used in radios and smoke detectors; has better performance than the carbon-zinc primary battery; but costs more. Batteries manufactured since 1996 contain no mercury. The exception is those manufactured as button cell batteries.
- *Lithium.* Used in cameras and cell phones. Light weight due to high energy density; long storage life; and expensive. Lithium has a high reactivity with water and air, so disposal requires special attention.

- *Silver.* Used in watches, calculators, and hearing aids. Has high energy density and is moderately expensive. These batteries are increasingly targeted for recycling because of the value of recoverable materials, the hazard to the environment, and the small size and easy handling relative to other battery types. Many shops that replace watch batteries accept these batteries for recycling at no charge.

Secondary batteries are those that can be recharged. In general, these batteries represent a greater disposal problem because of the materials they contain. Types of rechargeable batteries include⁹³:

- *Lead-Acid.* Used in vehicles and boats. Because lead is a toxic material, recycling is the only correct way to manage these batteries after they no longer can hold a charge. Retailers of lead acid batteries are required to accept customers' used lead batteries. Lead acid batteries cannot be disposed of in a landfill, and there is a penalty for improper disposal.
- *Nickel-Cadmium.* Is the most popular type of rechargeable battery. Has good performance, can be recharged hundreds of times, and is the least expensive of the secondary batteries. This type of battery contains cadmium. Because cadmium is toxic, it is important to recycle these batteries. They can be recycled through a national program offered by the Rechargeable Battery Recycling Corporation (RBRC).
- *Rechargeable Alkaline.* Has moderate performance. They can be recharged only a few times and require a special charger. They cost about the same as nickel-cadmium and do not have to be recycled.
- *Nickel-Metal Hydride.* Serves as a cadmium-free replacement battery for nickel-cadmium batteries. Has good performance and can be recharged hundreds of times, but is more expensive. Many newer laptop computers and other portable use nickel metal hydride batteries. Battery retailers accept reasonable numbers of batteries by mail for recycling.
- *Lithium.* Has the highest energy density and good performance but is the most expensive. Requires a special charger but can be recharged hundreds of times. Because lithium ignites very easily, requires special handling. However, no consumer recycling program (such as the RBRC program) has been established.
- *Zinc-Air.* Moderate performance; can be recharged only a few times; expensive; does not need to be recycled.

Battery-Recycling in Houghton County: The following options are available to the residents of Houghton County.

- Leave old car batteries with the retailer when they buy a new one. (Otherwise, a \$10 deposit for the new battery is charged.)
- Recycle old nickel-cadmium recyclable batteries through the Rechargeable Battery Recycling Corporation program. In the Houghton/Hancock area, the available drop-off points are Wal-Mart and Swift's True Value Hardware in Houghton.
- Participate in "recycle by mail" programs that manufacturers of Lithium batteries make available.

All other batteries can be thrown away in the trash. The best waste reduction strategy, of course, is to minimize one's use of batteries, especially those that cannot be recharged.

v. Pharmaceuticals

Improper disposal of pharmaceuticals has caused contamination in lakes, rivers, and streams. When pharmaceuticals are flushed down the sink or toilet they end up in the water system. Water treatment plants generally do not screen for pharmaceuticals, making it possible for them to enter the drinking water supply unknowingly. Improper disposal in household trash can also have negative consequences. When pharmaceuticals are put in a landfill, they can leach out. Even collected leachate from landfills may only be treated the same as household sewage⁹⁴. The best way to dispose of unused medications is to bring them to a drug collection site. More information on how to properly dispose of specific medications can be obtained from fda.gov/consumer.

Pharmaceutical Disposal in Houghton County: The Houghton County Sheriff's Department accepts unused prescription medications at any time year round. Syringes, liquids, and patches are not accepted.

VII. Promoting Participation

This section reviews literature and research on how to increase recycling participation. The overwhelming majority of research finds that social norms and economic incentives, in conjunction with available and convenient recycling and waste reduction programs and policies increase participation rates.

Successful recycling programs have many components including:

1. Strong elected officials to coordinate and communicate with the public⁹⁵
2. Clear and specific goals⁹⁶
3. Data collection. Data serves to justify recycling programs, provide information on public support, track success, link supply and demand, and contribute to knowledge on economic value of recycling initiatives (to name a few). States can provide support in financial, knowledge and technical based, and political forms.⁹⁷
4. Strong state/government support⁹⁸
5. One or more recycling programs in place

i. Types of Recycling Programs

There are several types of recycling programs available today. The first is a voluntary recycling initiative. This is a community service effort which utilizes a community volunteer group to set up temporary drop-off stations and transport materials to a recyclable-materials buyer. The success of these programs relies on word of mouth and easily accessible drop-off locations.⁹⁹

A second program is similar to the first. However, community volunteers work with a recycling center to collect and transport materials to a market. Again success relies on adequate publicity to operate and easily accessible drop-off.¹⁰⁰

A more common approach is municipally operated drop-off centers and/or curbside recycling. These are strategically located at city owned and operated facilities where community members can drop-off recyclable materials. In curbside recycling, municipalities provide recycling collection services to the community members, at varying times throughout the month (i.e. once a week). The convenience and simplicity of curbside recycling greatly increases recycling participation.¹⁰¹ In Michigan the average drop-off program sees 9% participation, while the average curbside program sees 67% participation.¹⁰² In 2013, the Michigan statewide recycling rate was 15%.¹⁰³

Some states or communities institute mandatory recycling programs such as: (1) curbside, (2) drop-off, (3) banning particular waste items from landfills, (4) bottle deposit laws, and/or (5) varying garbage fees (i.e. paying more for garbage bags).¹⁰⁴

ii. Education

At local levels, municipalities can use education and outreach as an intervention technique, which helps to increase recycling rates. Door-stepping is an informational campaign that encourages residents to make the most of the available recycling services.¹⁰⁵ Essentially door-stepping provides recycling information to residents door-to-door. This can be done in a number of ways: (1) nominated block leaders visit each resident's home to explain available services, remind residents of pickup schedules, and how to properly recycle materials, (2) distribute leaflets in resident's mailboxes, (3) distribute newsletters, or (4) place

awareness stickers on resident's recycling bins. Information alone did not influence recycling rates. The visibility of block leaders activated social norms and emotions surrounding recycling practices. Utilizing block leaders in door-stepping campaigns is the most effective to influence recycling rates by combining information and social norm activation. Distribution of leaflets, newspapers, and awareness stickers presents communities with additional costs.

iii. Incentives & Disincentives

Beyond education campaigns and efforts to establish norms, structural programs that incentivize waste reduction and recycling behavior are critical. Incentives function to motivate or encourage a desired behavior through a reward system. Economic incentives use market strategies to modify behavior through subsidies, disposal fees, product charges, deposit-refund systems, or user charges. Hancock/Houghton currently provides deposit-refunds on bottle/can returns. A second market-based incentive is unit-based pricing, or the "pay-as-you-throw" pricing, which essentially functions to decrease waste and promote recycling. Studies show waste tonnage decreases in the presence of unit-pricing, however this incentive is more effective when accompanied by community recycling programs.¹⁰⁶

There is room for creativity when designing effective recycling incentives. For example, RecycleBank is a company that awards points based on volume of household recycling activity. Residents redeem these points at local stores, through \$10 grocery vouchers, or more recently through ebay purchases.¹⁰⁷ Companies like RecyclingPerks partners with national companies to provide similar redeemable points,¹⁰⁸ at the national level.

It is also effective to introduce monetary "disincentives." Hancock/Houghton currently places fees on garbage bags. Increasing these fees, even by two or three dollars, coupled with available recycling programs may produce the desired effect: increase recycling rates and less garbage. To promote reusable bags, grocers can institute a fee for plastic/paper bags. These minor disincentives can gain traction and use source reduction to ultimately decrease waste upfront.

Source reduction is a better way to reduce waste, with a more positive environmental impact than recycling. Businesses can promote source reduction by using less packaging. Some stores (e.g. Target in Chicago and the Keweenaw Co-op in Hancock) provide a discount to customers who produce reusable bags at checkout.¹⁰⁹ This reduces plastic and paper bag volume in the landfill. Communities can regulate or ban plastic bags as well. Across the U.S, over 178 municipalities have bag bans in place.¹¹⁰ Similarly, movements on college campuses across the U.S. promote plastic water bottle bans.

iv. Local Implementation

In sum, the right combination of education and incentives sustains recycling behavior over time. First and foremost, municipalities must provide available and convenient services, such as curbside and drop-off recycling. Houghton and Hancock are at the infant stage to implementing an effective recycling program. Michigan Tech's participation rates are below the state average and well below the national average. For a university, these rates are quite low. Michigan Tech should serve as a leader both on campus and in the local communities spreading the message and encouraging recycling behavior. It could promote a culture of recycling through programs during orientation and integrated into courses. The cities should promote block leaders, or other door-stepping campaigns to distribute information about these programs and to establish a culture of pro-environmental recycling behavior and attitude.

The cities currently have two incentives available to promote recycling- garbage bag fees and return-for-deposit (a statewide initiative) (see Appendix C for a review of the current bottle deposit law). Michigan Tech has no real incentives in place.

Hancock, Houghton, *Waste Management*, and Michigan Tech could make changes to programs and shift incentive structures to promote greater recycling participation.

1. Houghton and Hancock could increase garbage bag fees or introduce plastic/paper bag fees at grocers and retail shops to incentivize waste reduction.
2. The limited hours of operation at the current drop-off site in Houghton probably limit participation.
3. Lack of a curbside program in Houghton currently makes recycling significantly more burdensome for households than disposing of materials in the garbage collected curbside.
4. Hancock's curbside program could be expanded to biweekly or even weekly. Monthly collection and storing materials for a month makes recycling less convenient than weekly garbage pickup.
5. Hancock requires residents to purchase a container for recycling. Providing all residents with a uniform container can increase recycling rates by demonstrating the priority of recycling, removing the disincentive of having to purchase a bin, and promoting the social norm of recycling when people see the uniform bins set out for recycling pickup.
6. Hancock/Houghton could utilize a point reward system that residents can redeem at local grocers or retailers.
7. Michigan Tech could expand its composting programs, make more bins available across campus, and remove the disincentive of having to purchase bins. It might also reduce how often garbage bins in individual offices are emptied or shift to needing to purchase garbage bins.

Some relatively minor and some bigger shifts in the current recycling programs could go a long way toward increasing recycling participation in the local area.

VIII. Successful Recycling Programs

This section summarizes some key features associated with three example programs in Michigan counties and communities that have been successful at reducing waste and/or increasing recycling.

Emmet County, Michigan

Emmet County is a rural county in northwest Michigan that has had a successful comprehensive recycling system (up to 80 percent resident participation rates) in place for 23 years. Characteristics of the system that have helped Emmet County be successful include the fact that it is comprehensive, it provides economic incentives for residents and businesses to recycle and reduce waste, and it is a non-tax based system. The program accepts 60 different materials, offers residents and business-owners 13 drop-off sites, and also includes curbside collection. The Emmet County Transfer Station revenues support both recycling and household chemical disposal services. The Emmet County Solid Waste Ordinance requires any waste haulers to be licensed in Emmet County and also to use the County Transfer Station. This levels the “disposal cost playing field” for any local, regional, or (multi)national companies who may compete for waste disposal servicing contracts in Emmet County.¹¹¹

The ordinance also includes a waste disposal fee system based on volume instead of a flat monthly rate; this is called the Pay-As-You-Throw or PAYT provision. This places responsibility of waste production on the household of businesses and incentivizes them to generate less garbage. The program was started under a 0.25 mils for 2 years millage (and some state grant assistance) that initially provided a truck, drop-off containers, and processing equipment. Income sources of the program are recyclables sales and transfer station revenues. The Emmet County Transfer Station maintains some of the lowest rates in the region. These incomes cover operating costs for 13 drop-off sites and the processing facility, and any previous expansions since 1992. The processing facility, or materials recovery facility (MRF), benefits the community by providing jobs and services and is an alternative to a landfill. Additional income comes into the county from neighboring counties that pay Emmet County to process their own recyclables. “The curbside communities pay for the service from their general funds”. In 2013, over 30 percent of Emmet County’s waste stream was recovered, and 11,832 tons of materials were processed and marketed through the Emmet County MRF.¹¹²

Kent County, Michigan

Kent County has been tracking its recyclables for the last 25 years (over 300,000 tons have been recycled since 1990). The county began accepting, processing, and selling residential recyclables “into the global marketplace” in 1990. These materials included plastic, metal, glass, and paper that have been turned into automobile parts, office furniture, building materials, clothing, and other products. The county uses a combination of manual and mechanized sorting to separate single-stream mixed recyclables into bales so they can be sold. This sorting facility is county-owned (1 of 11 similar facilities in Michigan and one of ~571 nationally) and also doubles as a public education center, the Kent County Recycling and Education Center. This center provides jobs for the local community and partners with job training entities like Goodwill Industries through workplace training and job programs.¹¹³

Kent County and Emmet County offer exemplary models of highly successful and economically feasible regional recycling programs in Michigan. Both counties operate their own processing facility which doubles as an education and outreach center and provides jobs and an income source for the local community. In addition, these and other successful programs all had easy to navigate websites containing well-organized and digestible information about their programs and management practices for residents and other municipalities. Emmet County in particular may be most relevant to Houghton County because it is also a rural northern county.

Ironwood, Michigan

The City of Ironwood (population: 5,387) has curbside garbage and recycling service through a contract with *Eagle Waste & Recycling*. According to their contract, each resident can have up to two 33-gallon trash bins picked up every week. To keep it simple, *Eagle Waste & Recycling* provides a 64-gallon trash bin to each household for their garbage. If a larger container is needed, *Eagle Waste & Recycling* will provide a 96-gallon trash bin for an additional \$3.00 per month. As of September 1, 2015, Ironwood has contracted with *Eagle Waste & Recycling* for curbside recycling, which added a cost of \$1.58 per household/month. *Eagle Waste & Recycling* provides each household with a 96-gallon wheeled recycling bin to be picked up every other week. This is single-stream recycling, so no sorting of recyclables is necessary. If an additional bin is needed, *Eagle Waste & Recycling* provides one at no cost. The curbside pickup process is fully automated for maximum efficiency. The curbside recycling program in Ironwood replaced the drop-off program they previously had for recycling. The curbside program eliminated the time and fuel expenses that residents were paying to bring recyclables to the drop-off stations.¹¹⁴ Ironwood now recycles approximately 33% of its waste stream through this system.¹¹⁵

IX. Assessment and Recommendations

This section reviews and interprets key points of information raised throughout this report (General Assessment). It also includes specific recommendations that our team believes would accomplish several important social and environmental goals. First, we could reduce the amount of waste and problematic waste that we landfill and the associated environmental risks associated with landfilling waste. Second, we could decrease the economic cost of handling waste. Finally, we could respond to community raised concerns and values providing requested efficient services to community members and businesses

i. General Assessment

Garbage Collection: Responsibility for garbage collection is split between curbside collection in the City of Hancock by the City of Hancock; curbside collection in the City of Houghton by *Waste Management*; pick up from dumpsters by *Waste Management* at Michigan Tech; and drop-off garbage for anyone at the Houghton County Solid Waste Transfer Station.

Residents of the cities expect their garbage to be picked up, and the cities have arranged for these services. Residents pay for garbage services through monthly bills added to the water/sewer bill for all households and through the purchase of city-approved garbage bags. The monthly fee is the same for all households within the same city. The garbage bag program provides incentive for residents to reduce the amount of waste they generate, in order to pay less in bag fees.

All of the garbage is taken to the K&W landfill in Ontonagon County. The basic tipping fees there are \$76/ton currently in 2015. The landfill does contract with organizations that bring garbage in bulk to reduce this fee, such as the contract with Houghton County at \$38.65/ton. In 2011 (the most recent year for which data were available), local fees compare to approximately \$47/ton average in state of Michigan and \$50/ton average across the United States. In general, tipping fees are higher in areas where land values are higher. This is not the case locally, where tipping fees are relatively high, despite low land values.

Recycling: Across the United States, we recycle about 34% of our waste stream. Michigan recycling rates, however, are significantly lower. The State of Michigan has set goals of increasing the state's recycling participation rate from 15% in 2013 to over 30% by 2017 and of increasing the number of counties in the state with convenient access to residential recycling from 25 in 2013 to 83 in 2017. Houghton County is currently NOT one of the counties that have convenient access to residential recycling. In fact, residents of the cities of Houghton and Hancock recycle only about 5% of the waste stream and Michigan Tech University recycles about 14% of its waste. Quite frankly, we have a long way to go to come close to state, regional, or national standards.

One of the primary reasons for low recycling rates locally, is that the **current access is not convenient**. In Michigan, the average participation rate for drop-off programs is about 9% of households compared to about 67% of households where regular curbside programs are available.¹¹⁶ In Houghton County, only Hancock offers a curbside recycling program, and it is limited. Moreover, the drop-off site in Houghton is only open limited hours with no weekend hours.

Hancock: The City of Hancock offers curbside recycling pickup once a month at no direct charge to residents. Hancock residents may also drop-off recyclables at the Department of Public Works during working hours for no charge. This is the most convenient and accessible recycling program and the only curbside recycling program in the local area.

Still, participation is low and has only increased modestly since the last review and assessment in 2002. At that time between 100 and 250 households were participating in curbside recycling in Hancock each month for a participation rate of between 6% and 11%.¹¹⁷ Between July and October 2015, an average of 288 households participated each month for a participation rate of about 16%. In 2002, the curbside collection program was collecting 2-3 tons of recyclable materials each month for a recycling rate of 2.2% of the waste stream. In 2015, the amount of recyclable material collected increased from an average of 3.3 tons per month (3.3% of waste) before the *Waste Management* transfer station instituted a fee for dropping of recycling to about 5 tons per month (5% of waste) in October and November.

Low participation is likely to do several factors, including:

- Monthly pickup makes it inconvenient for people to store accumulated materials for such a long period of time and irregular enough that people do not remember the date.
- Lack of prioritization and leadership from community leaders. There has not been a clear message to the community from leadership that this is important.
- Lack of data collected regularly and lack of attention to how the possible economic savings associated with increasing participation.

Houghton: Local residents who wish to recycle must transport materials to the *Waste Management* Transfer Station in Houghton where they pay \$4/vehicle to place their recyclables into bins.

In the past, a major hurdle in developing convenient recycling programs has been the rural nature of the area and its remoteness from recycling markets. The context has changed somewhat since 2014 with the new, recycling center in Eagle River, WI which limits the amount of material transport that must be done in comparison to years past.

Perhaps even more importantly, there has been little promotion of recycling programs by Michigan Tech University, by either of the cities, or by commercial service providers. *Waste Management* simply has no financial incentive to promote participation. They benefit more by sending more waste to the landfills that they own. Similarly, Houghton County sees little financial incentive to promote recycling or reduce the waste stream in any manner after have constructed a new Houghton County Solid Waste Transfer Station in 2012 for which the County still owes over \$1 million in bond payments and needs to continue earning as much money as possible from the disposal fees they collect in order to pay off that bond. The lack of promotion indirectly sends the message that recycling is not worth the effort, which is a problem because volunteer recycling programs are effective only when community leaders promote them. In general, recycling programs in Houghton, Hancock and at Michigan Tech have continued to suffer from benign neglect, as the Waste Reduction and Recycling Review and Assessment completed in 2002 pointed out.¹¹⁸

Even though *Waste Management* and Houghton County do not have any economic incentive to encourage participation, municipalities do. Any material that is diverted from the landfill stream and instead recycled, reduces the costs of garbage disposal which is charged per ton. Recycling is cheaper than landfills in both the short and the long term. In the long term, recycling reduces the costs that future generations will have to incur in managing landfills perpetually for methane emissions and leachate leaks.

In the short term, recycling is not free and markets don't always pay its costs, but it is still cheaper than disposing in the landfill. In the sense that recycling reduces the landfill/garbage disposal fees, it saves money. For instance, the City of Hancock currently pays *Waste Management* \$76/ton for garbage disposal in the landfill and \$70/ton for accepting recyclables. If Hancock increased its recycling rates, the over fees paid for handling the waste would decline. While the difference in recycling fee structure from garbage for Hancock working with *Waste Management* is relatively small (\$6/ton), other firms that do have

financial incentive to recycle charge less for recycling. For instance, *Eagle Waste & Recycling* in Eagle River, WI invested about \$5 million in 2013 on a material recovery facility (MRF) that is capable of sorting 18-24 tons of mixed recyclables (single stream) per hour. This company has invested in recycling as a major part of its business model within the local region and now seeks to recover the invested costs by processing as much recycling as possible.

Garbage & Recycling Cost Comparison: Looking closely at the costs for Hancock and Houghton on garbage and recycling in conjunction with another comparable community, Ironwood, MI, demonstrates how much (or little) it could cost (or save) to expand recycling programs. Table X shows current and hypothetical monthly garbage and recycling tonnages, rates, and costs for these communities per household each month. The communities all have a relatively comparable number of households to serve, all are located in the western Upper Peninsula, and all ultimately dispose of the garbage in the K&W landfill and recycling at *Eagle Waste & Recycling* processing center in Eagle River, WI. Houghton contracts with *Waste Management* for both hauling and disposal and has no contract for recycling, but a recycling drop-off site is available. Hancock uses municipal hauling for both garbage and recycling (recycling is picked up once per month and a drop-off site is available) and contracts with *Waste Management* to receive both garbage and recycling. Ironwood contracts with *Eagle Waste & Recycling* for both garbage and recycling hauling and disposal/processing. In Ironwood, recycling is picked up every other week curbside and garbage is picked up weekly curbside.

Table 7. Cost Comparison for Hancock, Houghton, and Ironwood, MI¹¹⁹

MCD	Service Provider	Households	Garbage tonnage	Recycle tonnage	Costs per HH/month		
					Garbage	Recycle	Total
Hancock	City/Waste Management	1,830	94	5.0	\$15.00	\$0.62	\$16.00
Houghton	Waste Management	1,156	92	n/a	\$11.00	\$4.00	\$15.00
Ironwood	Eagle Waste	2,400	n/a	n/a	\$10.16	\$1.58	\$11.74

Table 7 shows that the cost of instituting a curbside recycling program could potentially be minimal and perhaps cheaper than the current garbage and recycling costs being paid by Hancock and Houghton. Of course, contract rates will vary community to community based upon a range of factors. The rates paid by Ironwood may not be similar to that which would be charged in Hancock or Houghton for a variety of reasons. This table is included here for comparison purposes.

Houghton has no current contract for recycling, but instead *Waste Management* charges a \$4/vehicle service fee to individuals when they drop off recycling. Table 4 includes the \$4/household monthly rate for recycling as an approximation of what the average household is currently paying each month for recycling fees. This value underestimates what a household who participates highly in recycling would pay, because recycling all recyclable material would lead to needing more than one trip per month for most households. The value overestimates what the many households who choose not to participate in the program pay (\$0) and instead dispose of recyclable materials in the garbage.

In sum, recent past and current recycling efforts in Houghton, Hancock, and at Michigan Tech have been minimal and local recycling rates are among the lowest in the State of Michigan and across the country. However, several recent developments suggest that **now could be a very good time to institute new (or revised) programs:**

1. People are demanding more convenient recycling access, as evidenced by: a 2011 survey of Houghton residents, increasing tonnage collected by the City of Hancock program through 2015, and by ongoing community critique of a newly instituted \$4/vehicle fee for recycling drop-off at the *Waste Management* transfer station (instituted in August 2015).
2. The development of a new highly efficient and large capacity recycling sorting and processing center in Eagle River, WI in 2014 with the goal of service northern Wisconsin and the Upper Peninsula has reduced transportation costs and introduced a new regional service provider with a strong economic interest in promoting recycling.
3. The 2014 Michigan Recycling Plan of Action at the state level is providing resources in the form of grant money and expertise to help institute programs and political will and leadership promoting the importance of recycling.
4. Current garbage/recycling contracts for both City of Hancock and Houghton will expire in summer 2016 and both cities have expressed some interest in collaboration.
5. Instituting enhanced recycling programs may not add any additional cost to residents or the university and could possibly save money.

Composting: The City of Hancock provides residents with the opportunity to compost yard waste year-round at the Department of Public Works. The City of Houghton offers a fall clean-up drop off of yard wastes at the City Garage. Both of these services are free, but see limited participation. One way to increase participation would be to set and publicize participation goals, take action to meet those goals (information campaign, making more convenient, block leaders), monitor progress toward those goals, and if necessary, take additional action.

Michigan Tech composts its yard wastes (but not as effectively as it could) and a small amount of its food waste from the dining halls during the summer months. Tech has plans to create and implement in 2016 a more effective yard waste composting program that could meet the “food” needs of its organic gardens. It could also expand its food waste composting to all of dining services and year round and integrate with yard waste composting. They could also replace disposable flatware and paper plates with compostable options. They could then place compost bins in indoor and outdoor areas across campus where large numbers of people eat.

Diversion of Special Materials: Local government bodies (municipalities) take little responsibility for the disposal of hazardous wastes that are not allowed in landfills. One exception is that the Houghton County Solid Waste Transfer Station provides for disposal of used engine oil. In the case of old batteries, used appliances, electronics (e-waste), and worn tires, private firms provide the necessary disposal opportunities. Residents simply need to be informed of these opportunities.

Another problem is that there are several different providers who each take different materials, and it can be difficult to keep track of where to take what. An even more important problem is that residents do not have a way to dispose of many household hazardous wastes such as pesticides, solvents, paints, pharmaceuticals, and other hazardous chemicals. They are not supposed to throw these wastes into the regular garbage, yet no other disposal opportunity exists locally. Providing some option such as a drop-off site for these wastes one or two weekends a year would be the most practical way to address this gap.

ii. Specific Recommendations

Given that official encouragement, convenience, and financial incentives are major motivators in the success of any voluntary recycling and waste reduction programs, we recommend that the City Councils for Houghton and Hancock and the leadership at Michigan Tech University make recycling and waste reduction a clear priority. Leaders could do this by instituting programs that make recycling, composting, and disposing of hazardous wastes simple, easy, and cheap. They should also collect data indicating levels of participation, monitor these data, and report them to the public. And they should embark on a campaign to encourage residents to participate in the programs that are available.

More specifically, we recommend the following actions. These actions might be instituted by municipalities, by business organizations (such as downtown business associations), by Michigan Tech University leaders, and/or by an organized group of local citizens (such as the Copper Country Recycling Initiative). We believe the Cities will need to take a clear leadership role, but Houghton County, the Copper Country Recycling Initiative, Michigan Tech, and/or other organizations may also need to contribute.

1. **Institute programs that make recycling simple, easy, and cheap.** Recycling should be the easiest option for residents. This is our first and most important recommendation.

Within cities and villages, this can be effectively and efficiently done by implementing a weekly or bi-weekly (fortnightly) **curbside collection program** with bins that are clearly marked and provided to residents as part of their service agreement. In addition, conveniently placed drop-site locations where residents can drop off recycling at varied and convenient hours of the day would help to serve residents of less densely settled areas of the county or those who happen to miss their curbside pickup date. Drop-sites might be placed at frequently visited locations, such as Walmart or grocery stores and in satellite communities, such as Calumet and Chassell.

Recycling is easiest when it is single stream and households don't have to do any (or little) sorting of different material types. However, some simple sorting programs work effectively and have been successful in some locations (like Marquette).

In Hancock, where a curbside program already exists, we recommend that this program be expanded to at least every other week. From our review, it looks as if the City of Hancock has the resources in place to increase pickup from once a month to twice a month without increased cost and little organizational change. The City could also pursue State of Michigan grant funding (associated with the Governor's current initiative) to purchase and distribute bins for residents. Participation rates could also be increased by instituting block leaders to help informally encourage participation in their own neighborhoods; by leadership making clear statements about the importance and ease of participation; and by painting the recycling truck to designate it as "recycling."

Such a program could be instituted by putting out a Request for Proposals for contracts to service providers that include various recycling options or that specifically include a curbside recycling component. Another option would be for Cities or the County to collect materials themselves and either transport to a recycling sorter (such as *Eagle Waste & Recycling*) or to market materials themselves. Successful examples for relatively similar Michigan communities can be found for either of these models.

We make this recommendation for several important reasons, including:

- Curbside programs with regular service in clearly marked and distributed bins have been shown to dramatically increase recycling participation rates, especially when partnered with encouragement from leadership and simple instructions.¹²⁰
 - Recycling is cheaper than landfilling in both the short and long term. Municipalities (and residents) have a financial incentive to recycle more.
 - Houghton residents are demanding curbside recycling services as evident in the 2011 survey where respondents agreed that Houghton should provide curbside recycling services.¹²¹
 - There are regional service providers who could provide the service, and there are example peer communities that are effectively doing high participation rate curbside programs and saving money at the same time.
 - This would help to meet the Governor's goals of increasing the number of counties in Michigan that offer convenient access to recycling and to increase recycling rates.
2. Current contracts for both the City of Houghton and the City of Hancock expire during summer 2016. These **communities could achieve economies of scale by partnering**. A partnership between Hancock and Houghton could involve coordinating contract periods and requesting coordinated Requests for Proposals that would ensure a service provider a larger market. Alternatively, the cities might work together by sharing trucks or otherwise coordinate a shared system of garbage and/or recycling collection informally or more formally through establishing a joint solid waste management authority that might expand to include more local villages. At minimum, we recommend that the cities work together to discuss, compare, and jointly address the similar opportunities and challenges facing each community.

Coordination between Houghton County and its various municipalities and townships could also greatly improve local services and help to ensure that the needs of all of our local communities are met. Following the model in Emmet and Marquette counties, for instance, **cities could require that any haulers must use the Houghton County Transfer Station** as an initial drop site for materials collected. This would benefit the county by helping it to recoup investment already made into the transfer station. It would also level the playing field and presumably increase competition between different potential service providers effectively giving municipalities more choice in programs. One potential drawback of such a strategy is that because *Waste Management* essentially has a monopoly on landfill disposal, they could potentially respond by increasing disposal fees for the county.

3. **Work with businesses and schools.** Businesses and other community-based organizations (like schools, hospitals, etc.) should be included in solid waste planning and recycling programs. These organizations can partner in source reduction programs, such as charging customers for disposable plastic or paper bags and/or offering bulk purchasing opportunities. Plastic bags pose key challenges and introduce frustration in landfill disposal¹²² and in recycling programs.¹²³ Many organizations would have an interest in reducing their prevalence.

Organizations could also save money and reduce their environmental impact by recycling more of their own waste, and it is important for them to have convenient access to recycling. Depending on the type of business, about 60% of wastes generated are recyclable and most businesses in the local region (especially those that generate a higher quantity of recyclable waste) could save money by recycling more.¹²⁴ Another partnership opportunity would be to host drop-off recycling bins at high-traffic local business locations where people go anyway, such as Walmart

or local grocery stores. This would increase convenience for households and could also increase customers for the businesses and help them to meet their own sustainability goals and/or educational mission.

4. **Encourage composting.** Composting is a key way to divert up to 50% of materials (yard and food wastes) from the household waste stream and to convert these materials into useful fertilizer. It also has the benefit of being easy to do by individual households, neighborhood groups, or multi-family units in a small space in their own backyards. Composting at home, or close, eliminates transportation and service costs.

City residents already have incentive to compost in that it could reduce garbage costs paid in bag fees and also because it removes stinky organic material from the household immediately without having to wait for garbage collection.

Hancock and Houghton should implement a composting drive. They should bring composting bins to town in a mass shipment and offer them to residents and groups at reduced costs and in prime locations around the community, or offer an immediate rebate program to local businesses who already sell compost bins. Perhaps one or more events could be held (or offered at existing events, such as Bridgefest) where bins are offered and experts are available to talk with people about how to do composting. The drive would also need to include educational outreach and would benefit from working with block leaders who to talk to their neighbors and champion the cause in their neighborhoods. Partnering with existing gardening groups and/or groups promoting health local food efforts could also improve success. Grant funding for a project like this would likely be available from Michigan's Community P2 Grants.

Cities should promote yard waste composting already available in Hancock and Houghton. They should consider using a wood chipper to help take care of woody debris and facilitate its decomposition. They should also consider combining efforts to one yard waste composting area that could be shared between the two cities and consider picking up yard waste curbside monthly from May through November.

Michigan Tech should expand its composting program. The university should follow through on its plan to create a more integrated, useful, and better maintained composting area that could feed Tech gardens. They should expand and publicize food waste composting programs to all of the dining facilities, replace disposable flatware with compostable flatware in catering, and integrate the food waste composting program with the yard waste composting. It should collect data on how much food and yard waste is composted and report these successes and promote the programs as key strategies for meeting the university's sustainability goals.

5. **Hazardous & E-waste information campaign and drop-off sites.** We need to avoid hazardous wastes getting into the landfill, but currently local residents have few opportunities for appropriately disposing of household hazardous wastes. An information campaign that informs people of what materials are hazardous and where to dispose of such items is important. With regards to e-waste, there are local drop-off sites available (Ed's Used Parts), but this does not seem well known across the community. The Cities and Michigan Tech (whose students, faculty, and staff produce a great deal of e-waste) should clearly communicate this option on websites and in communication material. **Michigan Tech should develop an e-waste collection center on campus** to make this even more convenient, especially because many students do not have vehicles and transportation may be an issue. The cities and Michigan Tech should offer **biannual hazardous waste clean-up periods** and advertise them well, where residents can drop off hazardous wastes.

6. **Recycling advocates should engage in waste reduction and recycling discussions** with community and university leaders. Community and university leaders communicated to our research team that if there were more pressure from community members for waste reduction and recycling programs, they would be more inclined to pursue opportunities. They need to hear that people would value these services. Residents who would like to advocate for more waste reduction and recycling programs should attend city council meetings and raise the issue, organize together to work toward clearly defined, attainable, and well-research goals, raise awareness and generate public pressure. On the Michigan Tech campus, the best way to gain traction would be for students to organize campaigns and to collaborate with faculty and staff.
7. **Reduce, Reuse and Share.** Municipalities and businesses can create environments that encourage reuse in multiple ways, such as adding water bottle refill stations, allowing for bringing your own mug, providing dishwashing facilities, and instituting policies such as plastic bottle-free campus (see <https://www.banthebottle.net/>) or otherwise removing disposable options. Individuals and purchasing units can:¹²⁵
 - **Buy used.** There are multiple opportunities for this in the Keweenaw, including Keweenaw Consignment (in Ripley), Urban Rustics (in downtown Houghton), St. Vincent de Paul (in Hancock), Goodwill (in Houghton near Walmart), Habitat for Humanity Restore (Calumet), and at various antique and vintage stores.
 - **Look for products that use less packaging and buy in bulk,** which can both reduce packaging and save money. Bulk food items are available at the Keweenaw Co-op in Hancock. Local breweries will refill a growler rather than disposable/recyclable glass bottles or aluminum cans.
 - **Buy reusable over disposable items.**
 - **Trade and share with neighbors and friends.** These activities reduce waste, but also save individuals money and strengthen social ties and community cohesion. Activities that are already going on include the Little Free Library stations located across the community where people can trade books and various clothing swaps among groups of friends. Other activities include formal and informal tool and equipment sharing programs within neighborhood groups or through organizations such as the local library or the food co-op. These programs work well for items that we don't regularly need to use and that are expensive to purchase.
8. **Michigan Tech should serve as a community sustainability leader.** Promoting sustainability is part of Michigan Tech's vision and mission statements according to the Strategic Plan. But currently, the university has not developed clearly defined sustainability goals nor does not keep and publish data on sustainability metrics.

Michigan Tech's recycling rate is about 14%. This is below the state of Michigan's (low) average and embarrassingly low for a university. The university could increase participation on campus in multiple ways, including:

- Provide bins, free of charge, in offices and increase the number and visibility of bins.
- Reduce how often garbage bags are changed in individual offices or remove garbage bins from individual offices, encouraging employees to bring their garbage to more centralized bins (for each hall) and instead putting recycling bins in individual offices. This would make recycling more convenient than garbage.

- Develop a culture of recycling/composting during orientation by using peer students to describe the importance of sustainability and recycling/composting; describe waste reduction, composting, and recycling programs on campus (how to do it and where); and connect these programs to identity as a Husky.
- Instate a policy that requires that MTU units must purchase recycled paper and to encourage purchasing other recycled materials as well.

In addition, Michigan Tech should serve as a leader across the Keweenaw. The university should envision itself not only as planning for and instituting programs and planning on campus but also as a community partner that helps local municipalities to meet their waste reduction and recycling goals.

X. History of Recycling in Houghton County

An archival search of newspaper articles printed over the past thirty years highlights the cyclical trends in recycling throughout the Keweenaw Peninsula. Recycling programs had a slow start even with a push from the community to implement effective recycling programs. The low population density and remoteness of the region from major urban areas are factors that have limited recycling programs in the region, due to the high transportation costs when marketing recyclables. Recycled goods must travel a far distance in order to reach an appropriate market. None of the previous or current waste disposal providers in the region, *Tasco*, *Peninsula Sanitation*, and now *Waste Management* have found recycling to be profitable, and therefore have little incentive to implement recycling programs.

Since recycling began in the late 1980s the service providers' point of view has been to create a profitable program. This conflicts with the residents' desire to have a complete recycling program, where most items are accepted as recyclable. The limitations of profitable recycling programs (e.g., not accepting glass) cause discontent in residents due to the need to separate recyclables. This frustration with implemented programs has occurred since the early stages of recycling programs within the region.

With Houghton, Hancock, and Michigan Technological University having separate contracts with waste service providers over the years, each entity has experienced unique histories. Previous to the City of Houghton having any recycling programs available to residents, Michigan Tech had dumpsters available for Houghton residents to use and drop off their materials. When these bins were not available and recycling was not seen as profitable, the recycling program in Houghton would simply disappear.

Overtime citizens, community organizations, and companies would try and help with recycling programs in Houghton, but all seemed to have issues with whatever program was in place at the time. The City of Hancock's recycling history appears to be less turbulent than Houghton's. The stability of Hancock's programs may be due to the fact that the city has maintained drop off sites since inception of the recycling program and because of continual pressure from residents.

In the early- to mid-2000s the story shifts and the discussion stops being dominated by the call for city recycling programs and focuses more on local collection events for e-waste and hazardous household wastes and sometimes recycling. Local organizations, like Goodwill and Habitat for Humanity, are working together to host collection events for miscellaneous recyclable materials at the same time.

The financial burden of trying to recycle in a more rural region and associated diseconomies of scale and transportation costs have made it difficult for small local start-ups to succeed without the more major capital investment required to create an efficient recycling system. For larger companies which could invest in infrastructure, the fact that their primary business is in managing garbage and operating landfills creates disincentives to expand recycling programs. The result is that the residents of Houghton and Hancock have seen seemingly constant changes of what can be recycled, how to recycle, if they will be charged for recycling, and even if recycling will continue to be available. It appears that there has been near constant conversation over the last thirty years from residents of Houghton and Hancock wanting recycling and improved systems. But until the costs are no longer prohibitive or until communities begin working better together, improvements have so far been minimal.

i. Daily Mining Gazette Articles 1987 – 2012

12/15/87 "Trash Recycling Proposed"

- Copper Country Citizens for Recycling (CCCR) plans recycling proposal.
- It will start out as a tin can recycling plan, but looking to expand into countywide trash recycling
- CCCR will hold monthly can drive at the mall. The cans will go to a Mohawk scrap metal dealer.

2/5/88 "Recycling: Future for Waste"

- Waste dumping threatens Michigan's groundwater
- Baraga County has committed itself to the first rural recycling program in the state and is considered a pilot for others. Tasco is behind this approach, using Clean Michigan Funds (CMF).
- CMF is a \$10 million appropriation fund from the state of Michigan to help finance solutions to the state's solid waste problems. Michigan's overall solid waste management strategy calls for 81% reduction in use of landfills. Recycling is expected to account for 31% of waste reduction
- Baraga's program includes training for elementary and high school teachers, workshops, community seminars, community education, and student education.
- Recycling has been the "backbone" of the state's Solid Waste Management Strategy, unveiled in 1983-1984. The new transfer station will essentially be a recycling station. Working with Tasco to get the station serviced
- Houghton and Hancock are working on a yard waste recycling program and a kitchen waste collection pilot program. Have applied for \$70, 712 from CMF. Could collect as much as 640 tons of material per year.

3/4/88 "Recycling Drive Here Saturday"

- CCCR will hold recycling drive at Copper Country Mall.
- Sorted clear, amber, and green glass acceptable
- First drive was held in January and collected 400 lbs. of tin cans

3/30/88 "Recycling Operation Needs Wide Support"

- CCCR has been trying to implement a countywide recycling program to defray the cost of landfills.
- Steve Kratzer from DNR's Waste Management division announced that the state is developing a statewide solid waste management plan that would include incentives for resource recovery and recycling

5/12/88 "Tire Recycling Plant Eyed for Western UP Location"

- Rubber Research Elastomerics, Inc. in Minnesota is working with state legislature to recycling rubber products in the U.P. that cannot be dumped in landfills
- Under the plan, tires and other rubber products not accepted at conventional landfills would be transported to a plant to be converted into material for other rubber and plastic products, and asphalt

12/16/88 "Transfer Station Start, Recycling Day Coincide"

- Houghton County Transfer Station (HCTS) and recycling collection at the site will begin Saturday
- People are charged \$0.50 per household garbage bag they take to the station
- Tom Deschaine in process of contracting with Houghton County to place permanent recycling bins at HCTS.

- The county working on CMF grants to subsidize used motor oil collection

1/17/89 "Governments are Taking a Look at Recycling"

- Tightening regulations and rising disposal costs are forcing governments to consider recycling
- In late December, Gov. James Blanchard signed eight recycling bills aimed at reducing the almost 12 million tons of garbage generated in the state each year. The bills address: paper used in state offices, stepped-up research on plastics manufacturing, labeling, and recycling. One bill requires recycling to be considered in the mandatory county solid waste plans
- A 1987 DNR-commissioned study found that Houghton and Keweenaw counties create 29,613 tons of garbage (commercial, industrial, institutional, and household) each year
- Taking all that garbage to landfills (some is illegally dumped) would cost \$1.6 million (at \$55/ton)
- Transportation and collection make up 48% of solid waste costs, disposal costs 52%
- Increases in the costs of tipping fees are partly due to the costs of building environmentally safe landfills under strict state guidelines. Prices are in the millions of dollars (\$2.2 million for one in Marquette County; \$1.4 million for one in Delta County built in 1986)
- Many open dumps still operate locally. DNR would like to see all of these closed by 1991
- Michigan's Natural Resources Commission adopted a goal to reduce use of landfills from 85%-15% over the next 15 years
- State bond issues (Proposal C) passed on Nov. 8 will provide \$150 million for solid waste policies
- The number and lifespan of landfills is also decreasing. Portage Township landfill closed in 1987, L'Anse Village landfill will close on July 1st, Calumet Township landfill will close by 1991. Hancock, Franklin, Osceola, Keweenaw County, Laurium, Lake Linden, Portage Coast Guard Station, and Fort Wilkins State Park rely on the Calumet landfill, which doesn't meet EPA regulations. Houghton and Michigan Tech use the K and W Landfill in Ontonagon

1/18/89 "Tasco Finds Ways to Make Recycling Profitable"

- Tom and Andi Sanitation Co. (Tasco) sorts, grades, packs, and sell used glass, corrugated cardboard, newsprint and plastic milk jugs to other companies
- Glass is crushed and sent to Milwaukee to be turned into new bottles
- Cardboard is compressed into 800-850 pound bales goes to Menominee Paper (180 miles away) and transformed into useful products like toilet paper rolls
- Newspaper stacks (with no glossy sections) are sent to Celotex in L'Anse and turned into ceiling tiles
- White goods are shredded in Iron Mountain for sale to steel industries
- Plastic milk jugs are made plastic lumber, docks, park benches, picnic tables and fences. They are sent to Midwest Plastics in Wisconsin
- Faraway markets makes profits difficult
- Tasco collects recyclables on regular garbage routes. 20% of Baraga residents participate regularly 10% participate occasionally
- Looking to expand to pick up tin cans. Problems with this are getting them to Gary, Indiana and getting people to prepare them properly. Tasco has also applied for Clean Michigan funds to set up used motor oil collection bins and bins for HCTS, contracted to become a Tasco drop-off center

3/24/89 "First UP Recycling Confab Set"

- The first UP recycling conference will be May 6 at the Ford Forestry Center near L'Anse
- Conference was organized to foster communication between area recycling business; help

program leaders, state officials and UP residents meet, share ideas, and formulate goals; increase awareness of the role of recycling in solid waste management and reducing landfill costs

- The low volume of recyclables in the U.P. means companies need to cooperate and coordinate their efforts. A network of drop-off centers and material-sharing would increase effectiveness of programs

4/21/89 "Used Motor Oil Targeted"

- Houghton County has a \$6,933 grant from Clean Michigan to help build a used motor oil collection site at its transfer station
- Grant was written and submitted to the Natural Resources Commission by CCCR. Many Houghton-Hancock filling stations will accept used, uncontaminated motor oil

4/21/89 "Recycling: The American Way"

- CCCR states that recycling is just as patriotic now as in WWII. Area residents can take glass, tin and aluminum cans, plastic milk bottles and newspapers to the Houghton County Transfer Station

4/25/89 "Oil Recycling Urged"

- The two million Michigan residents create 13 million gallons of used motor oil each year.
- 10% of that was recycled in 1987, according to Michigan Motor Oil Recycling Program (MMORP)
- CCCR is asking locals to not dump oil. It can be recycled into fuel or lubricating products

5/8/89 "L'Anse Conference Draws Business, Recyclers"

- 110 people attended the conference
- The state wants people to buy recycled products in addition to recycling. The Quality of Life Bonds (total of \$150 million) approved in November will help start UP recycling programs. The state will pay 75% of the costs, local communities will pay 25%
- State officials will focus on developing markets for recycled items, which usually go to WI or MN
- Michigan Diversified Industries plans to operate a cellulose plant in Marquette that uses newspapers to make ceiling tile and other similar products
- According to Bette Premo, one of the organizers, the conference successful in fostering communication between business and recycling groups.

9/23/89 "Cities Assisting Recycling Efforts" Editorial

- The state is helping local governments by giving out grants through the Clean Michigan Fund (CMF) to collect and dispose of garbage in a more environmentally friendly manner
- Houghton and Hancock are participating. The cities will have cleanups to encourage citizens to become "recycling conscious," and will offer biodegradable garbage bags for grass clippings and leaves to be taken to HCTS. Newspapers, plastic milk jugs, corrugated cardboard, tin cans, and oil can also be take to HCTS
- City officials sated that the goal is to reduce the amount of material going to landfills

11/16/89 "Recycling Projects Among Funding Requests"

- DNR has received 122 applications for about \$2 million were submitted for round two of Solid Waste Alternatives portion of the Quality of Life Bond
- Applicants included: Tasco, Houghton City, MTU, and Peninsula Copper. They hope to enlarge current recycling programs and studies
- Tasco: applied for \$88,162 to expand from a local to a regional program.

- Houghton City applied \$9,300 to hire a recycling coordinator, establish more recycling centers and increase community recycling efforts
- MTU applied for \$149,669 to expand foundry industry waste reduction studies
- Peninsula Copper Industries applied for \$208,209 to expand circuit board recovery program. The grant will also go to increase marketing efforts

12/5/89 "Recycled Paper Pushed" Letter to the Editor

- Area residents should work to increase the availability of recycled and unbleached paper products and should ask businesses to use and sell them
- Earth Care Paper, Inc. sells recycled, unbleached paper products.

2/6/90 "Recycling Plastic Promising for State" Editorial (The Ann Arbor News)

- DNR is urging people to buy recycled instead of degradable plastics, which take too long to break down and perpetuate a "throw-away" mentality
- Clean Tech Inc. of Monroe, Michigan is the first company in the state to make new plastic bottles out of old ones and will begin production in June. It will keep 25 million lbs. of plastic out of landfills each year.

4/11/90 "Recycling Trend Picking up Steam" Editorial

- Recycling has "gained credibility" in the eyes of municipal officials
- Baraga and Houghton County Boards of Commissioners support recycling and have systems in place to permit it. Residents now need to take recycling seriously too.

8/10/90 "Recycling Seen as Key to Garbage Solution"

- Houghton County Commissioner Chair, Jackie Niemi declared that one can reduce 2/3 of waste by recycling
- Residents should also report any illegal dumping activity, which is a problem in all rural areas
- Northern Hardwoods general manager agreed to clean dump areas on company property

9/4/90 "Citizens for Recycling Draw up Collection Chart"

- CCCR devised a chart made up of local businesses that accept reusable or recyclable goods to help residents find alternatives
- Lists 28 local facilities that will buy, take at no cost, or charge fee for: household goods, glass, used motor oil, albums + CDs, appliances, electronics, tools, furniture, clothing, car batteries, metal cans
- CCCR is still looking for more businesses, especially those that will accept plastics, diapers, cardboard, and plastic liter pop bottles
- CCCR is also working with local governments on a grant to hire a recycling coordinator
- People need to follow the rules at HCTS

1991 "Manor Gives Economy a Boost"

- Heritage Manor has been recycling since it opened in 1976. It Started with newspaper, expanded program around same time Strack Recycling opened. Now recycles: cans, newspaper, bottles, #1 and #2 plastic, corrugated cardboard, magazines, shiny paper, paper products, batteries
- Paul Strack gave the Manor tips and picks up recyclables.
- Some tenants put a lot of time into sorting the materials. One resident would walk recyclables to Mall before HCTS opened. Residents say they recycle to leave a better world for their grandchildren

1/23/91 "Newsprint Recycling Ventures in the Works"

- DMG uses 2% recycled newsprint
- New facility in Thunder Bay, Ontario will provide newsprint with 40% recycled content
- This facility is involved with a joint recycled newsprint venture with the DMG's parent company

3/28/91 "Recycle's the Word"

- Paul and John Strack of Strack Brothers Recycling are responsible for servicing South Range, Daniell Heights, Hancock, and possibly Eagle River and area schools.
- Tasco operates the Houghton County Transfer Station and curbside pickup in Baraga County
- Government regulations dealing with recycling change almost daily.
- Upper Peninsula Recycling Coalition (UPRC) held the third annual U.P. Recycling Conference
- Paul Strack: Recycling is profitable, markets exist. Most stuff goes to Green Bay; shiny paper to Manistique; newspaper to Celotex (L'Anse). He is looking to build bigger facility and service more sites
- South Range survey found that 29% of residents recycle; 73% would if better program existed
- Chassell began working with Strack Brothers in Oct. '90. Strack provides trailers, barrels
- Strack accepts: vehicle batteries, wood, all glass bottles (no other glass), metals, white goods, cans without labels, lawnmowers, small motors and radiators, aluminum, chrome, copper, iron, steel, wire. white paper, black/white and color newsprint, magazines, (clean) corrugated cardboard, #1 and #2 plastic (labels okay). No chemical containers, paint cans, books.
- Tasco accepts: corrugated cardboard, office paper, newsprint, magazines, glass, plastic, metal, tin cans, limited amount of white goods (storage regulations - must be containerized). This is a highly competitive business. Tasco will not reveal markets, but they are 300-500 miles away.

3/28/91 "Residents Get Own Recycling Program Going"

- MTU's Daniell Heights began recycling Oct. 1990, making it one of the first communities to do so
- The DH Residence Council's Recycling Committee conducted recycling survey among residents: what they would like to recycle, preferred methods, use of profits. It estimated that 15-20% of residents use bins
- Before Strack approached the DH Council, residents had a rotation system to take recyclables to HCTS in own vehicles.
- The council would like to see place to recycle disposable diapers

6/10/91 "Recycle Center to Open"

- West Hancock Recycling Center will open at the Keweenaw Co-op
- It was built with \$700 in materials paid for by city and labor donated by Co-op members
- The city council hopes that this will be one of the first drop off sites it will provide
- The co-op center will accept: brown, clear, and green glass; tin and aluminum cans; newspaper; white office paper, shiny paper; cardboard; #1 and #2 plastic
- The site will be serviced by Strack Brothers of South Range

9/17/91 "Recycling Program Halted"

- The recycling bins at the Keweenaw Co-op and city garage have been closed until further notice due to problems with service by Strack Brothers of South Range, who were unable to keep up with pick ups at the site. Last week, a city garbage truck had to do the pick up.
- Paul Strack said his company will continue to service all other recycling points. It is quitting Hancock because it is too big and he has received no cooperation from the city

9/17/91 "Recycling Takes a Step Backward" Editorial

- Area residents have demonstrated a willingness to learn how to recycle properly, but still have a lot to learn
- The DMG is disappointed that Hancock's recycling centers have been shut down
- The city council should negotiate with the current company or another, step up education efforts. Increasing pick ups and telling recyclers not to place items in overflowing bins would clean up sites
- Curbside recycling would be the best option, but it requires careful planning

9/20/91 "Copper Country Speaks"

- When asked, "Do you recycle?" Copper Country residents replied:
 - Yes, as much as I can with limited opportunities (Chassell)
 - Yes, need more drop off points. Made garbage bill cheaper (Lake Linden)
 - No, but would if convenient (Houghton)
 - Yes, good for the future (South Range)
 - Need better facilities (Laurium)
 - Yes, wish for more drop off points (Hubbell)

10/19/91 "Recycling Rules Reinforced"

- Laurium's new recycling program is developing problems. People are unaware of what can be recycled and what cannot and are not separating recyclables properly.
- Laurium's station, serviced by Tasco accepts cans, glass (all colors), newspaper, plastic, milk and beverage jugs and tin and aluminum cans

1/2/92 "Users Asked to 'Clean up Act'"

- People are not following the rules. By law, recyclables must be in containers. People dump items into overflowing containers. Instead they should wait 1-2 days until bins are emptied.
- Other problems arise from putting unacceptable items in bins
- About 99% of people do follow the rules, it is the 1% that do not that cause problems

1/3/92 "No Free Lunch: Recycling Changes on the Horizon"

- The days of free grant money keeping Tasco afloat have passed. The company now will have to charge for its services due to increased labor and equipment costs and volatile markets
- Deschaine is optimistic about future due to increased awareness about recycling. Municipalities can save money in the long run by paying for recycling due to avoided tipping fees

1/4/92 "Paying the Price" Editorial

- Tasco is planning to charge for services. The question is whether people are willing to pay
- Not paying now means will have to pay price in tipping costs and environmental damage
- The first city to subsidize costs will probably be Hancock, which is working with Tasco to re-establish a collection site.
- Recyclers not making large profits. They have large operation costs and face "wildly fluctuating markets." A large volume of recyclables is needed to turn a profit.

1/6/92 "Recycling Returns to Hancock"

- The Hancock City Council has signed a one-year contract with Tasco to establish a recycling collection
- Materials accepted with the new program will be more limited
- 2 tons of recyclables per week will save the city \$350 each week

3/31/92 "Recycling Woes: Collection Centers Ban Glass"

- HCTS (operated by Tasco) banned glass 3 weeks ago
- In Laurium, glass bins pulled from recycling center
- Hancock residents can still drop off glass at their bins
- The ban was necessary due to problems with contamination, especially by window panes (which have a high lead content and cannot be mixed with glass for beverage containers). A Milwaukee market rejected a load of 23 tons of glass. Contamination is also a problem with sorting paper products
- Contamination results in loss at marketplace and increased labor costs for sorting
- Deschaine: would be better off if about 2% of the people did not recycle.
- Tasco has run at a loss over last 5 years: Low demand for recycled products

4/1/92 "Recycle with Care" Editorial

- People need to have a little more care and concern
- Tasco's has banned glass. The same thing happened in the fall of 1991 at the Keweenaw Co-op
- Twice in less than one year, carelessness has threatened to ruin a good program

5/27/92 "Recycling Effort Promised Support"

- Ontonagon Village Council agreed to help citizen recycling efforts and will pay half of the costs to service the bins at M-64 truck stop if other businesses or governments also provide some funds

11/18/92 "Area Should Clean up Recycling Mess" Editorial

- There's room for debate about merits of current recycling programs
- Hancock shut down recycling until Dec. 1 because of firearm deer season - no one was available to pick up recyclables. HCTS is also closed. Both centers are serviced by Tasco, who is not answering phones
- Contamination and tidiness has been a problem with recycling programs
- Curbside pickup or mandatory recycling may be the answer. Current recycling efforts are a mess

11/21/92 "Recycling's a Way of Life" DMG. Letter to the Editor. Nancy Dea, Allouez

- Solution to recycling problem is education - teach people how to use centers
- Laurium's center closed; bins in Hancock gone (deer season); bins at HCTS gone and it does not accept glass or cans, milk jug bin was closed
- Moved from metro-Detroit area. Downstate, tax dollars pay for centers, but they should be able to pay for themselves if people are careful

11/21/92 "Recycling Plan Needed" Letter to Editor. Carolyn C. Rolf O. Peterson (Houghton); Paul B. and Audrey G. Fraier (Hancock); Jim Boyce (Houghton); Elvi H and Albert P. Ruotsala (Laurium); Andrea Hauge (Hancock); Denise and David A. Heikinen (Houghton); Ulla D. and Harley Sachs (Houghton); Bornj E. and William Fink (Houghton); Arthur E. Anderson (Hancock); Haren McFarland (Houghton)

- Suggest a per capita fee of \$1/year added to tax bills to pay Tasco for operating costs
- Ask Houghton City Board of Commissioners for leadership to help solve recycling problems

11/27/92 "Recycling Effort in Peril" DMG. Roger Komula

- Assistant County Controller John Kelly sent a letter to Houghton City Council outlining a plan to spread recycling costs among county municipalities. Payment is based on population. The County would be responsible for the site, policing it, and snow removal

Municipality	Annual Cost	%	Approved
Houghton	\$1490	47%	No
Adams Twp	\$327	10%	No
Chassell Twp	\$335	11%	No
Portage Twp	\$584	19%	No
South Range	\$148	5%	Yes
Stanton Twp	\$236	8%	Yes
Total	\$3126	100%	

- Hancock was not included since it has its own recycling center at the city garage for residents only
- Some officials are skeptical of paying for a recycling program

11/27/92 Recycling Centers Not Free"

- The future of recycling in Copper Country is uncertain
- Bins will be back in Hancock on Dec. 1. They were removed because they were damaged last year when they froze to the ground and because of deer season. Bins at HCTS may not be back.
- Deschaine is negotiating with the county to help pay for service.
- Tom and his wife, Andrea are Tasco's only employees. Don't have money to hire labor.
- Deschaine is taking with Copper Country Mental Health Services to provide labor

11/30/92 "Area Needs Better Recycling Program" Letter to the Editor.

- Recycling efforts in the area are "plagued by a lack of leadership and education not by a lack of interest
- County government feels that Tasco is adequate, but both are pessimistic and unresponsive
- Other small recycling businesses in the UP have formed a coalition to help improve and locate markets, but Tasco has not taken advantage of this "marketing resource"
- Olmstead County, Minnesota has "an innovative and highly successful integrated waste management system," which is used as a national model
 - Barbara Clark from Hancock was the only representative from a local government or waste authority
 - The program services 135,00 people and manages 80,000 tons of waste per year using mandatory curbside recycling, waste abatement and education programs, waste-to-energy-plant, composting, and landfills (Houghton/Keweenaw counties have a population 41,000, and generate 30,000 tons of waste per year)
 - Most haulers are private, using a "trash-to-treasure" computer network, household hazardous waste collection, product giveaways, backyard compost demonstrations, educational tours, and an "open, educated attitude by workers, users, and government members" to recycle 31% of the waste stream
 - The total cost is \$82.65 per ton. Half is debt services, which will decrease over time
- Marquette County offers monthly drop-off for household hazardous waste and curbside recycling. Peninsula Sanitation has full time recycling coordinator on staff in Marquette.
- Local governments need to explore possibility of curbside recycling and assist Peninsula Sanitation in their efforts to purchase another specialized vehicle for recycling
- Houghton County has received a Clean Michigan Fund Grant "to sponsor a recycling coordinator position and education program, pursuant to matching funds of \$13,000." The grant could be lost because of lack of commitment to get the matching funds. County will not fund it because it "doesn't generate trash and will not receive direct benefits from savings in tipping fees" It is up

to local governments to fund this.

- Recycling needs to be convenient and incentives need to be in place by having people pay by the volume of trash taken to the landfill.
- People can help fluctuating markets by buying recycled materials. County offices are supposed to use recycled paper and have a list of vendors for the purchase of recycled goods.

12/8/92 "Other Communities Are Setting Recycling Example" Letter to the Editor

- DMG's two front page Nov. 27 articles about recycling outline problems, but no solutions
- Kingwood, Texas is about 30 miles north of Houston and has a population of 40,000
 - It has a non-profit, voluntary recycling program for clear and colored glass, newspaper, cardboard, tin and aluminum cans, and #1, #2 and #6 plastics
 - Costs are kept low by having the center open only on Saturdays 8a-12p.
- A successful program in the UP has to be regional.

12/10/92 "Recycling Talks Set"

- Assistant City Manager Scott MacInnes has started investigating a possible program for Houghton and will meet with Tom Deschaine from Tasco to ask what his long-range plans are
- For MacInnes, it comes down to a cost issue. Houghton pays about \$10 per ton less to dump garbage because it "got in the game early on."
- Deschaine offers Houghton same contract as Hancock. Tasco would provide 7 small bins (5 for paper, 1 for aluminum, 1 for tin) at \$30 each/ per month and one large bin for milk jugs at \$50 per month. Bins would be emptied once a week. It also includes a two week period of no service (11/15-12/1) for a "normal shutdown" so bins will not freeze to the ground.

12/11/92 "Recycling Success in Other Areas"

- Hope Krysiak, recycling coordinator for Marquette Peninsula Sanitation, said that the program is going "extremely well" and a similar program in Houghton would depend on market availability
- Doug Dernberger, vice-president for Houghton-Keweenaw Peninsula Sanitation, foresees a similar program for Houghton becoming available in the summer, when the current contract expires.
- Ishpeming: pays by weight for each truck of recyclables collected & monthly processing fee.
- Marquette does not have to pay for the service according to its contract. Krysiak anticipated enough revenue from selling the materials, which was a unique situation. The program has:
 - Curbside pickup and drop-off sites. People separate their plastic, aluminum and glass and place them in special clear plastic bags. Cardboard, newspapers, and magazines should be bundled
 - Peninsula Sanitation workers further sort items to be sent to market
 - Glass seems to be recyclable only in Chicago, but cardboard can stay in the U.P.
- Collection is the most expensive part of the programs. Processing and separating are less expensive, but still not cheap. In addition, there are wages and shipping costs

12/11/92 "City, Recycling Co. Remain at an Impasse" DMG. Rick Kessler

- Assistant City Manager Scott MacInnes met with Tom Deschaine of Tasco.
- MacInnes: unsure what city should do, issue still unresolved. Cannot devote all his efforts to investigating recycling program proposals.
- Deschaine: Will offer his service to the city, but plans to scale back in the future, perhaps to shipping only
- Deschaine: Can't operate recycling program in the UP without subsidized labor

- Rob Roy, executive director for the Copper Country Workshop: "if we could figure out a way to do it, if someone would write us a grant for a bundle of money, we'd probably do it"

1/12/93 "City Should Help Rescue Recycling" Editorial

- With the exception of Hancock, the area's efforts at comprehensive recycling program have collapsed
- DMG has heard from new residents to the area who are "amazed and appalled" that no recycling program exists. People are willing to go out of their way to recycle

1/13/93 "Recycling Advocates Look to City"

- Recycling will be the topic of today's city council meeting
- City officials Ray Kestner and Scott MacInnes recently met with Kim Stoker of the Western U.P. Planning and Development Region to discuss the possibility of a viable program
- Carolyn Peterson of CCCR would like to convince officials that citizens are ready to support a recycling program.

1/16/93 "Team Effort Can Revive Recycling" Letter to Editor

- The City of Houghton is considering an exclusive recycling program for city residents.
- People who feel a county-wide program is preferable should contact their local government quickly, especially the citizens of Adams Twp, Chassell Twp, Portage Twp and Hancock

1/22/93 "Recycling Program Needs Support" Michigan Tech Lode

- Because City of Houghton does not have own recycling program, MTU has to put in a little extra effort
- Paper can be recycled behind EERC, the library, administration building or Wadsworth Hall.
- Bins can be used by anyone since bins are not full and demand for recycled paper is higher than what Tech is currently recycling. More recycling may mean that more bins will be placed around campus
- Paper is used to make ceiling tiles, so the following can be accepted: any color paper, paper board, manila folders, envelopes (no plastic windows, labels okay), newspapers, magazines, brochures, Post-it notes. Cardboard and plastics are not acceptable

1/28/93 "Recyclers Must Turn to Townships for Help Funding Local Programs" Letter to the Editor.

- HCTS has shut down because the county asked townships for help in financing drop-off.
- The cost of \$2,600 per year would be split among townships
- To help, ask your township to start negotiating for curbside pick up (Peninsula Sanitation offers this service in Hancock and Marquette)

1/28/93 "City Will Pay for Recycling"

- Houghton City Council approved \$745 to participate in 6 month recycling program contingent on the participation of other municipalities and will be scrapped if county is unable to keep present program afloat.
- The city would rather have the county program than their own
- The city would collect recyclables at the public works garage and eventually expand to curbside service. The city would cultivate markets so program could operate if Tasco goes out of business

1/29/93 "Townships Play Waiting Game"

- Township officials in Houghton County say it is too early to pass judgment on the city of

Houghton's request that they pay their fair share for a county-wide recycling program. They need to see a written plan first

- Townships are concerned over basis for assigning the shares of the cost burden. If too many people from one township do not recycle, then paying on the basis of population would lose money for the township.

1/30/93 "Townships Should Follow City's Lead" Editorial

- Houghton took the initiative in reviving Houghton County's recycling center, pledging to pay its share of operation costs. This shows that recycling is affordable if everyone pays their share
- That fees are based on population should enable smaller municipalities to participate

2/2/93 "Adams on Recycling Bandwagon"

- Adams Twp board of supervisors agreed to pay its share for a proposed six month recycling program.
- Houghton County Board of Commissioners said that their budget has no room for county-wide recycling program without some sort of state or federal subsidy

2/3/93 to 2/6/93

- Portage Twp. might refuse to participate in six-month recycling program
- Board member Fred Jones: Lack of funds due to having to pay for the monitoring and maintenance of a closed county-wide landfill at a cost of \$8,000 a year
- Officials from Chassell, Stanton, and South Range have said they expect to participate
- Houghton County Board of commissioners will meet on Feb. 9. The County would act as overseer if all municipalities approve the program. Bins would be provided by Tasco.
- The decisions of municipalities to participate in the proposed six month recycling program are contingent on the participation of other municipalities

2/6/93 "Township Could Jeopardize Recycling" Editorial

- Portage Twp is set to take giant steps backward in recycling efforts
- Constituents want a recycling program because it saves landfill space, money, and avoids environmental problems such as the damage caused by the Portage Twp landfill before it was closed in the 1980s
- The closed landfill is expensive to monitor to gauge leakage and other ill effects.

2/9/93 "Portage to Help Recycling Effort" DMG. Rick Kessler

- Portage Township's reluctant Board of Trustees has agreed to participate in recycling program
- At least 3 trustees strongly disapproved of participating in a program that does not yet have a written contract
- Most trustees were upset that the township spends \$12,000 a year to monitor and maintain their landfill
- Other concern was the longevity of the program if it is run like the previous program

Municipality	1990 Pop.	%	6 Month Cost	Approved
Adams Twp	1,643	11%	\$160.50	Feb. 2
Chassell Twp	1,686	11%	\$167.50	Feb. 10
Houghton	7,498	48%	\$745	Jan. 27
Portage Twp	2,941	19%	\$292	Feb. 8
South Range	745	5%	\$74	Feb. 4
Stanton Twp	1,184	8%	\$118	Feb. 3

Total	15,697	100%	\$1560	
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2/10/93 "Commissioner Supports Recycling" Letter to Editor. James Quinlan, County Commissioner, District 5

- Response to editorial commenting on Quinlan's position on recycling
- Only one recycling proposal has been presented to the Houghton County Board. This was the proposal to add household tax to county residents to subsidize recycling
- Such a proposal is unfair to residents who live 70 miles away from the recycling center.
- A program with some sort of user fee is needed

2/11/93 "League Supports Recycling Efforts" Letter to Editor. Ruth Miller, President, Board of Directors, Copper Country League of Women Voters

- The League of Women Voters' position is that recycling is a sound solid waste management strategy.
- League is asking all municipalities to join the county-wide program and pay their share of the fees

2/12/93 "Copper Country on Threshold of Recycling Revival" DMG.

- Tom Deschaine and Houghton County Controller, Glen Pyhtila have started talking about a contract which will be signed at Feb. 17 recycling summit
- Q&A with Deschaine
 - *Why does Tasco have to charge for recycling now?*
 - The prices of materials have dropped and barely pay for processing and shipping. In the Copper Country we have a low volume of materials and far hauls – this makes for no profits. Most markets have stabilized their prices
 - *What criteria were used to come up with per month charge?*
 - Seven small bins (\$210) and 1 large bin (\$50) should meet the needs of HCTS
 - *Could you explain the process of a recycling Operation?*
 - It is a fairly simple matter of finding materials in the waste stream that have value, keeping them clean and separated from each other. We test market availability and specifications for a given material to see if we can handle it and issue news releases and post any changes on the bins
 - *Why does Tasco close for 2 weeks every year?*
 - It is frustrating that a few people in the Copper Country take "potshots" at us because we have been doing something while most others are still pondering what the ultimate recycling solution will be. Our program developed from a once/month drop off at the mall into a 7 days a week, year-round operation, even though the program was losing money. The 2 week shutdown is part of our contract. We do required maintenance on the equipment. Do go deer hunting, but there is more to it than that
 - *What would Tasco's role be in the 6-month program?*
 - Provide drop off at HCTS, supply and service the bins
 - *What will the future of Tasco be in light of the recent buyout of Peninsula Sanitation?*
 - It will affect us as a long-range recycling plan must look to Peninsula Sanitation
 - *Will Tasco ever collect glass again?*
 - Yes. We will handle glass when we can do it economically again

2/19/93 "Recycling Returns to Houghton"

- Use common sense. Do not put materials in bins if full or leave items on the ground
- Paper: should be clean, dry newspaper or white office paper. No shiny paper, magazines, books, carbon paper, glue, tape, envelopes with plastic windows, plastic. Should be bundled, tied, or in a brown paper bag
- Milk jugs should be rinsed and crushed, without caps or rings
- Tin cans should be rinsed and crushed, without labels. No chemical containers or paint cans
- Aluminum should be rinsed and crushed

2/20/93 "Future of Recycling Hinges on Residents"

- The future of recycling is in the hands of those who use the recycling center at HCTS. Past problems were from people who did not know or ignored the rules. Littering and contamination are costly problems
- Following the rules will ensure that Tasco, the area's only recycling collection business can collect enough clean, usable material to make it worthwhile to transport materials to markets.

2/24/93 "Recycling Off to Successful Start"

- So far, so good. People are doing a good job of keeping area clean and dumping the correct recyclables in separate bins.
- The six-month program is a temporary solution. Efforts are underway for long-term program

3/11/93 "Recycling Survey Could Determine Future Goals" Letter to Editor

- Recycling advocates should be actively involved in developing a long-term recycling plan
- Peninsula Sanitation has been purchased by United Waste from Connecticut.
- We need help with a survey to provide United Waste input
- The survey will also help County Commissioners determine the level of support for recycling
- Tom Deschaine suggested that a mini-survey be conducted by high school students at HCTS to find out who is using the bins
- People north of the bridge do not have to pay for the bins, but are still allowed to use them. If they are using them, it would be appropriate to spread the cost burden more evenly
- 20 people are on the task force already. Meets at the MUB and the public is invited.

3/22/93 "County Could Lead the Way" Letter to the Editor

- Recycling must be done in county-wide mandatory program. Otherwise, people will not recycle
- Sarasota, Florida has mandatory law to recycle. Recycled 33% of its waste
 - The County issued blue tub for plastic, cans, glass, and aluminum; red tub for paper. Tubs are picked up separately from garbage. Grass and tree limbs are collected every other Friday
 - It received \$200,000 from recycled items that the collection company sold.
 - Cardboard is also recycled from businesses, which have a separate bin for it
 - Many items are trucked over 500 miles.
- Better management, not taxes, is what is necessary. Maybe it is time to have our own county or township collect and manage the garbage and recycling programs

4/23/93 "WGGL to Broadcast Recycling Call-in Show"

- WGGL public radio will broadcast a live call-in program on recycling with Kim Stoker and Mike Abbott

- Stoker is planning director of the WUPPDR and has been involved in recycling for the past decade
- Abbott is in charge of recycling effort at MTU
- The program will address the current state of recycling efforts in the area and look to future prospects

7/11/93 "Recycling Tips are Offered" Letter to the Editor. GEM Center

- Announcement for citizens to return recycling survey
- Recycling programs at HCTS, Hancock city garage, and MTU are paying for themselves
- 54.6 tons of recyclables collected from Houghton and Hancock during a 14-week period. The cost was \$853.44 less for collection and transport by Tasco than would have been paid to dispose of them in the landfill
- Tom Deschaine: hopes to extend current contracts to Nov 1 and sign new one-year contracts. Also looking at opening a new drop-off site in the north part of the county
- Tips
 - Sort carefully
 - Avoid overfilling bins by recycling regularly
 - Keep in mind that market fluctuations impact collection and be flexible. Tasco had been stockpiling glass in L'Anse for almost a year when the bins were pulled from Hancock in July. Not economical to recycle glass for Copper Country at this time
 - Do not drop off recyclables when bins are being exchanged (usually on Thursdays)
 - Oil collection tank at HCTS is emptied by Oil Services and will be available Sept. 2
 - Watch for information for the Resource Recovery Education Project, funded by the DNR under the Protecting Michigan's Future Bond program and the WK Kellogg Foundation Groundwater Education in Michigan (GEM) program.

8/8/93 "Grant Will Help to Promote Local Recycling, Composting Programs"

- GEM will get grant for resource recovery education project in Houghton and Keweenaw Counties
- The goal is to promote existing and future recycling and composting programs; educate public, businesses and school children on solid waste reduction; inform people about the specific requirements, hours, and locations of different programs
- Recycling is not free, but costs will stabilize as markets expand while tipping fees will increase
- The first part of the project was a survey sent out to property owners with their summer tax bills

10/6/93 "Green Scene"

- GEM survey showed that residents do have an interest in recycling.
- Kristine Bradoff hopes that the survey will show city officials that there is support for recycling.
- Citizens complain about having to sort properly, but contamination causes problems
- Having to store recyclables until pick-up or transport is another common complaint
- Solid waste stream. In Michigan 32,000 lbs (16 tons) of solid waste is generated daily: 40% paper, paper products; 18% yard waste; 9% metal; 8% wood; 8% glass; 8% food; 7% plastic; 2% miscellaneous [according to EPA - DMG 10/6/93]

11/5/93 "Survey Shows Recycling Support"

- Final results for area-wide recycling survey conducted by GEM are in. The response rate was 23%
- 32% of replies from Houghton/Hancock, 66% from township residents
- 58% had recycled in past year, 42% had not
 - for Houghton-Hancock: 65% had, 35% had not

- for townships: 55% had, 45% had not
- 88% considered recycling an important way to manage waste, including 77% of those who had not recycled in the past year
- 16% of non recyclers said they needed more information
- 8% saw no reason for it, a waste of time and effort
- No consensus on how to finance it. A typical comment was to use saved tipping fees to pay
 - 43% favor county-wide program
 - 20% favor separate programs for each township, city, and village
 - 38% said they should not have to pay even if it reduces amount of waste going to landfill
- Of those who had not recycled in the past year, 57% said they would have if a curbside recycling program was available and 60% favored township drop-off sites
- GEM officials said the best option is to have local sorting and processing facility, which would require that a company besides Tasco gets involved

11/15/93 "Governments to Get Data on Recycling"

- Individual municipality reports on the recycling survey conducted by GEM will go out soon
- This will let government officials know how their residents feel about recycling and may aid them in deciding what to do
- Calumet residents were not as supportive of a program, perhaps because residents may have been frustrated over a previous recycling program shutdown
- There is no need for more action by the recycling task force now, but people still need to cooperate and follow the rules at the HCTS.
- To increase awareness, the Michigan State University Cooperative Extension Service to train volunteers to go into area schools and teach children about recycling

3/7/94 "Recycling in Jeopardy"

- Garbage and contamination could bring about the end of recycling programs
- Tasco is not making enough to stay afloat, primarily because of contamination. It does not have resources to deal with this problem, but is looking for ways to keep recycling in the area going.
- Soft and distant markets add to the company's problems
- The GEM Center: plans to contact local officials and recycling advocates to review options such as volunteer monitoring of HCTS bins, a new program, or a paper-only program

3/10/94 "Time to Change Recycling Program" Editorial

- Latest dilemma may be the most serious problem in trying to establish a long-term recycling program
- Tasco could go out of business as soon as April 1.
- DMG has run several editorials, articles, and letters urging people to follow rules, but contamination remains a costly problem
- Tasco has made it clear that its services cannot be free
- Area will need to "take a long, hard look at launching a viable recycling program" that is publicly funded

3/14/94 "Go Figure: Recycling May Not Pay"

- Based on the amount collected from each site, the market price, and the distance goods must travel, Deb Kinzi of Michigan Tech's GEM Center concluded that recycling is not profitable in Houghton.
- Last year, Tasco received about \$7,320 in service fees from Hancock, HCTS, MTU and

UPPCO, and grossed about \$14,300 before expenses

- The best plan would be to recycle only paper, which Celotex in L'Anse can use
- Tasco will no longer accept aluminum cans after April 1, regardless of what happens.
- A lot of bin contamination has contributed to the problem of low market prices.
- In addition, Michigan's bottle-bill means there's little aluminum left after cans return to stores
- A local youth hockey team took up aluminum collection as a fundraiser. They received \$247 for 2 bales of cans, a bale of foil and over 70 hours of work

5/1/94 "Recyclers Frustrated as Options Waste Away" Peninsula News

- Local citizens disappointed when recycling bins at HCTS began to take newsprint only.
- Formerly recyclable materials now litter the area
- Aluminum, one of the most profitable items to recycle (\$0.25 per lb) is not recycled at HCTS because of the deposit-refund system. Grocery stores are more efficient and recycle 90% of those containers.
- Steel and tin get \$0.01 per lb in Iron Mountain
- Cardboard could be recycled in the future because manufacturers are a reasonable distance away
- The public needs to be patient with the County Solid Waste Planning Committee. Cities are working with Peninsula Sanitation to develop a long-term system. Peninsula picks up all the waste from Keweenaw and half of Houghton's. If it picks up Hancock too, that would be over half of Houghton County. A larger contracted base of tonnage may make them more willing to look at other alternatives like recycling.

5/12/94 "Recycling - So Who Cares?" Editorial

- Only the same group of people who resurrected the last recycling program seem to care about the end of the area's only comprehensive recycling program
- Neither Houghton City nor municipalities have made recycling a top priority
- It is clear that recycling helps the environment, the economy, and it is a good solid waste strategy
- Local officials need to hear from more than the core of supporters.

5/17/94 "Readers Respond to Recycling Challenge; Urge Others to do the Same" Letter to the editor

- We will not throw away recyclables, believing that a new plan will soon be in place
- The Solid Waste Planning Committee working with Peninsula Sanitation is a good sign

5/18/94 "Hope Alive"

- Tasco will only collect newspapers, which can be sold to Celotex for \$30/ton
- Used motor oil collection at HCTS will continue, since it is serviced by Rock Oil of Stratford, WI
- Peninsula Sanitation is looking at building recycling and transfer station in Houghton
- Drop-off recycling available to all Marquette County residents. Curbside pickup is available in Marquette City and Ishpeming.

5/19/94 "State, Local Governments Must Focus on Recycling" Letter to the editor

- Something is wrong with Keweenaw, Houghton, and Baraga Counties if there is no recycling program
- The survival of recycling needs leadership from all levels of government and the use of recycling products by consumers

5/23/94 "Recycling Operator not 'Defunct'; Recycling Effort may Still be Alive" Letter to the editor

- Tasco is still picking up newsprint and transporting sorted materials from other U.P. recycling

programs

- Well-intentioned recyclers should continue to store other recyclables and not mix them with newspapers
- Residents can still make a big difference by recycling paper and used motor oil
 - MTU saved \$2,100 by recycling (instead of landfilling) 80 tons of paper in 1993
 - Hancock saved \$1,278 on 63 tons of recyclables
 - HCTS collected 93 tons of materials, which cost \$1,383 less than landfilling
 - In the last 6 months, 2,700 gallons of used motor oil collected at HCTS

6/13/94 "Oil's Well That Ends Well" DMG.

- Used oil picks up contaminants like lead, cadmium, arsenic, benzene and other toxins
- 200 million gallons of waste oil are drained each year by do-it-yourselfers, and only 10-15% recycled. In Michigan, 11 million gallons are drained and 1 million are recycled
- Improper disposal leads to ground or surface water contamination and is illegal
- In Michigan, it is illegal to use waste oil on any road (e.g. to hold down dust)
- Michigan's Department of Natural Resources completed a used oil collection network plan last October, as required by the Used Oil Recycling Act
- Associated Petroleum Industries is looking to add a \$0.01 fee per quart of oil sold. The \$1.2 million in revenues would help establish collection sites, provide liability coverage, and encourage recycling
- Rock Oil Refining of Wisconsin has collected 2,700 gallons of oil from HCTS in the last 6 months. 90% is burned as industrial fuel; the cleanest fractions are re-refined into lubricating oils
- Oil filters can retain 1/3 cup of oil even when drained. Texas and Minnesota mandate oil filter recycling, but Michigan does not, but filters must be drained overnight
- Star Industries of Marquette is promoting oil filter recycling. Filters are collected, melted into pig iron as residuals are burned. They charge 10-20cents per filter

7/13/94 "Will We Pay?"

- Houghton County wants to know if citizens are willing to help subsidize recycling efforts
- A survey ballot question will ask for a monthly household fee of \$2. This will generate \$288,000 per year

7/14/94 "County Proposal Is on the Right Track" Editorial

- It is a pain to clean, sort, and take recyclables to a drop-off site.
- Tasco has cut services because recycling does not pay
- A subsidy is a good idea, but more people would recycle if it was easy for them
- Need to get a large volume of materials and participation rate for recycling to be profitable
- Recycling is like any business – it takes money to make money

7/30/94 "Recycling An Election Issue" Letter to Editor

- FOLK activist Gordon Borsvold is running for County Commissioner. He wants to create markets for recyclables and reduce taxes through solid waste management. He should start a business, not run for office
- It has been four years since FOLK published a report on sustainable development with alternative economic proposals but has yet to create a "sustainable" market for recycled waste
- At a meeting on "sustainable development" sponsored by the UP Environmental Coalition (UPEC), someone reported that they were unable to attract and sustain the community's interest in recycling despite a \$30,000 grant to establish and promote recycling in Houghton County
- Hancock City Council decided on policy to restrict spring cleanup. It was \$180,200 over budget

in 3 years

- Hancock's municipal solid waste department ran deficits in 1992, 1993, and this year
- One cannot justify the \$2 per household subsidy because there is no plan in place

9/24/94 "Hancock Could Lead Region in Recycling" Letter to Editor

- This is a copy of a letter mailed to the city council
- The Council should adopt a plan centered around recycling and waste reduction
- Houghton's canceling of recycling program is hypocritical since the area's economy depends on tourism and the natural beauty of the Keweenaw
- Hancock's recycling drop-off program should be restarted immediately and gradually expand to curbside recycling. We already have an infrastructure and experience from the previous program
- Mankato, MN (pop. 35,000) has a good multi-tiered program
- Area communities should cooperate to begin a similar program. It is a "wise investment" and a requirement for an area that prides itself on its natural beauty

8/4/94 "Cooperation Key to Recycling" Letter to the editor. Member FOLK Executive Board

- Response to July 30 Letter to the editor on Recycling.
- Recycling is more than "political correctness" and the concern of environmental activists
- Neither FOLK nor UPEC have received a \$30,000 grant
- There is a need to create markets for recyclables and create a recycled waste goods industry. This should be done by the Keweenaw Industrial Council, Operation Action U.P., and the Chamber of Commerce
- The article's hostile tone towards environmental groups makes it harder to establish a recycling program.

10/26/94 "Bottle Law Blues"

- Deposits stop littering, but create problems for businesses
- Stores have to spend additional time and staff to return the recyclables that they receive.
- An estimated 2,500-3,000 cans are returned at Econo Foods (Houghton) each day.
- Cans are returned to distributors in bags of 240 and crushed cans reduce the store's credit. Michigan law states that stores have to accept cans with deposits regardless of their condition
- There are more cans returned at Econo Foods than the store sells
- Store managers would like to see a central recycling bin with separate sections for each material
- Petal Distributing Co. recycles 98% of its goods. It is extremely expensive, but it is better than litter.

2/24/95 "Recycling Costs on Rise" Thomson News Service

- On February 1, Peninsula Sanitation began charging for recycling drop offs at its Marquette facility – \$0.50 for a large bag of recyclables (e.g. grocery bag) or \$3 per cubic yard – to cover costs.
- Marquette residents are exempt from the charge due to their contract for curbside pickup
- The President of Recycle! Marquette who is an employee of the Ishpeming recycling program was not surprised by the move, since "recycling is not a money-making game."
- When Chocolay Township started a pay-as-you-throw system, waste collected dropped by 50%.
- Chocolay has now expanded its recycling program. Residents will vote on whether they want to continue the \$1/bag system or switch to a millage for garbage handled. Residents can drop off: newspaper, magazines, catalogs, shredded office paper, and corrugated cardboard. Starting

March 1, they can also recycle clear glass and hope to eventually recycle milk jugs

3/30/95 "Future of Area Recycling Brighter Than Before"

- Recycling poses problems - it is time and labor intensive; has to deal with wildly fluctuating markets, and loses money through contamination and transportation to distant markets
- However, cost savings exist from diverting materials away from landfills
- Peninsula Sanitation recently bought land in Houghton County industrial park to build a recycling and transfer station, which it hopes to have up and running by August
- The emphasis will be on recycling and the design will be modeled after the Marquette facility. Hancock's per bag system of garbage removal may provide the incentive to recycle
- In Marquette, Peninsula Sanitation sends a truck after the regular garbage truck to pick up recyclables and is willing to consider a similar program here
- In Marquette, Peninsula Sanitation collects 20 tons of corrugated cardboard, 12 tons of plastic milk jugs and 20 tons of metal annually
- Tasco has made several attempts at starting a recycling program in the area, but was forced to scale-down operations. There is too much sorting required for plastic and glass for them to be profitable. Tasco is working on a plan to move equipment to Houghton to start a curbside program and more drop off sites
- Tom Deschaine, owner of Tasco expects that a recycling program will also work out in Hancock and is looking to utilize a sheltered workshop or prison camp labor to help sort and process materials.
- HCTS is accepting newsprint and used motor oil (no filters) only. Filters should be punctured to break the vacuum seal and allow trapped oil to drain. People should push local oil -change garages to recycle filters

1/13/96 "Recycling to Return"

- Peninsula Sanitation's new transfer center will offer full-scale drop-off recycling center. A curbside program is possible in the future.
- Once the center is in full swing, the following will also be accepted: Clear glass (without caps and rinsed); mixed office paper (junk mail, newspaper inserts, hard and soft covered books, paper envelopes, computer printouts, fax and ledger paper, loose-leaf paper, legal pads, spiral notebooks, greeting cards, booklets, pamphlets and brochures, post its, glued pads and tablets, shredded paper. Paper clips, staples, tape, wire spirals are okay); and plastic milk jugs (without caps, rings, and rinsed)

3/7/96 "Curbside Recycling May Come to Hancock"

- Doug Dernberger, local manager of the Peninsula Sanitation, proposed a contract at the Hancock City Council meeting. The one year contract guaranteed the city a tipping charge of \$55 per ton for the first month and \$60 per ton for the remaining 11 months.
- Peninsula will provide monthly residential curbside recycling and access to drive-thru center at no charge
- Items accepted are: clear glass; metal cans, foil, metal caps; newsprint, magazines, catalogs; corrugated cardboard; plastic milk jugs
- Items should be placed in clear garbage bags. paper can be bundled or in paper bags and milk jugs can be placed in bags or strung together
- Dernberger expects 30% user rate

5/1/96 "Recycling Rules: Hancock Ready to Start"

- City officials' goal is to continue to reduce average tons of waste created by the city
- Three year contract with Peninsula Sanitation:

- Peninsula will provide once/month residential curbside collection and access to drive-thru center
- City responsible for weekly garbage collection
- Program will serve as a pilot program in the Keweenaw
- Hancock's overall tonnage has decreased by 30% since pay-per-bag system was implemented in September (\$0.50 for small bag and \$1.00 for large bag)
- The city will save money in reduced landfilling fees; residents will save money by buying fewer trash bags
- Clear bags are sold at many area stores

5/2/96 "Recycling Heroes Merit Applause" Editorial

- Would like to commend Peninsula Sanitation and Hancock for earth-friendly initiatives in returning recycling to the Copper Country
- Hancock has persisted in believing that recycling is necessary
- It saves landfill space and money: reducing tonnage and per ton shipping fees; fewer hikes in municipal garbage fees; reducing number of garbage bags bought

5/28/96 "Recycling Starts Thursday in Hancock"

- This will be the first time curbside will be offered in any Copper Country municipality
- The program will save Hancock and its residents money in the long run
- Drive-thru recycling will begin on July 1.

6/6/96 "Recycling Launch in Hancock Deemed Success"

- The first pickup up produced 5 tons of waste, which was higher than the original estimate
- There were a few problems with residents trying to recycle non-acceptable items
- Information on acceptable materials is available at Hancock City Hall, along with recycling bags

7/5/96 "Hancock's Recycling - Now So Can the Rest of Us"

- Peninsula Sanitation's drive-thru is open 9-3
- Peninsula Sanitation received 200-300 calls on Tuesday alone about the program
- Recycling pickup in Hancock for June yielded 4.5 tons

7/8/96 "Recycling Drop-off Ready" DMG. Molly Gudritz

- Success depends on knowledge of residents about what's allowable and non-contamination
- Markets:

Material	Price/ton
Plastic	\$170
Corrugated cardboard	\$50
Newspaper/magazines	\$30
Metal	\$20
Glass	\$5

12/30/96 "Hancock's Recycling Program on Track"

- Six months after program started, it is collecting 5 tons per month and has participation rate of 15-20% resident participation (UP average is ~10%)
- Weekly commercial cardboard pickup and cardboard drop off are available at the city garage

5/9/97 "There's an Alternative to Recycling" DMG. Ray Sharp

- People have to play by the rules. If a bin is contaminated when taken to market, they cut Peninsula Station off and they have to find new market farther away
- Contamination becomes a bigger problem with more users. Monitoring means charging a fee
- Peninsula Station recycles as a public service, it is not profitable
- Clear glass sent to Peninsula Station in Marquette and then to Chicago for \$5/ton
- Need for more manufacturers to use recycled materials and for consumers to demand these products in order for recycling to be profitable. Tax incentives would be nice for these companies. This would make it worthwhile for communities and businesses to provide curbside service.
- Hancock program is a 5 year pilot to see if recycling can be successful in Copper Country

5/12/97 "Recycling Rules Lifeblood of Program" Editorial

- It is frustrating that after years of effort, no stable, widespread, convenient and cost-effective recycling program exists. It is the same old "song and dance"
- The problem is recycling "bad habits": not rinsing or sorting properly, dumping. This gives recycling businesses big losses

10/8/97 "Punishment Won't Make Recycling Succeed" Letter to the Editor

- Paying for garbage bags is about the same as punishment when cheaper garbage bags are available.
- Price adds considerably to bill for low income families and increases illegal dumping
- Should not charge fee to recycle at recycling centers, but use volunteers to monitor
- The problem is consumerism

10/21/98 "Recycling Takes a Dive" DMG

- Cardboard prices plunged \$200/ton in 1995, \$100/ton in 1997, \$35/ton in 1998. Prices were affected by economic crisis in Asia, a major paper buyer
- In 1995, recycling programs paid for themselves, not before and not since then
- According to Waste Management, Inc. the service is just not profitable and it has discontinued curbside service to rural Ingham and Clinton County
- Federal subsidies for natural resource industry makes virgin material extraction much cheaper

5/31/99 "Campaign Launched to Recycle Oil " DMG.

- Copper Country "do-it-yourself" oil changers are recycling more vehicle oil than ever before: 9,500 gallons in 1998 (17% increase over previous 3 year average)
- Campaign kicked off in celebration of Safe Drinking Water Week. It was a joint effort between GEM Center for Science and Environmental Outreach at MTU; Keweenaw Community Foundation and Baraga County Community Foundation
- Information posters placed wherever oil is sold in the three county area that list oil collection sites
- One gallon can contaminate one million gallons of drinking water

7/2/99 "Tech Needs Recycling" Michigan Tech Lode

- Locations in the area recycle: used oil; car and rechargeable batteries; latex and oil-based paint; refrigeration units; ovens; washer and driers.
- MTU facility managers recycle metal scraps, motor oil , batteries. Are working on: fluorescent light bulb; computer and TV monitors.
- MTU recycled newspaper 2-3 years ago, but company went out of business

No Date "Batteries are difficult to Recycle" DMG. Kris Manty

- CCCR is concerned about heavy metals in batteries and sponsors household battery collection with MTU Student Pugwash, UPPCO and MSU Cooperative Extension Service
- alkaline and carbon-zinc batteries aren't recyclable; they go to licensed hazardous waste landfill
- lithium batteries go to Merco, Inc., NY; they are deactivated and sent to hazardous waste landfill
- nickel-cadmium batteries go to Merco, Inc. and are recyclable
- Batteries are not regulated

No Date "Recycling Project is a First for Michigan" DMG. Kevin Polzin

- Kim Stoker, planner for Western UP Planning and Development Region got idea from an European tour
- 172 households in West Houghton and 210 in East Hancock targeted
- Pilot program could lead to state-wide garbage separation drive aimed at cutting dumping costs and extending life of landfills
- Residents will be given a 13-gallon rubber container (for organic food waste, which will go to a composting area to be converted into soil for landscaping projects in Houghton/Hancock. 36% of household waste is organic according to USEPA) and biodegradable bags (to be taken to dumpsters located in each block in Hancock and nest to existing bins in Houghton
- Houghton and Hancock received \$71,612 in state grants for composting brush, organic food, natural waste
- Portage Twp received \$18,000 grant for composting leaves and brush

No Date "Recycling Push Can Pose Problems" DMG. Nancy Supanich

- Recycling needs markets. If no one buys it, no one will collect it.
- Money not made by recycling is money saved in forgone tipping fees
- Celotex imports more than one million pounds of paper each month to make ceiling products. Much of it comes from Milwaukee, and only 10 out of 750 tons a month comes from local paper drives
- There is a "newspaper glut" and low prices for recycled newspaper.
- Clean Michigan Fund study in 1985 found that less than 1/3 of 482,000 tons of newspaper generated in Michigan was recycled. This was before Peninsula Station was in operation
- Recycling centers need monitoring to prevent dumping

4/12/2000 Pamphlet for Recycling in the Keweenaw

- Lists locations to recycle: tires, used motor oil, household items, corrugated cardboard, car batteries, NiCad Rechargeable Batteries, Refrigeration Units, Large Household Appliances, Latex Paint, and Oil Based Paint
- Guidelines for recycling the following: Newspapers, Magazines, Cardboard, Plastic, Metal, and Glass

7/28/2000 "Let's boost recycling" Letter to the Editor

- Criticizes Houghton for making it difficult for citizens to recycle with limited hours and acceptable materials
- Compares the U.P. to Lee County, Florida
- Keweenaw Co-op stopped collecting reused paper grocery bags
- Urges businesses, civic, governmental, and university leaders to come together to better the recycling opportunities

9/14/2001 “Woeful recycling” Letter to the Editor

- Calls for people to attend the 13th annual Upper Peninsula Recycling Coalition conference in Iron Mountain
- Compares the U.P. recycling to Lee County, Florida’s system
- Looking for some of the advertised “leadership and innovation” in the politicians, educators, and chamber of commerce to improve the quality and quantity of recycling in the U.P.

9/6/2003 “Dirty recycling site” Letter to the Editor (from SC)

- The Houghton recycling center is dirty, smelly, and “despicable” with little indication of where recyclables went at the facility
- Calls for the citizens of Houghton to require the contractor to “clean up their act”

9/17/2003 “So little recycling” Letter to the Editor

- Wonders if the recycling program is poorly advertised and not well known about
- Thinks Hancock and Houghton are behind the times regarding recycling and helping the environment
- Calls for more promotion of the recycling program that is in effect in Hancock and a more frequent pick up schedule

10/6/2004 “Recycling Needed” Letter to the Editor

- Response to previous editorial “Recycling key to future”
- Mentions that smaller communities than ours manage to have more inclusive recycling programs
- Compares U.P. to Lee County, Florida
- Calls for the counties of the U.P. to come together with Michigan Tech, Northern Michigan University, and Lake Superior State University to come together so we can afford a recycling facility of our own

3/1/2005 “Recycling program begins in Trout Creek”

- Recycling committee begins a paper (junk mail, newspapers, magazines) recycling program
- Local churches and the White Door grocery acted as a pick up spot for recycling bags
- Masonic Lodge in Ewen has a trailer for drop off of the bags when they are at least half full. The bags could be dropped off at any time in the trailer and during business hours at the lodge
- Automotive batteries can be recycled for free at Interstate Batteries
- Cardboard, cereal boxes, and brown bags can be recycled – picked up twice a month by The Copper Country Mental Health Group
- Call for a single drop-off/pick-up point for all recycling

5/5/2005 “More than paper and plastic: Electronic waste program begins”

- Retired Senior Volunteer Program and Western Upper Peninsula Health Department working together to host electronic recycling days
- Residents used to have to pay \$30 to dispose of electronics
- 2004 Community Pollution Prevent Program grant funded by the Department of Environmental Quality allowed RSVP volunteers to collect unwanted electronics for a small fee
- “Electronic waste in the form of energy efficient lighting is the leading source of mercury in landfills.”
- Their first collection was held April 30 in Ironwood and collected almost 3,600 pounds of electronic waste

9/17/2005 “Paying to avoid the landfill”

- Geoff Hansen introduced a bill that would add \$0.01 to most purchases over \$2 and the money would be used to expand local recycling programs
- Hancock is interested in seeing if they could use some funds to expand their current program
- Peninsula Sanitation (owned by Waste Management) would be happy if the bill passed so they could expand their recycling facility's hours from 6 hours 2 days a week to 5 days a week
- The receipt would state that there is a "recycling fee one cent"
- Estimated by the Spartan Foods grocery chain that it could raise \$42 million/year
- 50% of the revenue would be used for matching grants for expanding recycling programs and 40% would be for grants and the left over 10% would be for litter abatement
- Only 15% of Michigan solid waste is recycled compared to 30% in neighboring states
- The bottle deposit in Michigan acts as a disincentive for recycling

9/27/2005 "E-waste recycling returns"

- RSVP hosting another round of e-waste recycling collections
- Same sliding scales/nominal fees as the previous year
- Collection sites in Houghton, Ironwood, and L'Anse
- RSVP collected more than 16.5 tons in the last collection
- DEQ even increased its funding for the program because of its success
- Using the extra money from the DEQ to keep the disposal costs low for the people bringing in their goods

9/28/2005 "Attention Houghton & Keweenaw County Residents"

- Advertisement for the Western Upper Peninsula Electronics Recycling Program collection day
- Table of items and fees:

Alkaline & lead acid batteries	\$2.00/pound
Cellular phones	Free
Central Processing Units, keyboards & mice, printers, scanners, fax & copy machines, VCR & DVD Players, Microwave Ovens, Stereo equipment	\$1.15/pound
Cordless phones	\$1.00 each
Fluorescent light bulbs (up to 8')	\$1.00 each
Laptop Computers, Computer Monitors, TVs	\$.20/pound
Rechargeable & Lead Acid Automobile Batteries (Ni-Cd), (NiMH), (Li-ion)	Free

10/01/2005 "Rigid rules"

- Letter to the editor from June Houle of Commerce Township
- Open letter to the City of Hancock regarding the curbside recycling program
- The open letter discusses the protocol for recycling through the curbside program in Hancock
- The open letter suggests that a less rigorous process of recycling (e.g., removing labels, certain types of cardboard) would increase the quantity of recyclables from Hancock residents

10/08/2005 "Improved area"

- Letter to the editor from Janeen Stephenson of Houghton
- Open letter of appreciation for the recent articles regarding recycling in the Copper Country
- Open letter of appreciation to Peninsula Sanitation thanking them for improving their recycling center on Enterprise Drive

- Encouragement of Copper Country residents to use Peninsula Sanitation and recycle their recyclables

10/11/2005 “Expand Hours” Letter to the Editor

- The hours are inconvenient for people with regular 9 to 5 jobs and are too few
- Request for Saturday morning hours

2005 “Electronics Recycling Program” Pamphlet passed out with newspaper

- Has sections for: Electronic Waste, The Risk Posed by Electronic Waste, What Can I Do About Electronic Waste?, Electronics Recycling Locally, and Did you know?
- Created by the DEQ and RSVP

3/04/2006 “Area leaders review Houghton recycling plan”

- In April of 2006 residents of Houghton will pay \$3 in order to recycle
- The article discusses the difference in cost between being charged for recycling (\$3) and garbage (\$1)
- The article mentions that Michigan Technological University professors suggest that an investigation into the recycling programs available through Waste Management would be appropriate
- The cost-benefit of recycling in the Copper Country was discussed in the article in the capacity that it might not be possible at all times due to the cost of recycling and the markets
- A public meeting regarding recycling was offered by city government officials

3/11/2006 “Concern Tax” Letter to the Editor

- Upset that there is a new \$3 charge beginning in April to use the recycling facility in Houghton
- States that the \$3 for some is not a big deal but for others it is the difference between “recycling and a piece of food on the table”

5/6/2006 “Recycling meeting tackles local issue”

- There was a meeting between Waste Management, Houghton’s garbage committee, and Michigan Tech’s co-chair of the Environmental Sustainability Committee to discuss the new fee for recycling
- Waste Management states that it was because the facility was built for Houghton residents mainly in 1996 and has since become used by the entire four-county area creating rising costs
- Waste Management transfers between 18 and 20 tons of mixed recyclables every 3 weeks to Antigo, Wisconsin
- While recycling makes people feel good the economic and environmental costs of recycling can’t be forgotten – the fuel to take the recycling to Wisconsin and the money that Waste Management must pay to dispose of the materials
- Idea posed for the trucks to “back haul” or bring back shipments for local companies so that there is no fuel wasted on the trip back and forth between the UP and Wisconsin
- Call for MTU to be involved in a creative fix for creating a local market for recyclables
- Finely ground glass could substitute sand as a market for recycled glass and an environmental solution for replacing salt
- Waste Management’s facilities are being stressed by the amount of recycling and is looking to expand and for other viable solutions

5/29/2006 “RSVP collecting unwanted electronics”

- Electronic waste is toxic and harmful even when placed in a landfill

- Retired and Senior Volunteer Program (RSVP) hosted an electronic waste recycling collection
- Residents of Baraga, Gogebic, Houghton, Keweenaw, and Ontonagon counties were welcome to recycle their electronic waste at the collection event
- RSVP was excited to host the event because of Michigan Department of Environmental Quality supported the reduction of electronic waste going into Michigan landfills
- The electronic waste was sent to Star Industries of Marquette, Michigan who would then break down the material and recycle the products

6/10/2006 “UNKNOWN TITLE”

- This article discusses the increased fee at the Waste Management recycling center in Houghton, Michigan
- Waste Management discontinued the service of collecting glass as a recyclable
- The article discusses the cost of recycling glass and how the weight of glass is the root of the high cost of recycling glass
- The Waste Management recycling center started collecting No. 2 HDPE plastics
- The Waste Management recycling center adjusted their hours from 9 a.m. to 3 p.m. Monday, Tuesday, Wednesday, and Friday. While on Thursday the recycling center would be open from 9 a.m. to 7 p.m.
- The article highlighted a few local residents that use the recycling center regularly and are pleased with the service

6/14/2007 “Electronics Recycling Collection”

- Advertisement for the Western Upper Peninsula Electronics Recycling Program collection day
- Table of items and fees:

Alkaline & lead acid batteries	\$0.85/pound
Central Processing Units, keyboards & mice, printers, scanners, fax & copy machines, VCR & DVD Players, Microwave Ovens, Stereo equipment, Cordless phones	\$.15/pound
Fluorescent light bulbs (4' to 8')	\$1.00 each
Fluorescent light bulbs circular & u-shape (up to 4')	\$0.50 each
Laptop Computers, Computer Monitors, TVs	\$.20/pound
Rechargeable & Lead Acid Automobile Batteries (Ni-Cd), (NiMH), (Li-ion) & Cell Phones	Free

6/14/2007 “RSVP to collect electronic refuse”

- Western Upper Peninsula Recycling Program, an extension of the programs and services offered by the Retired and Senior Volunteer Program (RSVP), hosted an electronic waste collection day
- Accepted electronic waste included: computers, computer components, TVs, VCRs, DVD players, printers, scanners, copy and fax machines, stereo equipment, microwave ovens, cellular and cordless phones, fluorescent bulbs and batteries.
- Costs associated with recycling electronic waste are 15 to 20 cents a pound with batteries being slightly more expensive
- 98% of people surveyed from a previous electronic waste collection day said that the cost was appropriate in order to recycle their electronic waste
- The electronic waste will be dismantled and distributed to the appropriate recycling centers
- Houghton county is the biggest site for citizens to recycle their items

- From 2005 to 2007, greater than 600 Western Upper Peninsula residents participated in the electronic waste collection days

9/05/2007 “Nominations being sought”

- Upper Peninsula Recycling Coalition seeking nominations for annual Recycler of the Year Award
- Looking for outstanding people who have demonstrated outstanding achievements in resource recovery in the Upper Peninsula
- Article is soliciting submissions to the Coalition for nominations for annual Recycler of the Year

2007 “Recycling bus”

- Trout Creek, Michigan initiated a recycling center that is a converted blue bus
- The recycling center accepts: glass, plastics, and aluminum cans
- The article discusses how there isn’t a recycling program in Trout Creek, Michigan. Specifically, the article discusses how there isn’t a curbside recycling program in Trout Creek
- The article highlights that citizens can initiate recycling programs even in small towns

1/09/2008 “EPA campaigns for cell recycling”

- United States Environmental Protection Agency (EPA) through their “Plug-In to eCycling” program advocates for cellular telephone recycling
- The article discusses the convenience, environmental, and social benefits of recycling cell phones
- The article discusses how some cellular phone providers accept cell phone recycling programs, while others do not. But, this program accepts all cell phones regardless of providers
- A local manager of a cell phone provider highlighted the ability to recycling the lithium batteries as a huge benefit from the program
- The article stresses the fact that getting the word out about the cell phone recycling program will increase the number of folks who participate and recycle their unused cell phones

6/20/2008 “RSVP electronic waste collection”

- From 2005 – 2008 the RSVP – Retired and Senior Volunteer Program (RSVP) has collected over 48 tons of electronic waste
- 750 households have participated in the RSVP electronic waste collection dates
- RSVP hosted another event 07/12/2008 in Baraga County
- Accepted items were: computers and computer components, TVs, VCR & DVD players, printers/scanners/copy and fax machines, stereo equipment, microwave ovens, cellular and cordless phones, fluorescent bulbs, and batteries

10/6/2008 “Recycling unplugged”

- Western Upper Peninsula Retired and Senior Volunteer Program (RSVP) hosted an electronic waste collection day
- For 10 cents a pound residents of the Copper Country dropped their unused electronic waste
- The article highlighted the successes of the RSVP electronic waste collection day
- Without the RSVP electronic waste collection day a majority of the electronic waste dropped off would end up in local landfills

11/13/2008 “America celebrates recycling”

- This article highlights the benefits and increasing trend of recycling in America
- From the 1960s to the 2000s recycling increased by 24%
- 33% of solid waste from 2007 was either composted or recycled

- By recycling aluminum cans, steel cans, plastic polyethylene terephthalate, glass containers, newspaper, and corrugated cardboard, Americans prevented the creation of energy of 17.8 million Americans
- This article highlights how Michigan Technological University has a progressive recycling program compared to local municipalities
- The article redirects readers to local businesses where they can recycle

2008 “Recycling awareness thrives at CLK schools”

- CLK Middle and High School students collected water bottles as a part of “Teens Who Care”
- Three large garbage bags of water bottles were collected each week
- Approximately a thousand water bottles have been recycled per week
- CLK simultaneously is supporting a reusable water bottle initiative to encourage students to reuse their water bottles rather than purchasing single-use water bottles

6/10/2009 “Don’t throw it out”

- Retired and Senior Volunteer Program (RSVP) hosted a volunteer electronic waste recycling collection
- The RSVP electronic waste collection day will accept: unwanted computer & computer components, televisions, VCR & DVD players, printers, scanners, copiers, fax machines, stereo equipment, microwave ovens, cellular phones, fluorescent bulbs, and batteries
- The cost for dropping off electronic waste recycling through the RSVP program is nearly half the cost of recycling electronic waste outside of the RSVP program
- RSVP collections of electronic waste took place in Gogebic, Ontonagon, and Houghton Counties
- 100% of the collected materials (when following the appropriate guidelines) will be recycled
- Seven tons of electronic waste was collected from the Gogebic County RSVP collection day

9/3/2009 “Recycler of the Year sought”

- The Upper Peninsula Recycling Coalition posted an article seeking nominations for the Upper Peninsula Recycler of the Year
- Nominations are open to organizations, businesses, and individuals of the Upper Peninsula
- Nominations should be based upon actions that result in significant or innovative diversion of materials from the waste stream, in other words, reducing the amount of waste that ends up in local landfills

12/8/2009 “A new recycling plan?”

- Considered the idea not to require recyclables be separated, but the Department of Public Works rejected it because people were putting trash in their recyclables to save money on bags
- Recycling is taken to the Waste Management Houghton facility (which is “single stream”) and then taken to either Green Bay or Germantown, Wisconsin for further processing
- Waste Management is paying \$700/month plus \$40-\$60/ton to drop the goods off and the recycling centers

7/8/2010 “WUPHD, RSVP to collect unwanted electronics”

- Western Upper Peninsula Health Department and Retired and Senior Volunteer Program are hosting an electronic waste collection day
- Residents from Houghton, Keweenaw, and Baraga Counties are welcome to drop their unused electronic waste at the collection point
- This was the first year the program was hosted without external grant funding
- This was the 23rd collection date of the period that was hosted by the RSVP

- There are 22 RSVP organizations around the state of Michigan

9/6/2010 “Nominations sought for top U.P. recycler”

- Upper Peninsula Recycling Coalition submits an open request for submissions of Upper Peninsula Recycler of the Year
- The UP Recycler of the Year Award is given to a Upper Peninsula resident in order to raise awareness of recycling
- Awareness can reduce the amount of recyclables in the solid waste mainstream which reduces the amount of garbage that ends up in local landfills

9/10/2010 “RSVP to host electronics recycling station Saturday”

- The Retired and Senior Volunteer Program (RSVP) hosted an electronic waste collection day in L’Anse
- Accepted materials were: Computers, monitors, mouse, cords, printers, fax machines, copy machines, TVs, VCRs, stereo equipment, DVD players, microwaves, florescent light bulbs, and batteries.
- Most of the items will be collected for free

6/30/2011 “RSVP program recycling electronic waste”

- Retired and Senior Volunteer Program hosted a collection day to allow Copper Country residents to drop off their unused electronic waste
- The materials donated will be collected by 5R Processors of Lady Smith, WI which will dismantle the electronic waste and recycle them accordingly

4/19/2012 “Converting waste to energy”

- Alliance Global Conservation turns waste into energy through Pyrolysis, the process of decomposing waste by heating in the absence or near absence of oxygen, to turn into raw oil, carbon ash, and gas similar to natural gas.
- Existing landfills can be mined as well
- Attended the meeting of the Keweenaw County Commissioners to discuss the possibility of expanding into the U.P.

4/28-29/2012 “Keeping it out of the landfill”

- Goodwill and Habitat for Humanity ReStore joined together to collect items from residents
- Goodwill will take all of the clothing, kitchen items, and small appliances
- ReStore will take construction items, furniture, large appliances, hardware and other items
- Broken items should not be brought because they are too expensive to repair

7/14-15/2012 “Recycling center opens”

- Franklin Township Goodwill Work Center opened a recycling and donation center
- The weeklong trial brought in hundreds of people
- Accepting clothing, household items, and domestic goods
- If sorted the following items are also accepted: 100% plastic items, returnable cans and bottles, white paper, magazines, mixed paper, cardboard, scrap metal, household e-waste, computers and/or computer components

9/12/2012 “Electronics collection set”

- Hosted by RSVP obsolete electronics can be recycled at the Western Upper Peninsula Health Department in Hancock (on Saturday)

- 2011 was the biggest collection in the events history with 25 tons of materials being hauled away
- Most drop offs are free, but there is a fee of \$1.50/lb of alkaline, button cell, lead acid and other household batteries
- Financial support from Houghton and Keweenaw counties

9/17/2012 “Recycling electronics”

- Photo of a resident carrying a computer monitor dropped off at the RSVP e-waste recycling collection

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Appendix A

RECYCLE/REUSE KEWEENAW

Please call first to verify FEE or payment (\$) AND Recycle/Reuse only during business hours

ANTIFREEZE

Dave's Marathon-Hancock 482-3410 FEE
Ed's Used Parts-Houghton 482-4531 FEE
Edsusedparts.com

APPLIANCES-WORKING/USABLE

Habitat for Humanity-ReStore-Calumet
337-0020
Efficiencyunited.com 1-877-3673191
Working refrigerators/freezers \$

ASPHALT ROOFING

Rockwood Concepts-Mohawk 337-0875 FEE
rockwoodconcepts.com

BAGS *PLASTIC **PAPER

*Econo Collection Box
*Festival Foods Collection Box
*/** St Vincent De Paul-Hancock 482-7705
*Shopko-Houghton
*Wal-Mart-Houghton 482-0639

BATTERIES - ALKALINE & ALL HEARING AID BATTERIES

REMY'S BATTERY SHOP-HANCOCK 482-3800
FREE

BALLASTS FLUORESCENT TUBES

Bill's Electric-Calumet 337-2284 FEE

Batteries - Alkaline & All Hearing Aid Batteries

Remy's Battery Shop-Hancock 482-3800 Free

BATTERIES-Lead Acid

Dave's Marathon-Hancock 482-3410 \$
Ed's Used Parts-Houghton 482-4531 \$
Fine Line Tire-Hancock 482-6268
Julio' Contracting-Ripley 482-0666
Remy's Battery Shop-Hancock 482-3800
Swift True Value-Houghton 482-0530 FEE

BATTERIES-Rechargeable

Ace Hardware-Calumet
AT&T-Houghton 482-8484
Remy's Battery Shop-Hancock 482-3800
Sound and Motion-Houghton 482-4445
Swift True Value-Houghton
482-0530

BOOKS-USABLE

Barter Bin-Hancock 231-6631
Goodwill-Houghton 482-3680

Books - Usable

Habitat for Humanity-ReStore-Calumet
337-0020
habitat.org/env/restores.aspx
St Vincent De Paul-Hancock 482-7705

Cell Phones

AT&T-Houghton 482-8484
Cartridges & More-Marquette 228-4140

Cell Phones

Ed's Used Parts-Houghton 482-4531
Edsusedparts.com
Wal-Mart Vision Center-Houghton 482-0639

CFLs and FLUORESCENT TUBES

Swift True Value-Houghton 482-0530 FEE

CLOTHING-CLEAN/USABLE

Goodwill-Houghton 482-3680
St Vincent De Paul-Hancock 482-7705

CLOTHING-CLEAN-> RAGS

St Vincent De Paul-Hancock 482-7705

CONSTRUCTION MATERIALS-USABLE (counter tops, cabinets, doors, electrical, light and plumbing fixtures, flooring, hinges, insulation, nails, screws, tile, tools, windows, and wood trim)

Habitat for Humanity-ReStore-Calumet
337-0020 habitat.org/env/restores.aspx

E-WASTE (AC adapters, computers, corded appliances, flat screen monitors, hard drives, keyboards, laptops, mice, modems, motherboards, network switches, power cables & strips, televisions, routers, and telephones)

Ed's Used Parts-Houghton 482-4531
Edsusedparts.com

FURNITURE-CLEAN/USABLE

Barter Bin-Hancock 231-6631
Goodwill-Houghton 482-3680
Habitat for Humanity-ReStore-Calumet
337-0020
habitat.org/env/restores.aspx
St Vincent De Paul-Hancock 482-7705



RECYCLE/REUSE KEWEENAW

Please call first to verify FEE or payment (\$) AND Recycle/Reuse only during business hours

HOUSEHOLD GOODS - CLEAN/USABLE

Barter Bin-Hancock 231-6631
Goodwill-Houghton 482-3680
Habitat for Humanity-ReStore-Calumet
337-0020
habitat.org/env/restores.aspx
St Vincent De Paul-Hancock 482-770

MEDICATIONS-PLEASE DO NOT FLUSH

Sheriff's Office-Houghton

MOTOR OIL

Autozone-Houghton 483-2479
Ed's Used Part - Houghton 482-4531
Houghton County Transfer Station-Atlantic
Mine 482-8872 houghtoncounty.net/directory-hc-transfer.shtml
Dave's Marathon-Hancock 482-3410

PACKING MATERIAL (bubble wrap, foam sheets, used coolers, styrofoam peanuts)
The Shipping Shop-Houghton 487-6167

PAINT, LATEX

Marquette Wallpaper & Paint 228-8376 FEE
Habitat for Humanity-ReStore-Calumet
337-0020 (no lead based paint)

PLANT POTS-USABLE (CLAY & PLASTIC)

G&A Garden Center-Houghton
www.localharvest.org/g-a-farmers-market-and-garden-center-M54560

PRINTER INK CARTRIDGES

Cartridges & More
Wal-Mart-electronics section

SCRAP METAL (aluminum, appliances, brass, copper, junk cars, steel - call to verify acceptable materials, especially air conditioners & freezers due to Freon)
Ed's Used Parts - Houghton 482-4531 \$
Julio Contracting-Ripley 482-2650 FEE
Houghton County Transfer Station-Houghton
482-8872 (no cars or refrigerators)
Men-Co-Calumet 337-3700

TIRES (all have Fee and may limit number accepted - call first)

Fine Line Tire-Hancock 482-6268 car/light truck \$2.75, large truck \$12.00

Tires

Ed's Used Parts-Houghton 482-4531 car \$3.00 or \$1.00 if rim attached
Men-Co-Calumet 337-0000 car FEE \$3.00 or \$1.00 if rim attached
The Tire Shop-Hancock 482-1850 car \$3.00, light truck \$4.00, large truck varies

CHECK FOR ON-LINE/SEND IN RECYCLING:

Printer Manufacturer may take used ink cartridges

Alternative Community Training
www.actservices.org VHS tapes, CDs, DVDs, Blue-Rays, and all plastic storage cases

CD Recycling Center of America
www.cdrecyclingcenter.com CDs, DVDs and related packaging

Green Disk www.greendisk.com media, tapes, drives, communication devices, film, GPS units, computers, misc items

PLEASE CHECK WITH WASTE MANAGEMENT - HOUGHTON - FOR A LIST OF MATERIALS THEY ACCEPT FOR RECYCLING



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 **ACCEPTABLE ITEMS**    **UNACCEPTABLE ITEMS**

[illegible]

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***ALL ACCEPTABLE ITEMS for
RECYCLING MAY BE MIXED***

FLATTEN ALL CARDBOARD BOXES

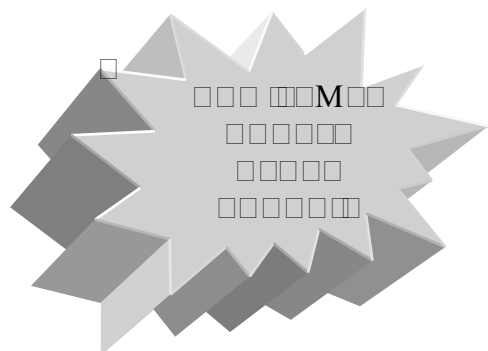
[illegible]

MON, TUE, WED & FRI

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THURSDAY

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Appendix C: Bottle Deposits

In Michigan, vendors of carbonated beverages, such as beer and soda, are required to add a ten-cent deposit on each container they sell. Consumers pay the extra ten cents and get their money back when return the bottle or can. This deposit system is a result of the Michigan Bottle Bill, which was passed by the state legislature as an effort to reduce roadside and picnic area litter. The bill was not passed as a measure to increase recycling of bottles and cans in Michigan and does not have any reference to recyclingⁱ. Nevertheless, the system facilitates recycling as distributors can recycle the material they collect.

Here is a description of how the bottle bill works, and what happens to the cans and bottles that are brought back to the vendor:

1. John D. Consumer buys a six-pack of soda. He pays 60 cents extra for the bottle deposit.
2. When John has finished drinking his soda he returns the bottles to the store. The store gives John his 60 cents back.
3. The cans and bottles are separated at the grocery store and are stored at the grocery store until there is enough for the distributor to come and pick them up. Most big grocery stores have machines that crush the cans and plastic bottles. The glass is kept uncrushed.
4. When there are enough bottles and cans collected at the store, the different distributors pick up them up. They bring the cans and bottles to their warehouses, where the plastic is shredded and the cans are crushed. Currently, the glass is thrown away and ends up in a landfill.
5. When there is enough shredded plastic, sorted by color, to fill a semi (about 45,000 lbs. max), a truck paid for by a commercial recycling company picks up the material. The recycling center is contracted out by the bottling company, such as Coke or Pepsi, not by the local distributor. The same pattern applies to aluminum cans. When there is enough aluminum cans to fill a trailer, an aluminum recycling company takes that trailer away and brings another one.

The Bottle Bill does not require companies to recycle the containers brought back to the distributor. It is for this reason that the glass bottles can be disposed of in the landfill instead of being recycled. Because of their higher market value, aluminum cans and plastic bottles are recycled even if they have to be trucked a long distanceⁱⁱ.

Economics of the Bottle Deposit System. The bottle deposit system was developed to reduce the amount of litter on Michigan roadsides. The ten-cent deposit is not a subsidy for recycling. Where does the ten cents go if a consumer fails to return a can or bottle? Currently, here is how the system works.

1. The distributor pays the state ten cents for all bottles and cans it sells to grocery stores.
2. The grocery store pays the distributor a ten cent deposit for each container it purchases from the distributor. Hence, the distributor is reimbursed for deposits paid to the state.
3. John Consumer buys a six pack of soda from the store and pays his deposit. Hence, the retailer is reimbursed for deposits paid to the distributor.
4. John Consumer drinks the soda but returns only five cans because one got lost on the floor of his car.

5. The store gives John fifty cents.
6. The store returns the five cans to the distributor and the distributor reimburses the store for the fifty cents paid to John.
7. The state then reimburses the distributor from the funds it originally collected. The ten cents that John never claimed remains with the state. The state then uses any excess funds for educational programs.

In general, costs associated with operating the deposit system--such as sorting, shredding, and crushing--are paid for by retailers and distributors. For example, sorting is done by hand, and the laborers are typically paid, minimum wage or \$8.15 per hour. Some costs can be recovered through recycling. The rest is integrated into the price of the product. The beverage companies are not obligated to recycle, but they do because of the large quantities and the high market value of aluminum and plastic.

ⁱ Container Recycling Institute. 2015. Bottle Bill Resource Guide. <http://www.bottlebill.org/legislation/usa/michigan.htm>

ⁱⁱ Ibid.