

# CHAPTER 12: SUSTAINABILITY

## IN THIS CHAPTER

<b>Purpose and Applicability</b> .....	12-1
<b>12.1 Pollution Prevention (P2)</b> .....	12-2
<b>12.1.1 Why Practice Pollution Prevention?</b> .....	12-3
<b>12.1.2 Getting Started</b> .....	12-4
<b>12.1.3 The Pollution Prevention Plan</b> .....	12-6
<b>12.1.4 Common Pollution Prevention Opportunities and Techniques</b> .....	12-11
<b>12.2 Environmental Management Systems (EMS)</b> .....	12-14
<b>12.2.1 Benefits of an Environmental Management System</b> .....	12-15
<b>12.2.2 Stages of Environmental Management System Development</b> .....	12-16
<b>12.3 Energy</b> .....	12-18
<b>12.3.1 Energy Efficiency</b> .....	12-18
<b>12.3.2 Renewable Energy Zoning Database</b> .....	12-20
<b>12.4 Reuse, Recycling and Market Development</b> .....	12-20
<b>12.4.1 Recycling Directories</b> .....	12-20
<b>12.4.2 Scrap Tire Market Development &amp; Law Enforcement Grant Program</b> .....	12-20
<b>WHERE TO GO FOR HELP</b> .....	12-21

## PURPOSE AND APPLICABILITY

Sustainability helps us to evaluate the choices we make and suggests a more effective means of doing business as usual. A strong financial case for sustainability exists as institutions, businesses, and individuals use sustainability to modify current practices to make them more effective, saving both capital and time. These environmental, social, and economic considerations are known as the triple bottom line and can be thought of as another way to define sustainability.

This chapter briefly discusses the benefits, tools, and opportunities common to the sustainable approach. It also summarizes pollution prevention assistance and incentive programs offered by the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

## 12.1 POLLUTION PREVENTION (P2)

Pollution prevention is a scientific, continuous improvement approach that often results in cost reduction, risk avoidance, and enhanced competitive advantage. Perhaps more importantly, protecting Michigan’s environment through pollution prevention (P2) is a key element in preserving Michigan’s natural resources for future generations. Businesses have been instrumental in protecting the environment for decades.

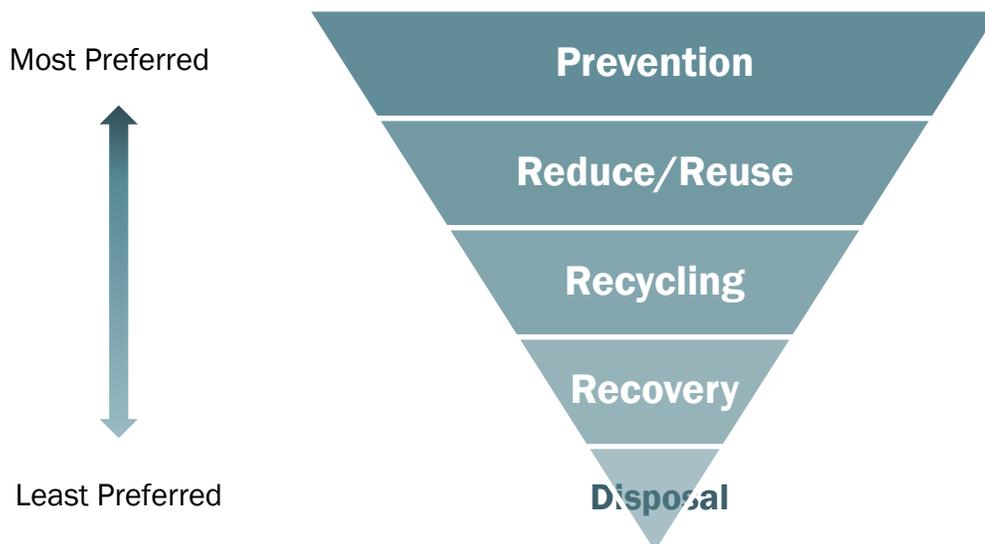


The state of Michigan’s P2 programs are administered by EGLE, in accordance with the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This legislation entrusts EGLE with the responsibility of:

- Educating and serving as a catalyst for change within the business community to bring about reductions in the generation of environmental wastes.
- Providing technical and financial assistance to small businesses and institutions to facilitate P2.

EGLE’s P2 programs are a conduit for non-regulatory assistance to businesses, institutions, and local communities to improve the environment and protect workers and citizens from exposure to harmful substances. This is accomplished through advancing voluntary, multi-media, environmental, social, and economic improvement using scientific, collaborative solutions to achieve a healthy and sustainable environment.

### WASTE MATERIALS MANAGEMENT HIERARCHY



**Common examples of P2 include:**

- Replacing hazardous organic solvents with non-toxic aqueous cleaners.
- Replacing old process equipment with new equipment that uses fewer raw materials.
- Modifying manufacturing and industrial processes to eliminate the need for hazardous substances.
- Choosing alternative fuel sources that lower nitrogen oxide (NO<sub>x</sub>) emissions.
- Conserving and reusing process water.
- Installing green infrastructure.
- Purchasing mercury-free switches, relays, lamps, or other equipment.
- Using modified packaging that creates less waste.
- Deconstructing a building and reusing certain materials rather than demolition and landfilling.
- Recycling metals, solvents, oils, cardboard, wood pallets, office paper, organics, and other recyclable materials.
- Purchasing products manufactured of post-consumer recycled materials.
- Purchasing products containing less toxic, bio-based substances that result in less hazardous waste being generated.
- Purchasing products that are built for disassembly and material recovery.
- Conducting energy audits and practicing conservation.
- Using certified green products such as cleaners, glues, paints, etc. that contain fewer toxic materials and reduce employee exposure, asthma reactions, and odor complaints.
- Replacing standard motors, pumps, and lighting with high efficiency units.
- Stopping leaks, drips, and spills; and instituting preventive maintenance practices.
- Developing emergency response plans and procedures.

**12.1.1 WHY PRACTICE POLLUTION PREVENTION?**

Pollution prevention is a scientific, continuous improvement approach that often results in cost reduction, risk avoidance, and enhanced competitive advantage. P2 not only helps to meet environmental goals, but also reduces waste, improves efficiencies, saves money, reduces potential liabilities, and mitigates hazardous exposures. Unlike costly pollution control measures, pollution prevention offers important economic, regulatory, environmental, and social benefits that may often result in a more competitive business.

A facility with an effective P2 program will often:

- Reduce waste treatment, transport, and disposal costs.
- Reduce costs for energy, water, and raw materials.
- Eliminate or minimize compliance issues and associated costs.
- Reduce future liabilities through improved quality of work, environment, and employee health and safety.
- Avoid costs of accidents and spills.
- Improve production times.
- Enhance its public image and community relations.

In addition, instituting green practices and showcasing a strong environmental ethic provides a competitive edge and may open up new markets for your products to others that are concerned about environmental and health impacts.

### 12.1.2 GETTING STARTED

An excellent way to get started with any P2 effort is to draw upon the many resources available through EGLE's P2 assistance programs, projects, and initiatives. To help you develop an action plan or start a P2 program, the following is a brief description of EGLE assistance activities and incentive programs, including industry partnerships and collaborations.

- I. **Financial Assistance:** A number of EGLE financial assistance programs are available to encourage the adoption of pollution prevention within the state.
  - a. **Small Business Pollution Prevention Loan Program:** Low-interest loans of up to \$400,000 are available to small businesses of 500 employees or fewer to finance projects that eliminate or minimize the generation of waste, result in environmentally sound reuse and recycling of wastes, or conserve energy or water within their organizations.
  - b. **Non-Point Source/Stormwater Grants:** Nonpoint source pollution is pollution caused when rain, snowmelt, or wind carries pollutants off the land and into lakes, streams, wetlands, and other water bodies. EGLE's Nonpoint Source Program provides grants to local units of government and non-profit entities to reduce nonpoint source pollution statewide.
  - c. **Fuel Transformation Program:** EGLE's Fuel Transformation Program goals are to:
    - reduce nitrogen oxide (NOx) emissions and maximize air quality benefits statewide with an emphasis on priority areas (areas designated as non-attainment and maintenance areas for the National Ambient Air Quality Standards).
    - increase adoption of zero emission vehicles, alternate fuel vehicles and equipment.
    - reduce diesel emissions from school buses statewide.

Under the Fuel Transformation Program, P2 projects are solicited through a competitive application process and funded on a reimbursement basis after all required documentation has been successfully submitted and approved by EGLE. Examples of projects funded or expected to be funded under this program include those which involve upgrades from old diesel equipment to clean diesel equipment or propane for equipment like school busses, Class 4-8 local freight vehicles (eligible medium and large trucks and port drayage trucks), Class 4-8 shuttle and transit buses, freight switchers, Great Lakes ferries and tugboats, shore power, port cargo handling equipment and forklifts, and airport ground support.

- d. **Integrated Assessment Program:** EGLE provides free, confidential integrated assessments to help companies evaluate P2 and compliance opportunities. Recommendations from the assessment are currently eligible for grant funding through the USEPA State and Tribal Assistance Grant Program.
- e. **Electric Vehicle (EV) Funding Opportunities:** EGLE's EV Program aims to build infrastructure for direct current fast charging stations across Michigan to ensure the feasibility of long-distance trips for EV users in Michigan. To achieve this, EGLE provides funding for qualified EV charging equipment, site preparation, equipment installation, networking fees and signage. Any public or private organization located in Michigan, or those outside of Michigan that have demonstrated significant experience installing and maintaining electric vehicle charging stations and have a significant presence in Michigan, and are enrolled in a Utility EV program, are eligible to apply for this grant. The grant amount is the lesser of 33.3 percent of the total cost or a direct match of the amount paid for eligible EV charging equipment, up to \$70,000.
- f. **Clean Diesel Program:** EGLE provides matching grants to local units of government, schools, non-profits, port authorities, metropolitan planning organizations, private business and industry for endeavors that will:
  - reduce diesel engine particulate matter and nitrogen oxide emissions in Michigan
  - provide increased health benefits for populations in areas of the state where the air quality is affected by diesel engine emissions from nearby stationary or mobile emission sources

Visit [Michigan.gov/EGLEGrantsAndLoans](https://Michigan.gov/EGLEGrantsAndLoans) for more information on financial assistance opportunities available through EGLE.

- II. **Training and Outreach:** The easiest way to stay informed of EGLE's training and outreach is to subscribe for notifications on topics of interest through [Michigan.gov/EGLEConnect](https://Michigan.gov/EGLEConnect). EGLE hosts numerous events that share information on pollution prevention, new technologies, current regulatory requirements, and compliance assistance resources. For the latest events and access to past event resources and recorded webinars, visit [Michigan.gov/EGLEEvents](https://Michigan.gov/EGLEEvents). EGLE also produces many guidance documents, fact sheets, and other publications to help advance P2 activities and assist with maintaining compliance. These publications can be found at [Michigan.gov/EGLEPublications](https://Michigan.gov/EGLEPublications).

- III. **Technical Assistance:** These programs focus on providing P2 information and technical assistance to companies, institutions, and communities.
  - a. **Integrated Assessment Program:** EGLE provides free, confidential Integrated Assessments to help companies evaluate pollution prevention opportunities.
  - b. **Recycling Assistance:** Resources are available to assist companies in their recycling efforts at [Michigan.gov/EGLERecycling](http://Michigan.gov/EGLERecycling) and [RecyclingRacoons.org](http://RecyclingRacoons.org).
- IV. **P2 Programs:** By participating in any of the following P2 programs, a business can receive well-deserved public recognition, customized assistance, and other benefits for P2 and compliance efforts.
  - a. **Clean Corporate Citizen (C3) Program:** Regulated companies, municipalities, and institutions meeting certain environmental performance criteria can be designated as Clean Corporate Citizens. In return they receive positive public recognition and are entitled to certain regulatory benefits, such as streamlined air quality permit processing.
  - b. **Green Communities Challenge:** This peer-to-peer network shares home-grown best practices to help Michigan communities overcome barriers on the path toward sustainability. Members can earn recognition for sustainability accomplishments and track progress by participating in the Challenge. Visit [migrreencommunities.com](http://migrreencommunities.com).
  - c. **Michigan Business Pollution Prevention Partnership (MBP3):** Open to all businesses, associations, organizations, and agencies, MBP3 is a voluntary P2 program designed to encourage businesses to initiate or expand their P2 practices. Participants receive public recognition for their efforts and involvement in a community of practice.
  - d. **Neighborhood Environmental Partners:** A recognition program intended to increase interaction between businesses and their neighbors, with the goal of enhancing the environment and the quality of life in the community.

### 12.1.3 THE POLLUTION PREVENTION PLAN

It has been shown that a systematic approach to planning, with measurable goals, results in effective pollution prevention. An effective P2 plan can reduce waste and costs. A good plan includes gaining full support of management, committing resources, and establishing policies that support reductions of waste, resources, water, and energy use within the company. Input from all levels of your business should be called upon to contribute P2 ideas, technical assistance, and decision-making. By following the steps outlined below, you can set the stage for a successful P2 program, which can help you achieve goals set for compliance, environmental management plans, and sustainability efforts.

## 13 STEPS TO AN EFFECTIVE POLLUTION PREVENTION PLAN

- STEP 1** Start with a commitment.
- STEP 2** Establish a P2 team and P2 coordinator.
- STEP 3** Establish reduction goals for wastes, toxics, climate change, water, and energy.
- STEP 4** Establish priorities and procedures for conducting detailed assessments.
- STEP 5** Designate an assessment team.
- STEP 6** Conduct a facility-wide assessment.
- STEP 7** Identify potential P2 opportunities.
- STEP 8** Perform technical and economic analyses on the potential P2 opportunities.
- STEP 9** Develop an implementation plan.
- STEP 10** Implement the selected projects.
- STEP 11** Evaluate project effectiveness annually and document results.
- STEP 12** Celebrate positive results and learn from negative results.
- STEP 13** Modify the plan as needed and select the next steps to be taken.

### STEP 1

#### **Start with a commitment.**

P2 programs are only as strong and effective as the company's internal commitment. Make the philosophy of pollution prevention a company priority. Put the company's commitment in writing to legitimize the program with employees and set the tone for P2 efficiencies as an everyday part of doing business. P2 should be incorporated into every aspect of the business, including mission and policy statements, budgeting, purchasing, design, and production. A senior staff member should lead the program and solicit employees' input in identifying areas where waste, toxics, water, and energy usage can be reduced. Engage employees from all parts of the organization in the program.

### STEP 2

#### **Establish a pollution prevention team and coordinator.**

Once your facility establishes a clear commitment to P2, gather interested, appointed, and affected individuals for a brainstorming session. This group of individuals should include a cross-section from all levels of staff, including management to front-line workers in the purchasing, financial, clerical, production, maintenance, and warehousing areas. Heading this team should be a Pollution Prevention Coordinator. This P2 champion is the one who coordinates the assessments, carries forward your team recommendations, and provides oversight to the implementation of projects. This person also acts as a point person for any questions, comments, or recommendations from other employees. Putting someone in charge helps ensure the program will move forward in a timely and effective manner.

**STEP  
3**

**Establish overall reduction goals for wastes, toxics, climate change, water, and energy.**

The first goals need to be target goals such as achieving specific energy, toxics, water, or waste reductions by a set date. Then determine what steps the company needs to take to achieve this goal. Purchasing changes are probably the easiest and most powerful means of reducing toxics that result in hazardous waste and employee exposures as well as reducing energy usage.

**STEP  
4**

**Establish priorities and procedures for conducting more detailed assessments.**

Before conducting an assessment, you must determine what will be measured, how costs will be assessed, who should be involved, and how the assessment will proceed. Identify potential obstacles and define the means for overcoming them. These obstacles will be less likely to impede the process if there is a mechanism for addressing them as they arise.

**STEP  
5**

**Designate a detailed assessment team(s).**

Designate a team to perform detailed assessments (or an individual if staffing is tight).

**STEP  
6**

**Conduct the assessment.**

An in-depth, comprehensive assessment is critical to a successful P2 plan. Experience has shown that only after a company realizes the true costs of its wastes will it have the motivation needed for an ambitious P2 effort. Also, by assigning waste costs to specific department budgets, greater efforts to eliminate costs associated with waste are likely to occur. An in-depth waste assessment helps a business to identify:

- Sources, compositions, and the true costs of wastes.
- Potential P2 opportunities and the benefits of acting on these opportunities.
- Obstacles to implementing P2 opportunities.

For a very small business, an in-house waste assessment might consist of a visual inspection of what goes into the trash dumpster, followed by research into local opportunities for recycling cardboard, office paper, plastic packaging, and other easy-to-recycle materials. Businesses with more complex operations should perform a walking tour of the facility, observing the various points of waste generation and the conditions with the potential for causing accidents, health hazards, or environmental emissions. Discussions with operational staff can reveal additional useful information. Other sources of important information include records of waste disposal costs, environmental compliance documents, and raw materials purchase invoices. Identify the wastes that cost the most due to volume, disposal, or toxicity to help identify good P2 options.

Additionally, a business can request an **Integrated Assessment** that identifies P2 and compliance assistance opportunities within their facility.

For a free, confidential, integrated assessment, complete the Pre-Assessment Survey at [Michigan.gov/P2IntegratedAssessment](https://Michigan.gov/P2IntegratedAssessment).



Businesses may also wish to have an assessment conducted by a professional technical consultant to **characterize wastes** and perform a cost-benefit analysis of each P2 option. If the facility can research the topic, there may even be a ‘self-audit’ checklist available to identify your own areas of focus. Contact your trade associations, business forums, or others for self-checklists or guidance.

**STEP  
7****Identify potential pollution prevention opportunities.**

Once the information is collected and summarized, team members should discuss possible alternatives to reduce or eliminate waste and toxic materials, energy or resource intense processes, and/or ways to recycle waste streams. An initial list of P2 opportunities can typically be developed with simple brainstorming.

**STEP  
8****Perform technical and economic analyses on potential P2 opportunities.**

Based on a set of selection criteria, an examination of the technical workability of P2 opportunities should occur, followed by an evaluation of cost and environmental impacts of each opportunity. This requires consideration of all costs and benefits involved, such as decreases in operating costs; changes in regulatory burden; future liabilities; and improvements in productivity, worker safety, environmental protection, and quality management practices.

Projects can vary from easy to hard; inexpensive to costly. When considering costs, think in terms of return on investment and long-term impacts. A stock investment with a 10 percent return per year is considered good. Note that this would require 10 years for the stock to fully pay back that initial investment. If an investment in waste, resources, or energy reduction saves enough money to pay for itself in 5-7 years, that’s better payback than the stock market! In addition, it is likely that costs for waste disposal, energy, water, and other resources will only increase over time, making the payback timeline even shorter.

The P2 team should investigate possible funding sources for those projects that require capital investment. A financial analysis of any project is helpful in requesting funding. Members of the financial departments should be included in this process. Options with the highest rate of return should be presented to management as final recommendations. For energy related projects, see the funding discussion under Section 12.3.3.

**STEP  
9****Develop an implementation plan.**

With management’s decision to act upon given P2 opportunities, steps to create waste, toxics, resource, water, and energy reduction actions must be designed. Financial and personnel resources must also be designated. An excellent financial resource is available from the **Small Business Pollution Prevention Loan Program**. Low-interest loans of up to \$400,000 are available to small businesses of 500 employees or less, for financing P2 projects.

Visit [Michigan.gov/P2Loan](https://Michigan.gov/P2Loan) for more information about the P2 Loan Program.



It is important that each step of the implementation plan be approved by the P2 team. For each step or action to be taken, clearly indicate the following:

- Action to be implemented.
- Person or persons responsible for implementation.
- Possible barriers and ways to overcome them.
- Timeline for action to be completed.

### STEP 10

#### **Implement the selected projects.**

Inform all employees about the selected P2 projects and begin the implementation phase. All involved employees should have a clear understanding of the purpose of the P2 project and their role in implementing it. The pollution prevention team members should lead other employees and provide guidance in the implementation process.

### STEP 11

#### **Evaluate project effectiveness and document results.**

By reviewing the program's successes and failures, managers can assess the degree to which P2 goals are being met and what the economic results have been. The comparison identifies P2 techniques that work well and those that do not. This information helps guide future P2 assessment and implementation cycles. In order to evaluate project effectiveness, a set of baseline data (gathered during the waste assessment phase/Step 6) should be used to measure progress. Periodically conduct tests to determine if and where waste and hazards have been reduced. Results should be documented. This is a good way to determine if alternative production methods are working as expected. It is also an opportunity to re-evaluate methods and make any corrections.

### STEP 12

#### **Celebrate positive results and learn from negative results.**

Once the results are known, celebrate the positive steps forward. Are you purchasing fewer toxic materials and reducing hazardous wastes? If so, this means you're reducing the exposure to your employees as well as the disposal costs. Post the information where employees and the public can see what you're doing to save money and protect the environment as well as the health of your employees and customers. As we all know, not all new projects are successful. If you find a P2 project isn't working as expected, determine if it can be improved or if something different is needed, or if it should be shelved until new resources are available. Learn from the experience but keep working on improvements.

### STEP 13

#### **Modify the plan as needed and select the next steps to be taken.**

The P2 plan should evolve as the P2 program proceeds. Goals once achieved can be expanded or new goals can be set, and policies can be revised. Maintaining a viable P2 program requires continued support and involvement from management and everyone involved in planning and implementation. With support and enthusiasm from respected persons within the company, employees at all levels can and will want to participate. Pollution prevention can become a part of quality management practices, contributing to the company bottom line.

### 12.1.4 COMMON POLLUTION PREVENTION OPPORTUNITIES AND TECHNIQUES

There are several ways to increase efficiency and prevent waste in all aspects of a business. The following is a brief review of some of the most common P2 opportunities and techniques a business can use to achieve its P2 goals.

#### 12.1.4.a Cost Accounting

Experience has shown that the most successful P2 programs are those that account for the true cost of wastes, including expenses for lost raw materials; staffing; needed paperwork and insurance; sample analyses; and storage, treatment, and disposal costs. Successful billing strategies to account for the true costs of wastes include the following approaches:

- Charge direct and indirect costs of all air, land, and water discharges to specific processes, products, or departments.
- Allocate treatment/disposal costs to operations/departments that generate the waste.
- Allocate utility costs to specific processes, products, operations, or departments.

Once all the true costs of the various processes or products are known, you may determine if the waste, toxic substances use, resource use, and energy costs for a particular product are much larger than expected or identify the source of most of the hazardous waste. These are good areas to focus P2 efforts to reduce costs and liabilities.

#### 12.1.4.b Purchasing and Inventory Management

A purchasing policy on non-toxic and energy-efficient alternatives can result in significant improvements, but purchasing staff need guidance on what those alternatives are. Purchasing changes are probably the easiest and most powerful means of reducing toxics that result in hazardous waste and employee exposures as well as reducing energy usage. This can also impact the companies you select to purchase from. Select suppliers or manufacturers who also exhibit your same environmental commitment. This also opens up a market for your products.

- Order products according to need. The cost associated with the disposal of surplus hazardous materials or the resulting hazardous wastes often exceeds the purchase price of the item or raw material. A non-toxic alternative that does not generate hazardous waste may reduce those costs, risks, and regulatory oversight.
- A coordinated material purchasing program can monitor all requests for products throughout the company or plant and implement efficient purchasing policies.
- An inventory control program can promote sharing of materials between common users, provide data on who is using extremely hazardous products, identify large volume users, locate unused materials, and identify where waste reduction/material substitution options are viable. Inventory control should rotate stock on a first-in, first-out basis.

### 12.1.4.c Packaging, Shipping, and Containers

A second look at the transportation and product packaging that companies send and receive often leads to waste reduction without sacrificing product safety or quality.

- Request that deliveries be shipped in returnable/recyclable/reusable containers.
- Work with suppliers and customers to eliminate excess packaging.
- Increase your use of reusable shipping containers and recycled or recyclable packaging.
- Purchase products in bulk, in concentrated form, or in quantities matching process demand.
- Incorporate language into contracts specifying P2 requirements or preferences.

### 12.1.4.d Solvent Substitution, Green Cleaners, and Safer Chemicals

Regulatory and cost pressures, along with worker safety and liability issues, have led to the development of alternative cleaning technologies, safer solvents, and improved cleaning and recovery equipment. In recent years, new programs have developed to certify what are 'green' cleaning materials and processes. Green Seal is one certification program and provides a list of certified green cleaners at [GreenSeal.org](http://GreenSeal.org). Implementing safer, green cleaning technologies has become easier and often only requires purchasing materials off the shelf or from a good supplier that also provides training. Facilities that want to do their own research will need:

- A better understanding of the chemistry, mechanics, and other fundamentals of cleaning.
- A clear determination on how clean equipment or process materials truly need to be.
- A review of upstream processes/practices and how they influence the cleaning process.
- An awareness and understanding of the pros and cons of potential alternatives.
- Some degree of modification of both up- and down-stream processes and practices.
- A significant experimentation and learning period for identifying appropriate and effective alternative cleaners, optimizing cleaner concentrations and cleaning times, adjusting equipment and process operations, and modifying employee practices.

In general, pollution prevention opportunities for solvent cleaning processes include:

- Using alternative cleaning technologies such as:
  - Aqueous and semi-aqueous cleaning processes.
  - Thermal and steam cleaning processes.
  - Abrasive blasting using dry ice, baking soda, starch, plastic, and other media.
  - Supercritical carbon dioxide solvent cleaning.

- Using alternative/less hazardous solvents with low vapor pressure, low toxicity, or non-ozone-depleting characteristics such as lactic acid, dimethyl esters, DMSO, n-methyl pyrrolidone, glycol ethers, terpenes, soybean, and other bio-based solvents. Web sites that may be useful to identify alternative solvents include:
  - CleanGredients list of solvents: [CleanGredients.org](http://CleanGredients.org)
  - Clean Production Action's 'Green Screen for Safer Chemicals' program is a guide for decision making towards the use of the least hazardous materials: [CleanProduction.org/programs/Greenscreen](http://CleanProduction.org/programs/Greenscreen)
  - USEPA Safer Choice: [epa.gov/saferchoice](http://epa.gov/saferchoice)
- Extending solution life by pre-cleaning, using in-line filtration, countercurrent flows, reducing drag-out and evaporative losses, and removing sludge and surface oils/scum.
- Reclaiming/recycling spent solvents using distillation, filtration and vapor recovery equipment, and off-site recycling services.
- Evaluating and modifying upstream processes and practices, solvent handling/storage practices, and employee practices for reducing solvent waste generation.

#### 12.1.4.e Water

Water usage and wastewater discharge treatment entail substantial costs for many businesses and manufacturers. By metering water usage and regularly taking inventory of all water users, companies can reduce a major operating expense and reduce the demands on wastewater treatment facilities. Additionally, reducing water usage generally saves energy with less water needing to be pumped. Funding for some water efficiency steps may be provided by your local utility. Reducing water usage reduces water bills as well as the amount of wastewater that requires costly treatment.

- Cleaning Systems: Replace high-volume hoses with high-pressure, low-volume cleaning systems.
- Cooling Towers: Install or replace conductivity controllers on cooling towers to reduce the amount of blowdown water wasted. A medical supplier replaced a controller on an existing tower and reduced their annual water usage by 34 percent or over 437,000 gallons. Reuse treated wastewater for cooling water. Reuse cooling tower blowdown waters for other purposes like cleaning air scrubbers.
- Equipment: Purchase water efficient equipment and appliances including cafeteria dish washers, laundry washing machines, dual flush toilets, waterless urinals, etc. See the USEPA's WaterSense Web site at: [epa.gov/WaterSense](http://epa.gov/WaterSense).

- **Graywater:** Separate out graywater from treatment waters and sanitary wastes so they can be reused in other non-potable applications such as landscape irrigation or toilet flushing during expansions, renovations or new construction.
- **Landscaping:** Use native plantings to reduce or eliminate potable water use for irrigation or reuse on-site accumulated storm water.
- **Irrigation Systems:** Conduct routine irrigation system audits and inspections to maintain the system and prevent undetected, inefficient water loss.
- **Non-contact Cooling Water:** Once through non-contact cooling water should be replaced by a closed-loop cooling water system.
- **Rinsing:** Use countercurrent rinsing and equip all hoses with shut-off nozzles.
- **Storm water reuse:** Capture storm water and use it for irrigation, toilets or non-critical process usage.
- **Valves:** Install automatic shut-off valves on equipment to stop water flow when not in use.
- **Wastewater Reuse:** Investigate the reuse of treated wastewater for separately supplied, non-potable uses. This could include cleaning air scrubbers; floor washing; fire response supply (confirm this is acceptable with related regulatory staff); landscaping; toilets; etc.
- **Water Demand:** Determine if the need for water is critical or could be reduced or eliminated.
- **Water Treatment Costs:** Determine if the pollutants that require expensive treatment could be eliminated from the wastewater sources rather than do expensive treatment.

## 12.2 ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS)

An EMS is based on the International Organization for Standardization's environmental framework - ISO 14001. The EMS creates an overall site-specific management system that addresses environmental concerns through the allocation of resources, assignment of responsibilities, and ongoing evaluation of practices, procedures, and processes to achieve sound environmental performance. Each EMS is created by a site-specific team of employees and takes into account the geographic location, stakeholder and employee concerns, past uses of the site, corporate goals, and other factors when designing goals and objectives to achieve positive environmental/financial results.

Once your facility has an EMS in place, consider applying for the [Michigan Clean Corporate Citizen \(C3\)](#) designation for positive recognition and collaborative opportunities. For C3, EMS, or ISO 14001 assistance, call EGLE's Environmental Assistance Center at 800-662-9278.

## ISO 14001 Environmental Standard

### Environmental Policy and Scope

### Environmental Planning

- Identifying Aspects and Impacts
- Significance Ranking
- Setting Objectives and Targets
- Environmental Management Programs (EMPs)

### Implementation and Operation

- Roles, Responsibilities, Time Frames
- Training and Competence, Communication
- Controls and Documentation
- Emergency Preparedness

### Monitoring and Measurement

- Evaluation of Compliance
- Dealing with Non-conformances
- Corrective and Preventative Actions
- Records
- EMS Audit Program and Procedures



Implementation of an EMS does not substitute for compliance with regulations but can improve your compliance record and help you address issues that are not covered by regulation. In short, environmental management is an ongoing improvement process propelled by the desire to comply with regulations and operate cost effectively. Fully developing and integrating an EMS into your day-to-day management processes and operations is a more effective way of doing business.

### 12.2.1 BENEFITS OF AN ENVIRONMENTAL MANAGEMENT SYSTEM

Developing and implementing an EMS for your Michigan business can help improve your triple bottom line, thus improving the economic, environmental, and social benefits derived from your business operations. It can also help you qualify for **Clean Corporate Citizen** (C3) designation. By bringing environmental factors into daily business decisions, implementation of an EMS helps accomplish the following:

- **Reduce costs** – Facilities that have implemented an EMS show improved operating efficiency by focusing on important issues, developing standard procedures, and increasing employee training. Most companies have reported reduced costs through the systematic process of identifying potential risks and impacts. Some facilities have earned favorable status on financial indexes based on their reduced legal liability, reduced likelihood of catastrophic occurrences, and improved environmental and social responsibility.
- **Assume a competitive advantage** – Consumers and manufacturers give preference to products from environmentally responsible suppliers. An EMS can help obtain that “green” image. Several larger companies in the U.S., especially in the automotive and electronic sectors, have mature systems and are now requiring (or strongly encouraging) that their suppliers implement an EMS.
- **Improved image with stakeholders** – An EMS can improve your image and give credibility to your environmental programs. Your local politicians, environmental regulators, and community groups see development of an EMS as an indication of a good corporate citizen and the willingness to go beyond compliance. Accordingly, they recognize and reward these efforts.
- **Enhance regulatory compliance** – An EMS can help improve regulatory compliance and reduce liabilities associated with noncompliance. The adoption of procedures, work instructions, and additional training programs typically adds consistency and stability to business operations. It enables improved control over potential impacts and helps anticipate and control upsets.
- **Improve environmental performance** – The systematic identification of potential environmental impacts and continual improvement goals lead to more efficient business operations. Achieving these goals will lead to improved performance, a cleaner environment, and a sustainable community.

### 12.2.2 STAGES OF ENVIRONMENTAL MANAGEMENT SYSTEM DEVELOPMENT

Typically, an EMS undergoes three states of maturity:

- 1) In the years 0 – 2, the EMS is developed and implemented (internal value systems).
  - a. Large changes are typically avoided in these years.
  - b. Tends to be reactive, often focusing on “end-of-pipe” controls.
  - c. Staff strive to fully understand ISO 14001 (or other) requirements.
  - d. The system focuses on learning how to communicate to stakeholders.
  - e. It establishes what and how to disclose information to the public.
  - f. Tends to be driven by one person (typically the Environmental, Health and Safety leader).

- g. There is limited involvement and/or buy-in.
  - h. Determination of significant aspects and hazards is often complex and time consuming.
  - i. Management provides resources, but their involvement is minimal.
  - j. Very simple metrics are used to report results toward goals.
- 2) The years 2 – 5 can be described as deployment.
- a. Linkages within the system are strengthened.
  - b. EMSs are in conformance with standard requirements.
  - c. Benefits (social, environmental, financial) are demonstrated.
  - d. Alignment with other requirements and systems becomes integrated (quality, health, safety, security, environmental, purchasing, etc.).
  - e. Consistent metric systems are established for measuring and reporting results and trends.
  - f. It moves away from a one-person driven system to include a cross-functional team.
  - g. Objective and targets tend to be modest.
  - h. Corrective and preventative action processes tend to be weak.
  - i. Communication and reporting systems are being refined.
  - j. Cultural change is starting.
- 3) Five+ years the EMS is mature or an external value system.
- a. Stakeholders are involved with EMS review.
  - b. The organization achieves and maintains high levels of performance.
  - c. Value is demonstrated.
  - d. Efficiency through process improvements is a primary activity.
  - e. Inclusion of collected data in strategic planning takes place.
  - f. Corrective and preventive action processes are well established.
  - g. Objectives and targets are “stretch” goals.
  - h. There is a high level of management involvement.
  - i. The management system serves as a launch pad for new initiatives.
  - j. Metrics are well established and support business goals.
  - k. Employees are held accountable for performance.
  - l. Management is committed to environmental protection (including the allocation of resources and time and the assignment of responsibility).

## 12.3 ENERGY

Energy use is often seen as a key area where, through efficiency and conservation, operating costs can be readily controlled and often significantly reduced. Energy savings can be achieved by simple changes in daily operations, maintenance practices, and worker habits, and can be implemented at little or no cost. Although more significant energy savings may involve investment in new/upgraded equipment, these simple changes typically have excellent financial returns.

### 12.3.1 ENERGY EFFICIENCY

Basic energy efficiency steps to consider include:

- Submeter electrical energy usage for detailed information on when, how, and where electrical energy is used. Some pricing is based on time of day and peak usage. Changing or staggering startup times may save money at no cost. Knowing how and where energy is used is critical to identifying major usage to focus energy efficiency efforts and gain best savings.
- Maintain equipment and the facility through an ongoing maintenance program.
  - Furnaces
    - ✓ Analyze flue gas and adjust the fuel-air ratio to increase efficiency.
  - Process Heat, Heat Recovery, and Heat Containment
    - ✓ Enhance sensitivity of temperature control and cutoff.
    - ✓ Use flue gas waste heat to preheat combustion air.
  - Process Cooling: Cooling Towers and Chillers/Refrigeration
    - ✓ Use a cooling tower instead of refrigeration when outside temperature allows.
    - ✓ Use waste heat for absorption refrigeration.
  - Motors and Drives
    - ✓ Develop an ongoing motor replacement program to upgrade existing motors to high efficiency motors. Where power factor is not controlled elsewhere in the shop, choose replacement motors with high power factor.
    - ✓ Use variable speed drives to control motor speeds where varying pump or fan flows can be utilized.
  - Compressed Air Systems
    - ✓ Compressed air is almost always the most expensive means for performing work at a facility and should only be used when essential.
    - ✓ Establish a vigorous maintenance program and check for leaks often.
    - ✓ Operate the system at the lowest acceptable pressure.
  - Electrical Power
    - ✓ De-energize excess transformer capacity and increase power factor for facilities and equipment by installing the proper combination of fixed and variable capacitance.

- Heating, Ventilation, and Air Conditioning (HVAC) Equipment
  - ✓ Develop an optimal start/stop schedule for your HVAC system.
  - ✓ Use seven-day, programmable thermostats to coordinate system operations with occupancy loads.
  - ✓ Install variable air volume systems where practical.
  - ✓ Install an airside, rooftop, central, or waterside economizer to use outside air to cool the space when outside temperatures allow.
- Lighting
  - ✓ Install low-mercury T-8 or T-5 fluorescent systems with electronic ballasts or LEDs (light-emitting diodes).
  - ✓ Remove two out of four tubes in fluorescent fixtures where lower light levels are acceptable. Also, disconnect the ballast that operates these tubes to save even more energy (especially magnetic ballasts). If necessary, install reflectors or higher output lamps so more light is utilized.
  - ✓ Install low-wattage, long-life, LED exit signs or bulbs.
  - ✓ Use high-efficiency halogen, low-voltage halogen, quartz, or LED lamps where lighting quality is critical (e.g., retail displays).
  - ✓ Replace mercury vapor or other inefficient, high-intensity, discharge lighting systems with an efficient, metal halide, sodium, or other high-output fluorescent system.
  - ✓ Tailor lighting levels to the task and occupants and increase the use of “task lighting.”
  - ✓ Rewire fixtures or use dimming controls so unnecessary lighting can be turned off.
  - ✓ Install occupancy sensors in areas of sporadic use. (Examples include supply closets and restrooms.)
  - ✓ Install light sensors near windows to shut down light sections on bright sunny days.
- Office Equipment
  - ✓ When purchasing new equipment, buy Energy Star®, or higher efficiency models. Also compare the “Energy Guide” label included on many major appliances to determine the more efficient model.
  - ✓ Consider installing Energy Management software on servers to control sleep and shutdown modes of desktop computers.

### 12.3.2 RENEWABLE ENERGY ZONING DATABASE

In February 2020, EGLE launched a unique searchable database of municipal ordinances across Michigan that address siting for renewable energy installations. The database was developed in collaboration with the Graham Sustainability Institute at the University of Michigan.

Over half of Michigan's more than 1,800 municipalities have considered renewable energy in their zoning ordinances. The [renewable energy zoning database](#) is the first compilation of all renewable energy ordinances across the state and the first database of its kind in the nation.

The database is an in-depth resource guide for municipalities developing ordinances or for developers looking to site wind, solar, or other alternative energy projects. At-a-glance maps updated in real time will help users to quickly determine which municipalities are primed for renewable energy development with existing ordinances.

## 12.4 REUSE, RECYCLING AND MARKET DEVELOPMENT

### 12.4.1 RECYCLING DIRECTORIES

The [Recycled Materials Market Directory](#) (RMMD) is a searchable online directory for businesses looking to divert materials from landfill disposal. This tool connects businesses with companies located in Michigan and across the Midwest that accept materials for reuse or recycling. The directory provides specific information about a company's service area, acceptable materials, other services provided and contact information. Businesses looking to reduce their waste to landfill can use the RMMD as an easy way of locating recycling service providers in your area. As a business-to-business directory, the RMMD is populated with organizations that accept commercial volumes of recyclable materials.

Businesses can also use the Michigan Materials Marketplace to connect with other businesses and develop and scale new reuse and recycling opportunities for challenging waste and by-product materials. Learn more and join today at [Michigan.MaterialsMarketplace.org](https://Michigan.MaterialsMarketplace.org).

An organization that accepts recyclables generated from the residential sector only or residents looking for collection options, can visit [Michigan.gov/RecyclingDirectory](https://Michigan.gov/RecyclingDirectory).

### 12.4.2 SCRAP TIRE MARKET DEVELOPMENT & LAW ENFORCEMENT GRANT PROGRAM

EGLE administers Scrap Tire Market Development Grants to reimburse up to 50 percent of the cost to purchase scrap tires to support the development of increased markets for scrap tires. Grant funding is also available to reimburse up to 50 percent of the cost of purchasing equipment or for research and development to provide for a new or increased use for scrap tires.

## WHERE TO GO FOR HELP

Websites, program contacts, and publications/resources for sustainability topics

### **Pollution Prevention (P2) Program Assistance**

800-662-9278 | [Michigan.gov/p2](https://www.michigan.gov/p2)

### **Integrated Assessments**

[Michigan.gov/P2IntegratedAssessments](https://www.michigan.gov/P2IntegratedAssessments)

800-662-9278 | [RogersC1@michigan.gov](mailto:RogersC1@michigan.gov)

### **EMS Development / Michigan's Clean Corporate Citizen (C3) Program**

800-662-9278 | [dodged1@michigan.gov](mailto:dodged1@michigan.gov)

### **EMS Standards**

American National Standards Institute (ANSI): 212-342-4900 | [ansi.org](https://www.ansi.org)

Registrar Accreditation Board (RAB): 888-722-2440 | [anab.org](https://www.anab.org)

### **Responsible Care Management Systems**

[ResponsibleCare-us.com](https://www.ResponsibleCare-us.com)

### **American Chemistry Council**

[AmericanChemistry.com](https://www.AmericanChemistry.com)