



HINTS AND TIPS FOR IMPROVING RESOURCE EFFICIENCY IN YOUR BUSINESS

Publication 1255 October 2008

EPA Victoria has assembled a range of hints and tips aimed at assisting you to improve the resource efficiency in your business.

These tips will help identify ways to improve business environmental performance while increasing productivity and reducing costs of production. Resource efficiency is often a cheap and fast way to solve problems as reducing waste will reduce the size and cost of any subsequent treatment process and/or disposal costs.

Your business can look forward to:

- Increased cost saving
- Process efficiency
- Improved occupational health and safety management
- Enhanced shareholder relations
- Improved reputation.

The hints and tips have been grouped for ease of reference and the broad categories are listed below. They are intended to help you focus on specific areas in your business and guide your subsequent actions.

The impacts of any actions on other resources should always be assessed prior to implementation. Please use this document in conjunction with the *Environment Resource Efficiency Program Toolkit*, which can be found on EPA Victoria's website.



WASTE ASSESSMENT

If it's your factory, it's your waste and it's your money!

One way of assessing your current environmental performance is to conduct a waste assessment. A waste assessment will help you to better understand where your efforts will gain most value.

What is the purpose of a waste assessment?

The main aims of a waste assessment are to:

- Identify each waste stream on or leaving the site.
- Quantify and characterise each waste stream to establish benchmark data.
- Establish how and why each waste stream is generated.
- Calculate costs incurred with treatment, storage, handling and disposal of wastes, including quantifying associated labour, energy, water and lost raw material costs where possible.
- Determine liabilities associated with waste generation.
- Identify options for more efficient and effective waste management (for example identify reduction/diversion opportunities).

What's involved?

The following are the key tasks involved in a waste assessment:

- Select waste assessment team – this should include at least one company employee.
- Determine audit scope – this depends on size of assessment required and parameters set.
- Collect available data.
- Identify and characterise waste streams.
- Evaluate data.
- Identify and prioritise options.
- Prepare a report and plan of action.

What happens?

There are three main stages involved in a waste assessment. These are:

1. Preliminary assessment - aims to identify major environmental issues, major opportunities for improvement and major economic issues.
2. Detailed study and improvement plan - aims to find the best options for minimisation in the site.
3. Monitoring and review - aims to monitor and confirm the indicators and targets previously established.

Waste involves the manufacture and discharge or disposal of things that cannot be sold at a profit. The cost of waste management and disposal is almost always much less than the value entrained in the waste. By finding the lost dollars, you will identify the waste reduction and profit increasing opportunities.



IMPROVE PURCHASING

Cleaner production starts with cleaner procurement

By improving your purchasing, your resource use and waste output will be reduced. Buying recycled materials can reduce the amount of waste sent to landfill.

Improve purchasing to...

Reduce waste production

- Match package quantities to your batch sizes to avoid over ordering of raw materials.
- Investigate whether a different raw material would produce less waste.
- Set environmental standards for your suppliers, their products and services, and request substantiation of their claims. There should be no premium for this.
- Check for damaged or tainted goods when received as these are a source of costly waste.
- Ask your suppliers to accept their empty drums in return for full ones.

Reward waste minimisation

- Purchase recycled materials where possible, if you do not 'buy recycled', you're not recycling.
- Give preference to products that are designed for long life, are reusable or recyclable, and are made and packaged with minimum material.
- Consider service contracts with a definable process outcome (for example, a clean, safe, efficient cooling tower) rather than chemical inputs regardless of effect.
- Ask your supplier to help you reduce chemical usage, and share the savings.
- Produce efficiency benchmarks for the use of raw materials with the help of your suppliers.
- Avoid buying new products or services, which will increase the risk to your business.



IMPROVING STORAGE

Improvements can be made to...

Storage

- Only store what you need. Good inventory management can save money.
- Keep all storage areas uncluttered, clean and clearly labelled.
- Ensure that materials in storage cannot collect, contaminate or mix with rainwater.
- Ensure storage tanks, including those underground, are not leaking.
- Store all materials and wastes in separate clearly designated areas.
- Store hazardous materials undercover and on a sealed surface, ideally in a bunded area. A bund is a hump around a work or storage area that prevents oil, water, and other fluids from escaping to stormwater drains. Bunds are usually permanent installations made from concrete or steel, but they can also be portable plastic or rubber construction.
- Keep storage areas well ventilated.
- Ensure chemicals cannot react with others stored nearby. For example, battery acid should not be stored beside brake fluid as they can react violently.
- Ensure that your store always operates on a 'first in, first out' basis, so that old materials and packages do not accumulate in your store.
- Check expiry dates for all stored materials.
- Use drum pumps and/or filters to completely drain drums before their return to the supplier, alternatively triple rinse drums and other containers and recycle them.
- Avoid keeping empty containers, unless they have a specific use.
- Establish clearly signed, segregated areas for appropriate storage of all equipment, materials and wastes.
- Ensure storage of materials only occurs in designated areas.

Housekeeping

- Establish and enforce standards for housekeeping.
- Identify activities that add value to your business to improve time efficiency.

Minimise waste

- Only stockpile wastes if this enables more cost effective recycling.
- Avoid accumulation of unnecessary items - if you do not need it, get rid of it.
- Ensure all employees are responsible for the waste they produce.
- Make sure your staff know what to do with any wastes they produce.
- Look at what other industries, or companies within your industry, are doing.

Spill response

- Keep a spill kit easily and quickly accessible in your chemicals storage area.
- Ensure spills are cleaned immediately with a spill kit, and recycled or disposed of correctly.

If you manage storage properly you can improve workplace safety, reduce risks to the environment and save money through reduced storage losses.



CONSERVING ENERGY

Using less costs less

If you reduce your energy consumption you can save money and reduce greenhouse gases caused by burning fossil fuels.

Improvements can be made...

In the workplace

- Turn off all lights and equipment when they do not need to be operating.
- Use energy efficient office equipment and power saving functions where they will be most effective.
- Use the most efficient motors, make sure equipment is the right size for the job, that is, not too big.
- Use the most efficient lights – triphosphor tubes are cheaper to run than fluorescent lights.
- Replace incandescent globes with fluorescent tubes to save power as well as reduce air conditioning loads and reduce labour needed to change globes.
- Install skylights in the roof or walls to reduce the need for artificial lighting.
- Minimise expenditure on space heating. At 20 °C, a 1 °C increase can cost about 20 per cent more.
- Insulate rooms to minimise energy waste.
- Fit self closing doors to reduce heat (or cold) loss from draughts.
- Consider installing a co-generation plant to reduce energy costs and increase energy efficiency.
- Minimise the use of hot water as it costs much more than cold water.

In the process

- Improve insulation of all hot process items and steam lines to minimise simple heat loss.
- Remove frost on refrigerated coolant lines through better insulation. This will keep the ice where you need it and where it can add value to your business.
- Avoid steam leaks. A 1 kg/min steam leak costs about \$1/hour and \$2/hour in an air-conditioned space.
- Find ways to transfer heat from hot process streams into cold streams.
- Ensure your boiler is tuned properly and that blowdown losses are minimised. Improved feedwater quality (for example rainwater) may help reduce blowdown losses.
- Require suppliers to quote the energy consumption and costs of a new piece of equipment.

When choosing energy sources

- Investigate alternative energy sources such as solar hot water, waste, bio-ethanol and wind energy.
- Use a clean fuel such as LPG or methanol.
- Use fuels with the least greenhouse impact.
-

Methane	LEAST
LPG	
Oil	
Diesel	
Black coal	
Brown coal	MOST



CONSERVING WATER

Don't spend money like water, spend water like money

The way you use it or waste it, water is in your hands...

To save water...

Reduce

- Determine the minimum volume of water you need. Compare your performance to others and make improvements where possible.
- Fix dripping taps and leaking pipes – a dripping tap wastes more than \$100 a year.
- Install water saving accessories around your business, contact your local water authority for ideas.
- Compare water usage on volume per unit production, not per unit time (for example, use litres/bottle of soda, not litres/minute).
- Avoid using water wherever possible – use a dry technique such as a broom, vacuum cleaner or compressed air jet.
- Use a dry method as a materials conveyor instead of water.
- Use counter flow rinsing with as many rinse stages as possible, as most contaminants are removed in the first rinse. Two short rinse stages are much more water efficient than one long one.
- Minimise contaminant 'drag out' to additional rinse stages by optimising your counter flow rinse system.

Reuse

- Determine the cheapest way to treat wastewater. It may be more profitable to treat the water for reuse rather than disposal.
- Investigate the possibility of rainwater harvesting for use as boiler feed or cooling tower makeup. This can be a cost effective way of reducing water related costs such as reducing the size of drainage systems in new structures.
- Account for all losses involved in the disposal of water. Heat, chemicals, labour and plant capacity may also be thrown away.
- Consider using wastewater for lower grade uses where water quality does not have to be so high (check, however, that it does not compromise product quality).



PRESERVING WATERWAYS

To preserve the waterways...

Protect the drains

- Ensure that all stormwater drains and sewer entry points are correctly and clearly marked, and protected where appropriate.
- Ensure that all staff know the difference between stormwater and sewer.
- Fit litter traps onto stormwater inlets to stop rubbish going to the local creek.
- Identify stormwater drains to reduce accidental discharges to the local creek.
- Prevent sediment from construction sites entering stormwater drains by using straw bales or fabric filters.
- Ensure that all waste streams including wash pads, triple interceptor traps, and filter separators are not connected to stormwater drains but are connected to the sewer, where appropriate, in accordance with the trade waste agreement with your sewer authority.
- Make sure all rainwater downpipes connect to stormwater and not to the sewer.
- Prevent contamination of rainwater by roofing over areas where spills can occur.

Control washing and spills

- Avoid washing equipment, transferring chemicals, opening liquid containers and filling tanks where spillage could flow to a creek or stormwater drain.
- Use a broom and dust pan (that is, dry methods) instead of hosing down paved areas.
- Keep large exterior work areas clean to significantly improve water quality.
- Never tip oils, paints, solvents or any pollutant onto the ground or down a drain.
- Prevent spilt materials or wastewater from flowing into stormwater drains.
- Store wastes, oils and chemicals where spills cannot contaminate stormwater.
- Ensure your staff can quickly and effectively block your stormwater drains in an emergency.
- Be prepared for spills and respond to them immediately (do not hose them away).
- Use a tray or bucket to catch spills under work areas.
- Keep machinery clean to identify and rectify faults or leaks.
- Keep a spill kit on site for cleaning up any spills.

Unless you ensure that only clean stormwater flows from your site you could be causing pollution in nearby creeks and rivers.



REDUCING WASTE

Segregated waste can often be recycled and may be a valuable product for another business

Remember the 3 Rs...

Reduce

- Quantify the waste you produce. Waste is the difference between the materials you pay for and the materials your customer pays for.
- Account for the difference between the tonnage of raw materials and the tonnage of products you produce. This will allow you to identify reduction opportunities.
- Examine each process step to determine where wastes are produced and to devise measures for waste prevention or reduction. Many wastes occur because of process inefficiency.
- Calculate the theoretical minimum waste production from your processes. You should aim to keep within 10 per cent of this figure.
- Devise ways of reducing your waste with your employees and suppliers so they too can share in the savings, for example rewards for employees and suppliers who reduce waste.
- Remember, your waste management contractor is a key supplier for assisting with waste minimisation. Ask them how they can help and work in partnership.
- Keep a running tally of waste production so you can track your improvement. Make sure you include internal wastes such as rework and recycle streams.

Reuse

- Reuse drums and containers where possible. Ask suppliers to exchange empties.
- Identify ways of reusing materials in the process at different stages, for example recirculating cooling water.
- Identify possible ways of selling your waste to other organisations for their production processes. This information can be found through Sustainability Victoria.

Recycle

- Segregate wastes wherever possible – this will aid recycling and provide an indication of why waste is forming (do not mix waste streams).
- Investigate alternative uses for organic waste that cannot be reduced or reused, for example compost or convert the waste to energy.
- Divert recyclable wastes from the general waste bin, identify recyclers or waste disposal contractors and organise regular collections.
- Join with neighbouring businesses to get common wastes recycled cost effectively and talk to your waste contractor about cost off-sets by efficient serving of the area.

Less waste = less pollution = less effort = less cost



REDUCING RISK

Prevent pollution and minimise risk by...

Improving management

- Keeping up-to-date and accurate records.
- Regular maintenance programs.

Assessing chemical use

- Substituting toxic materials with non-toxic materials where possible.
- Insist on a material safety data sheet (MSDS) from suppliers before accepting and new batches of chemicals. This will explain the safety and environmental measures that are required to store and use the product properly.

Training

- Train staff to handle materials as directed by the information on the MSDS.
- Ensure staff know who to contact if they encounter an environmental problem beyond their capability.
- Provide adequate training to employees in all aspects of their roles including environmental management skills and obligations.

Using correct storage techniques

- Ensure lighting is adequate to avoid accumulation of mess and to allow fault detection.
- Store materials where a spill cannot contaminate the soil.
- Store liquids indoors or undercover, on a sealed surface and within a bunded area.
- Store oils and chemicals in closed containers.
- Maintain stock levels of raw materials and wastes below one month's production needs.
- Keep a list of all chemicals stored, together with their material safety data sheets MSDS.
- Ensure chemicals cannot react with others stored nearby. For example, acids should not be stored beside alkalis as they can react together violently.
- Include planning for fire and other emergencies when planning storage locations.

Correct handling and disposal techniques

- Make sure you know where every type of waste should go - talk to your waste contractor, neighbouring companies or contact EPA if you are unsure of your environmental responsibilities.
- Develop a management or removal plan for any asbestos or polychlorinated biphenyls (PCBs) that maybe in the structure or equipment of your factory.
- Dispose of materials using a reputable and correctly licensed contractor.
- Ensure unwanted substances are disposed of promptly, in accordance with EPA guidelines.
- Organise a specialist contractor to remove old/suspect stock.
- Develop handling methods for chemicals that minimise potential for spillage.
- Ensure that all staff have an appropriate level of induction and operational skills training to fulfil their duties safely and efficiently.

By identifying the risks in your business due to the storage of oils, fuels and chemicals, the potential costs and chance of air, water or soil pollution can be reduced.



IMPROVING INFORMATION

Improvements can be made to...

Measurement

- Measure and track your usage rates for energy, water and ingredients.
- Ensure that your suppliers measure, and are accountable for, the quality of their product or service, including environmental impacts.
- Define the optimum start up conditions for each process, and train staff to minimise start up losses.
- Measure what you sell or package and ensure you do not give your product away.
- Assess your environmental performance regularly.

Recording

- Keep maintenance/material safety data sheet manuals in an easily accessible place (and keep them up-to-date).
- Keep current records up to date and manage your historical records effectively.

Reporting

- Devise reports in terms of products that you sell. For example, litres of water per tonne of product, or kilograms of waste per tonne of product.
- Track usage rates of raw materials, for example, product yields, number of spills and waste output rates.
- Develop a system to record your measurements, and determine full cost attribution for each waste product (that is, know how much each waste really costs).
- Be consistent when taking and recording measurements.
- Establish regular reports for major resource consumables including water and energy. Report all consumption by a per unit production basis, not by time (for example, litres of water/unit of production not litres of water/minute).

By measuring the rate at which resources are consumed and wastes produced, you will be able to manage improvement in your business, particularly in increasing efficiency and reducing waste...and proving it!



IMPROVING SYSTEMS

Managing compliance is managing waste, managing efficiently will ensure compliance

By developing and documenting sound work systems and procedures (such as an environmental management system), you can ensure that you are in control of your business and are less likely to experience failures, unexpected wastage or non-compliances.

Improvements can be made to...

Systems management

- Identify and assess environmental impacts of your business activities - a good way to start is to conduct a waste assessment.
- Review the effectiveness of all existing controls and work instructions.
- Identify what issues that need to be addressed and what practices need to be changed, and record this information.
- Develop an effective waste management plan as a minimum.
- Devise procedures and plans to reduce environmental impacts.
- Establish an environmental policy (that is achievable in your business) and communicate it to staff and external stakeholders such as suppliers and customers.
- Consider integrating environmental management activities into existing systems such as quality and/or safety.
- Plan for emergencies, develop contingency plans for potential incident scenarios.
- Measure and monitor your environmental performance on a regular basis.
- Involve staff, suppliers, customers, local community and other stakeholders in developing a long-term environmental improvement plan for your business.
- Consider establishing an environmental management system to ISO 14001 standard.

Staff responsibilities

- Ensure environmental management is an integral part of your business responsibilities.
- Form a cleaner production team and nominate a team leader.
- Brainstorm with the team (and other staff if possible) to develop a list of improvement options for eliminating or reducing wastage.
- Integrate environmental responsibilities such as for materials and energy efficiency into position descriptions.
- Use trained staff (or train your staff if required) to undertake monitoring of environmental performance and to review your systems on a yearly basis.



REDUCING ODOUR AND AIR EMISSIONS

There are simple ways to reduce or eliminate odour and/or other air emissions, including...

- When working with solvents and odorous materials, use a fume hood or spray booth to reduce the vapours leaving the area.
- Closing doors and windows of the premises when using odorous materials.
- Using low odour products and materials.
- Minimising the quantities of solvents and other volatile materials used.
- Seeking advice on reducing odour emissions or other such air emission issue.
- Remembering that odours can be irritating to neighbours and other commercial/industrial premises in the vicinity, so improve communication with neighbours to avoid conflict.
- Improving housekeeping.
- For dust, improve communication with neighbours and 'damp down' dusty surfaces/materials.

Many air emissions may be negligible in terms of quantity, but they may still provide an odour that is irritating to others nearby.