

Environmental Impacts and Control for the Electronics Manufacturer

Written by Scott Mazur

Tuesday, 04 September 2012 02:41 - Last Updated Wednesday, 05 September 2012 21:55

Steps for saving money through awareness and tighter process control.

Electronics manufacturers have many potential impacts to the environment. Here, we provide a methodology to identify and institute controls to mitigate negative impacts to the environment. Environmental impacts will be different between manufacturers, but the goal is the same: to identify, control and improve.

Identify. An environmental impact will be defined as a process, material or activity that interacts with the environment. The first action is cataloging, reviewing the facility's manufacturing processes, materials, products and services to determine which activities impact or could potentially impact the environment. Sourcing of information for compiling this list typically includes:

- Facilities' environmental permits and reports.
- Material and chemicals that are hazardous or used in volume within the facility.
- Air emission processes and equipment.
- Generated waste, nonhazardous and hazardous.
- Materials, products and items that can be recycled.
- Energy use.

Some examples of environmental impacts are lead or lead-free solder, manufacturing chemicals, hazardous waste, recyclable materials, including manufacturing materials and non-manufacturing materials such as bottles, cans and metal.

One of the best approaches is to audit the facility and determine what is being thrown out as waste. Investigate if any of the items can be recycled. Recyclable packaging materials such as cardboard, paper, metals might otherwise be discarded without understanding the negative environmental impact.

Controlling the environmental impact. Upon identifying and listing the environmental impacts within a facility, the next stage is controlling the process, material or activity. The control may be

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different given the specific impact, with the main goal being to eliminate the opportunity to adversely affect the environment.

Controls may not be needed for some impacts; these would require improvement as detailed in the next section. **Table 1** lists some examples for controlling the impact.

TABLE 1. Means for Controlling the Environmental Impact

ENVIRONMENTAL IMPACT	POTENTIAL CONTROL
Chemical use	Properly disposing of the chemical after use, out of date or byproduct chemical may need to be considered hazardous waste. Ensure spill control address accidents.
Chemical use for extremely hazardous substances (e.g., sulfuric acid)	Some chemicals are considered extremely hazardous substances by required for handling, operation, disposal (typically per state and federal)
Hazardous waste generation and disposal (e.g., lead solder)	Ensure policies and procedures in place for proper disposal, handling per state and federal guidelines. Per state and federal regulations, procedures must be in place.
Cleaning operation	Is the cleaning operation inspected? Which state or local regulations prevent an environmental impact from overspill?

Some chemicals are considered as hazardous waste and should be disposed of per federal and state guidelines. For chemical spills, control procedures may be required per state and federal guidelines dependent on the specific chemical, and if determined to be hazardous or regulated by the EPA.

When controlling environmental impacts, consider health and safety of the employees and wearing the appropriate personal protective equipment (PPE), such as gloves, eyewear and clothing. These PPE guidelines are listed on the material safety data sheet (MSDS) for the specific chemical and material.

Improve. Some environmental impacts within a facility may not require controls because the absence of controls will not impact the environment directly. Nevertheless, these impacts should be continuously improved. Recycling opportunities and energy use are two areas that if improved could help the environment.

Recycling opportunities. Opportunities exist, the first being glass, plastic bottles and

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aluminum cans. The next major opportunity is commingled fiber, which includes cardboard, printer paper, newspaper, magazines, notebooks, etc. Conduct an audit of what is being discarded at the facility as waste; some items may be recyclable, saving waste from the landfill.

Electronics assemblies, subassemblies and individual components may also be recyclable; the determination requires diligence before being deemed recyclable, given hazardous substances and state regulations. Solder dross (lead and lead-free) is one example of material that may be recycled, given its characteristics and metal content.

Other opportunities within a typical manufacturing facility include computer equipment and scrap metal, such as piping, tooling and fixtures. Including the environmental benefit of recycling, a cost payback may be received given the item and supplier. Typically, solder dross and metal will have the two highest paybacks.

Energy use. Most electronics manufacturing facilities have many opportunities when trying to reduce energy use. A few of the main areas to investigate and improve are lighting, equipment and motors. Lighting can be addressed by upgrading fixtures and lights to high-efficiency equivalents and determining if certain areas of a facility can be shut off when not in operation.

Equipment is similar to lighting; determine if the specific piece of equipment can be turned off to save energy. This may make sense for some machines, but not for others. A wave solder machine or a plating bath, for instance, can take several hours to reheat the metals. Given the time it takes and manufacturing build requirements, it may not make sense to switch off such equipment.

Motors are used throughout every facility and are often overlooked. Older motors with higher horse power use the most energy. A new high-efficiency motor will save on energy and may have a payback of less than one year, especially if rebates are available by your local electric company. With any energy project, calculate the cost savings and time to payback the cost of upgrading.

By identifying impacts as detailed above, an operation can deploy controls to eliminate or significantly reduce the impact to the environment. Many opportunities exist within a facility to recycle or for energy reduction. Both help the environment and can result in cost paybacks or reductions.

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