WASTE MANAGEMENT PRACTICES IN PRINTING INDUSTRY
Waste Management

Waste management is one of the biggest environmental issues faced by printers. To determine the best waste management option, from most desirable to least desirable, consider the following waste hierarchy:

• Avoid unnecessary resource consumption
• Recover resources (including reusing, reprocessing and recycling) and recover energy
• As a last resort, dispose of the material safely and lawfully.

By focusing on waste, printers can save money, protect the environment and human health and conserve natural resources. To improve waste management:

• Conduct a waste audit and measure the amount and type of wastes you generate, and work out how these can be minimized.
• Avoid waste by:
  ➢ Using raw materials more efficiently by decreasing off-cut waste and converting more into product
  ➢ Reducing the amount of materials purchased. Hazardous waste is expensive to dispose of and requires approval and transport documents, so it’s a good idea to avoid it altogether by reducing chemical use
• Reuse materials. For example you can use the blank side of used paper for press set up and make ready instead of new sheets
• Recycle materials to preserve resources
• Only dispose of wastes after trying the options above first
Waste Recycling and Reuse

Recycling plays an important role in any printer's waste management program. Materials reported in the literature as being recycled by printers include:

- Paper
- Solvents
- ink containers
- reusable plate
- cylinder boxes
- Pallets
- ink

- Install clearly marked drums on the plant floor.
- Always make sure that the solvent is actually spent before it is exchanged for new solvent.
- The solvents collected from the cleaning operations and recovered from the rags can be recycled on-site or sent to a professional recycler.
- Using returnable/refillable items, when available, can cut down on packaging waste.
- Vendors or suppliers can be requested to provide returnable/refillable containers as part of their contract with the printer.
The three major types of wastes in the printing industry include:

- **Solid Wastes** - In a general printing environment solid waste could consist of the following, empty containers, used film packages, outdated materials, damaged plates, developed film, dated materials, test production, bad printing or spoilage, damaged products, and scrap paper.

- **Wastewater** - Wastewaters from printing operations may contain waste ink, cleanup solvents, photographic chemicals and plate coatings, as well as metals such as silver & iron.

- **Air Emissions** - Printing operations produce volatile organic compound (VOC) emissions from the use of cleaning solvents and inks as well as alcohols and other wetting agents. Larger plants can be the source of $\text{NO}_x$ and $\text{CO}_2$ emissions.
Non-paper substrate (plastics, metals, wood, flexibles, glass, fabric, laminates)
- If you don’t print on paper but use another substrate, the recyclability of that material will be critical to reducing the costs of your operations
- Consider reusing or recycling screen printing frames where possible

Plastics
- Many plastics can be recycled, including shrink-wrap, but some contractors require the plastic types to be separated
- Inks can be supplied in plastic cartridges that are reusable

Metals
- Metals are easily recycled. Separate them into different types to increase their value
- Aluminum printing plates are commonly recycled as scrap metal

Containers
- Purchase products from suppliers that provide a collection, reuse or refill service for containers
- Glass and some plastic containers may be able to be recycled.

Paper
- Keep your presses well-maintained to avoid spoilage
- Set up the presses for optimum performance and train your personnel to achieve minimum make-ready waste
- Seek out the causes of spoilage and try to eliminate them
- Make sure each job is fully signed-off by the pre-press area to avoid waste from proofing, copy or artwork mistakes
- Consider improving efficiency by using a newer press, preferably computer controlled.
- Find out if you can recycle paper or board in two grades. Non-inked or less inked paper can be worth more to recyclers, and if so, could bring you a better return
- Make blank pads from excess paper
Solvents Management

Industrial solvents and solvent-based coatings pose the single greatest risk to the environment in a printing operation. They are toxic, dangerous materials that can cause significant water and air pollution, as well as soil contamination. To determine the best solvent for the job, start at the safer end of the spectrum (where 1 is the safest alternative) only moving to the next level if the solvent does not perform the cleaning job adequately:

1. Non-flammable
2. Flammable
3. Alcohol
4. Acetone
5. Toluene based.

It is recommended that all xylene and benzene based solvents be replaced by one of the lower toxicity solvents mentioned above.

Ways to reduce solvent use and waste:

- Avoid solvents – use soap or detergent solutions wherever possible or use acetic acid-based cleaners.
- Change to lower volatility products.
- Test the new solvent for effectiveness and sell its advantages to personnel.
- Install efficient blanket washing systems that use only a small quantity of blanket wash. For instance, automatic blanket cleaning systems automatically flush inked areas such as blankets and ink rollers with cleaning products.
- Reduce the quantity of solvent or blanket wash used and minimize solvent losses.
- Train employees to use the least amount of solvent possible.
- Wet cloths and paper wipes should be stored in a sealed container after use.
- Capture solvent vapors from the press area using catalytic afterburners or remove the solvent by passing it through activated carbon filters.
Ink Management

Ink-related waste can be due to:

- Inefficient ink-mixing
- Inefficient ink delivery systems
- Poor press quality control
- Inefficient ink recovery from the presses,
- Poor stock control and unsuitable storage conditions

To reduce risks associated with air emissions, printers should consider using new types of ink.

- Water-based inks have low VOC emissions and wash-up waste may be suitable for disposal to the sewer.
- UV-cure inks generate less waste and have lower VOC emissions. These inks are available for lithographic, screen printing, gravure and flexographic printing processes.
- Newer inks based on vegetable oils and pigments are more environmentally friendly and may require a non-flammable solvent for obtaining the correct operating viscosity, thus further reducing VOC emissions.

Ways to reduce ink waste and improve productivity

- Change from tins to plastic cartridges.
- Use computer-based ink management systems to keep track of ink in your inventory and produce recipes for PMS colors from excess stock.
- Mix excess ink, including black and colored inks, to produce usable ink.
- Mix excess ink with virgin ink of the same color – if the excess ink is contaminant free.
- Install a computerized color matching system equipped with color scanners if the volume is large enough.
- Investigate with suppliers the possibility of re-working older inks on-site.
- Fill ink fountains according to expected needs, as opposed to routine filling.
- Keep lids on ink tins to ensure longer storage life.

If your solvents contain certain chemicals equal to or above 10% before use, they are listed hazardous for disposal. Some of these chemicals (look at your MSDSs to find) are:

• Acetone
• Benzene
• Chlorobenzene
• Cyclohexane
• Ethyl acetate
• Ethyl benzene
• Ethyl ether
• Methanol
• etc

As a rule, hazardous wastes cannot go to landfill or be discharged to the sewer or storm water system. These wastes are highly toxic and will damage the environment if not dealt with appropriately. For example rags that are soaked with inks or oils generally cannot be sent to landfill. If you are a generator of hazardous waste you are responsible for ensuring that it is transported to a facility that is licensed to receive and/or treat that type of waste. When sending hazardous waste for treatment or disposal, make sure that:

✓ The transporter is appropriately licensed
✓ The waste is being sent to a facility that can lawfully take it
✓ You keep all collection receipts
Air Emissions Management

The European Commission’s package of proposals to fight climate change includes reductions in greenhouse gases of at least 20% by 2020 (compared with 1990 levels). European industries have an important share in reaching this target.

**Minimize VOCs**
- Change the printing process to one that uses fewer solvents. For example, waterless printing reduces VOC emissions because fewer chemicals are required
- Maintain printing equipment:
  - Keep ink rollers clean and in good condition
  - Clean presses immediately after use to prevent a buildup of ink, paper dust and lint

**Reduce other air emissions**
- Control and clean up dust. Controlling paper dust and printing powders will improve indoor air quality
- Find out if CFCs are used in your refrigeration and air conditioning equipment. If they are, make sure this equipment is well-maintained. It is an offence to allow these gases to escape to the environment. Replace CFCs used in your refrigeration and air conditioning equipment with ecological Freon (e.g. R410)
- Replace any BCF fire extinguishers on-site
- Don’t burn waste. It’s against the law to burn any rubbish on-site, including paper, solvents or wood
Noise Management

To improve noise management:

• Take a regular walk around your premises and the neighboring area to monitor noise from your business activities, especially hums or rattles from units located on the outside or rear of your building as these may not be noticeable from the inside

• Make contact with your neighbors – build a working relationship so that any concerns about your operations that may arise in the future can be readily addressed

• Be mindful that background noise levels can be reduced after normal business hours and the noise of your operation could therefore seem louder to neighbors

• Consider noise reduction measures such as shielding or muffling of noisy equipment and machinery.

• Locate noisy equipment away from doorways

• Find out about low-noise options when you purchase new equipment

• Avoid using telephone extension bells or public address systems
Consumption

Water consumption

Major water uses in the printing industry may include washing/rinsing/hosing, product ingredient, air conditioning systems and boilers. There are significant benefits that can be realized through becoming more water efficient. These include reductions in:

• Costs – water, wastewater discharge and wastewater treatment, maintenance. The cost of water is not just the cost of purchase but includes, handling, heating, holding, treating and discharging

• Energy consumption - energy and water costs are very often linked, e.g. reducing hot water for cleaning saves heating costs as well

• Wastes – wastewater treatment often results in the generation of prescribed wastes, which are costly to dispose off

Energy consumption

Many printing processes require large amounts of heat and mechanical power most of which is delivered as natural gas, petroleum fuels and as electricity. Energy efficiency is the goal of efforts to reduce the amount of energy required to provide products and services. Improvements in energy efficiency are most often achieved by adopting a more efficient technology or production process.

There are various motivations to improve energy efficiency. Reducing energy use reduces energy costs and may result in a financial cost saving to consumers if the energy savings offset any additional costs of implementing an energy efficient technology. Reducing energy use is also seen as a key solution to the problem of reducing greenhouse gas emissions.