

# RESOURCE EFFICIENCY IN THE IRISH PRINT & PACKAGING SECTOR



Rialtas  
na hÉireann  
Government  
of Ireland



NATIONAL WASTE  
PREVENTION PROGRAMME





# FOREWORD; PRINT AND PACKAGING FORUM



Dr. Kevin Byrne



Over recent years, Irish printing and packaging firms have been seeking to reduce costs and achieve a more competitive position. Environmental sustainability and awareness can create significant, unseen savings for most firms. If approached holistically, these savings can be sizeable, and in turn can add to the bottom line on an on-going basis.

With the diversity of firms operating in the sector, there is no definitive formula, that is applicable to all firms and therefore no one-size fits all solution. This booklet is a guide for firms, to allow them identify relevant areas of saving and the best environmentally sound solution for their specific needs.

The Print and Packaging Forum wish to thank the Environmental Protection Agency, Flannery Nagel Environmental, Green Business and Clean Technology Centre Cork for their assistance with this process and the production of this guide.

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*This document was published by CTC of behalf of/with the support of the EPA's National Waste Prevention Programme through the Green Business initiative which ran from 2008 to 2018*

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# CONTENTS

INTRODUCTION	1
ORGANISING A RESOURCE EFFICIENCY (RE) PROGRAMME	2
RAW MATERIALS	4
WASTE MANAGEMENT	8
ENERGY EFFICIENCY	10
WATER MANAGEMENT	18
'GREEN' PROCUREMENT AND ECO-LABELS	20
FURTHER GUIDANCE AND LINKS	23





# INTRODUCTION

This Resource Efficiency Guide aims to help the Irish Printing and Printed Packaging sector to save money, use resources more efficiently and improve environmental performance.

The objective of this guide is to motivate businesses to view resource efficiency (RE) as a way of increasing company profitability and competitiveness. In a time where profit margins are under pressure, and customers are looking at environmental credentials as a deciding factor for contract award, it makes sense to look at your operations with a critical eye, find ways to save money and at the same time increase your competitive edge. Most of the improvement measures in this Guide only require a little constructive thinking, time and effort, rather than significant expenditure.

This Guide has been produced following a Green Print and Packaging Initiative, 2012-2013, funded by the Environmental Protection Agency under their Green Business Programme, and supported by the Irish Print and Packaging Forum. The information in this booklet is based on current Best Practice identified from international research, commendable processes observed in Irish companies during the programme, as well as the experience of the Green Business advisors involved in the programme.

Ten Printing and Printed Packaging companies across Ireland took part in the programme by availing of free Resource Efficiency Assessments (REAs) and environmental advice. The organisations visited during the programme included large and small companies working in offset lithographic, screen, flexographic, digital and envelope printing.

This Guide aims to be as generic as possible and should be of help to a wide range of companies across the sector.

## **Resource Efficiency Saves Money!**

Regardless of size of facility, resource efficiency aims to get the most out of the energy and materials used whilst also reducing waste bills and minimising process costs.

As various case study examples from the Print and Pack Programme have shown, implementation of the recommendations in the Guide will help to reduce costs and thus increase profits or make you more competitive in the marketplace.

Many printing companies that we worked with have saved five or six figure sums annually through resource efficiency measures.

## **National and International Drivers of Resource Efficiency in Printing**

Drivers of resource efficiency (RE) for the sector, aside from cost reduction and compliance, include the Irish Government “Green Tenders - an Action Plan for Public Procurement”, of March 2012 and “A Framework for sustainable Development for Ireland - Our Sustainable Future” policy document (DECLG, 2012) Customers in general are requiring increasingly high environmental performance from their supply chains. It is important to make demonstrable changes and to advertise your green credentials to potential customers. This is where certification or participation in recognised standards and programmes is of particular benefit.

**For further information on green procurement, eco-labels and environmental standards see page 20-23.**



# ORGANISING A RESOURCE EFFICIENCY (RE) PROGRAMME

All aspects of your business require some degree of management and structure. In order to successfully manage your resources and costs, it is recommended that your business adopts a simple resource efficiency management system. Remember, people are the main drivers of a successful resource efficiency programme.



## 1. Management commitment

For a programme to work, both management and staff must be committed to the programme. Management in particular must be convinced that the investment of staff time and finances in the area of resource efficiency is necessary.

Commitment is driven by cost saving, legal, environmental and social responsibility perspectives.

## 7. Review improvements

Through regular monitoring, you should be able to identify improvements made by your actions. Check how you are progressing in terms of meeting quarterly or annual targets set out. Review of the savings actually achieved as against the expected savings. Review your action plan and improvements regularly. Don't forget to tell people how the project is going, and most importantly don't forget to reward people for improvements made!



and so the journey continues...

## 6. Implement Action plans

Implement the action plans and involve staff. Ensure action plans are reviewed on a regular basis at Green Team Meetings. Involve your suppliers, who may be able to assist in helping you to be more efficient. For example, you can talk to your suppliers about reducing unnecessary packaging with deliveries.





## 2. Establish a Business Efficiency Green Team

A green team, which includes both staff and management, is a good way to manage any programme. The Green Team should consist of a core group of employees who have a direct influence on resources or have relevant skills or expertise. Typically representatives could be included from finance, maintenance, shop floor; and general management. The Green Team can be big or small - depending on the size of your business.

The green team can:

- Develop action plans and targets relating to energy use, water use and waste prevention.
- Develop training and awareness raising initiatives.
- Review actions taken and consider their effectiveness.



## 3. Review and identify

The assessment phase of a prevention programme is important in order to paint a picture of 'where we are now' so that the team can plan for 'where we want to go'. When you have collected information on your energy use, water use and waste generation you'll be able to set benchmarks.

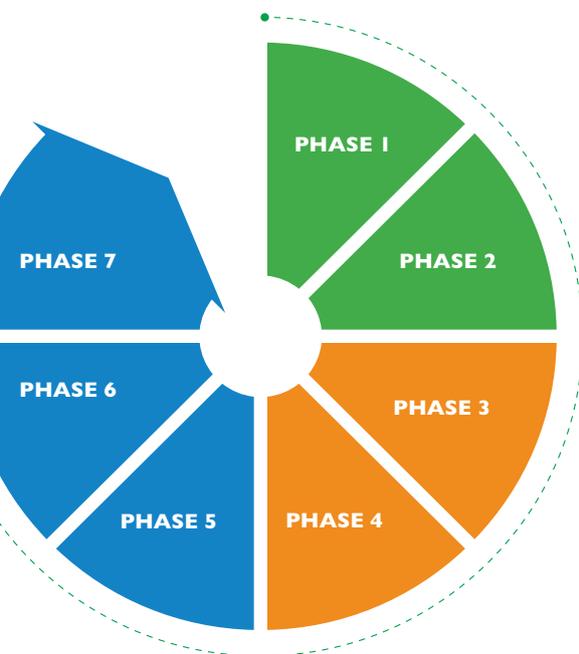
## 4. Create action plans

Create action plans for energy, water and waste. You should set out clear actions, the date you wish to achieve them by, and who will take charge of completing the task. Estimate expected costs and the savings that for each action (savings both financial and environmental). Remember to set realistic goals in order to help keep people motivated for continuous improvements.



## 5. Create awareness amongst staff through training

Training is a vital part of any programme. Staff should be aware of the RE action plans and specific ways in which they can help achieve targets set out. Training can cover areas such as waste prevention and segregation, procedures for use of equipment, lighting, and efficient use of water. Remember to listen to all your staff. There may be some very innovative ideas amongst the group.



# RAW MATERIALS

## Introduction

Raw materials are the highest cost for most printers. The more efficient use of these raw materials is often the best way of improving profitability. If the same product can be manufactured using less substrate, fewer plates, less ink and less solvent, this will have an immediate and positive effect on the bottom line. Less use of materials should also enable a reduction in energy and water consumption, labour costs and disposal costs.

In addition, cost is accrued from purchasing packaging material for the final product. This includes shrink wrap, cardboard, final product labels and pallets. Even where recycling can provide good rebates, e.g. for waste paper or aluminium, there is still a net cost to the business and it is far better to reduce usage at source rather than recycle.



## Typical Raw Material Costs

Item	Typical Cost Range €
Paper	€ 0.9 – 2.2 per kg
Board	€ 1.5 – 2.0 per kg
PVC/ Foil	€ 3.5 – 4.5 per kg
Ink	€ 5.5 – 15.0 per kg
Binder Adhesive	€ 4.0 - 5.5 per kg
Aluminium Plates	€ 7.0 – 10.0 per plate
Solvents and Cleaners	€ 2.0 – 4.0 per litre

The table above shows some typical raw material costs for the print and packaging sector. When scaled up, significant savings can be made by improved resource efficiency. The examples on the next page give some idea of the scale of potential savings.

## CASE STUDY



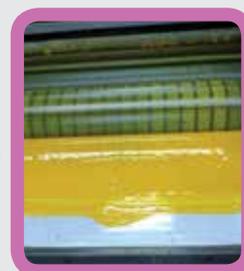
### Chesapeake Pharmaceutical & Healthcare Packaging Westport

€140,000 potential savings were identified through a range of resource efficiency measures including the reuse of plates.

[www.greenbusiness.ie](http://www.greenbusiness.ie)

### Material Usage and Cost Saving Example 1

**ALUMINIUM PLATES:** Most litho printers now use 'Computer to Plate' (CTP) technology, whereby the aluminium plate is directly etched from a computer image. The speed and relatively low cost of making new plates has reduced the need to gum and store aluminium plates for reuse. However, new plates are expensive at €7 – €10 per plate (2012 prices) with the rebate for recycled aluminium only around €1 to €1.50 per plate. Typically around €7 to €8 is lost with every plate that is only used once.



**Example:**

If 25,000 plates are used per year, each with a net cost of €8, this equates to a net loss of €200,000/ annum. Even a 10% reuse of plates would save **€20,000** per annum. Simpler plates for repeat jobs are a good choice as they are less likely to develop faults after gumming/clean down.

### Material Usage and Cost Saving Example 2

**INKS:** Ink is costly and in many facilities ink is being discarded when it is still of good quality. This may be because too much ink is made for a job and small amounts of remaining ink in the tub are thrown out. Opportunities often lie in the improved use of job forecasting tools and in the proper storage, labelling and reuse of leftover inks.



**Example:**

One screen printing company wasted 120 tonnes of ink per year worth €60,000 due to over-making, mixing losses and clean down losses in pipes. Over 50% (**€30,000**) of this was saved through more careful forecasting of ink needs for a job.

### Material Usage and Cost Saving Example 3

**PAPER / SUBSTRATE:** Substrate can be very expensive. Sites visited had 3% to 10% wastage allowance which had often been unchallenged for many years. Inadequate stock control and careless storage (e.g. damp conditions) and handling can lead to avoidable wastage. In addition, make-ready paper can often be reused. Even a small percentage saving on paper raw material could add tens of thousands to your bottom line.



**Example:**

Annual Paper Cost: €1,150/t average paper stock x 2,500t annual paper use = €2,875,000 2% Saving = €57,500. At one company, they were throwing away a wad of top and bottom sheets off every stack irrespective of whether they were damaged, costing the company over **€4,000** per annum.



## MATERIAL REDUCTION - TOP TIPS

Numerous measures can be taken to improve material efficiency and reduce costs.

PROCESS	SUGGESTED ACTIONS
Plate Reuse	<ul style="list-style-type: none"> <li>• Introduce a dual system that allows simpler plates for repeat jobs to be kept for reuse (where the risk of faults is minimal) and other plates to be recycled.</li> </ul>
Ink Reuse	<ul style="list-style-type: none"> <li>• Set up a good ink management system with bar-coded stock control and a responsible 'ink manager'.</li> <li>• Any left-over ink should be scraped back into the tin or into the main ink dispenser/reservoir.</li> <li>• Excess 'spot' inks should be stored for reuse and bar coded to assist tracking.</li> <li>• Use out of date/spec inks, e.g. for set-up/make ready.</li> <li>• Consider re-blending waste inks. Invest in colorimetric spectrophotometry to enable re-blending of opened ink tubs for reusable spec and colour.</li> <li>• Don't allow operators to manually remix by eye as this generally leads to quality issues and wastage.</li> </ul>
Booklet Binders and Adhesives	<ul style="list-style-type: none"> <li>• Where adhesive fluids are applied by roller, allow the reservoir to run to its lowest level and minimise top up prior to time-related change-overs (as the adhesive goes off with time).</li> </ul>
Preventative Maintenance and Clean Down	<ul style="list-style-type: none"> <li>• Schedule print runs to reduce the need for cleaning and the wastage related to start-ups.</li> <li>• Clean as you go - Use spray bottles and cleaning solutions that penetrate and remove inks from screens/plates/rollers.</li> <li>• Periodically remove rollers from the press and do a deep clean, using rags and cleaning solutions.</li> <li>• Dispense solvents in an accountable and controlled way, i.e. through measured amounts.</li> <li>• Avoid open-top solvent baths as these use large quantities of solvent compared to wipe down methods and also allow evaporation of solvent.</li> <li>• Where a cleaning/degreasing bath is required, ensure that it is fully enclosed. Ultrasonic on baths can help to make cleaning more effective and reduce solvent use.</li> <li>• In screen printing use enclosed screen cleaning machines that recover wash chemicals or otherwise a high pressure hose system. The latter will clean screens more quickly with less solvent use.</li> <li>• Consider investment in a solvent recycling / distillation unit. This allows solvent from press wash-down to be cleaned and reused. Depending on current solvent use and size of distilling unit, the investment may be repaid within a year.</li> <li>• Keep solvents and rag bins lidded at all times.</li> <li>• Use cleaning rags several times, rather than disposing if only a small corner is dirty.</li> <li>• Where possible send wipes off site for cleaning and return for reuse.</li> </ul>
Packaging	<ul style="list-style-type: none"> <li>• Where possible obtain materials from suppliers in returnable and reusable containers.</li> <li>• Try and buy in bulk where this won't increase the risk of material (e.g. ink) wastage.</li> <li>• Reuse cardboard packaging from suppliers for on-site storage or outgoing final product packaging where possible.</li> <li>• Minimise use of pallet wrap, for example by using a semi-automated turntable wrapper to optimise 'roping' overlap.</li> <li>• Consider using pre-stretched stretch wrap that goes further for manual application or optimise wrap tension on the pallet wrapper.</li> <li>• Investigate printing directly onto product boxes (using a laser printer) rather than onto additional labels.</li> <li>• Investigate reuse of pallets or join a pallet leasing scheme like CHEP (blue pallet).</li> </ul>





PROCESS	SUGGESTED ACTIONS
Plate Making and Production Planning Associated	<ul style="list-style-type: none"> <li>• If you don't have it, consider investing in 'Computer to Plate' or Screen (CTP/CTS) technology. This saves; Water use/Effluent bills, Chemicals use, Film and Aluminium (fewer scrapped plates).</li> <li>• Make the most of associated software such as CIP3/4 Print Production Format (PPF). This can reduce waste through; Automatic setting of ink fountains/keys on the press, Plate size and mounting position on press, Separations required for the job, Positions and colours of colour test strips, Positions of registration marks, Positions of fold and cut marks.</li> <li>• Optimise your production planning to reduce wastage by: making use of print estimator tools; calculating the optimum production method for the finished spec; using software (e.g. METRICS Imposition) that optimises layout of single job on plate; gang printing of more than one job at a time and making use of software to optimise job groupings (i.e. ganging).</li> <li>• Make sure that bar codes and other job markings take up the minimum of space, e.g. on the edge trim rather than between jobs.</li> </ul>
Substrate Choice and Handling	<ul style="list-style-type: none"> <li>• Do not automatically discard the top and bottom layers' of a stack.</li> <li>• Review storage, packaging and handling.</li> <li>• Ensure you use a First in First Out policy.</li> <li>• Undertake forklift driver training to prevent damage.</li> <li>• Use bespoke sheet sizes where possible to reduce edge trim.</li> <li>• Minimise paper thickness – where it doesn't affect product quality.</li> <li>• On web, optimise use as close to the end of the roll as possible: identify where the creasing risk really starts. Alternatively consider installing/adjusting a laser sensor to allow the core to be run down further than the current set up.</li> </ul>
Make Ready	<ul style="list-style-type: none"> <li>• Don't just rely on press manufacturer's settings or 'last equivalent job' e.g. for ink key settings and registration.</li> <li>• On repeat/equivalent jobs, use historic data from the press to give better averages (e.g. PPF data).</li> <li>• Store and reuse best of make-ready paper for next job set-up.</li> <li>• Use leftover / slightly damaged stock for set-up.</li> <li>• Use rebled/ out-of-spec inks for initial set up.</li> <li>• Introduce a sheet wastage KPI (from press count data) for benchmarking purposes (internally, from job to job) – often the only measure is make ready time which can result in set-up wastage.</li> </ul>
Inks and Solvents	<ul style="list-style-type: none"> <li>• Use low VOC inks, such as water-based/UV cured inks where possible.</li> <li>• Think about whole life costing. For example, UV inks for screen printing are higher cost but can offer: Faster drying; higher productivity; easier screen cleaning; less extraction/ventilation required; avoided need for pollution control equipment; improved print quality; Payback under 3 years.</li> <li>• Use low IPA dampening or waterless printing where possible.</li> <li>• Forecast ink quantities carefully using software based on historic use data on the same or equivalent jobs. Buy small volume colours in 2.5kg tins/tubs to reduce the risk of wastage.</li> <li>• Avoid large plastic colour cartridges on presses as these generally do not allow excess ink to be reused easily. If ink is dispensed to tubs, ensure that tubs for each press contains just as much as needed for each job.</li> <li>• Store products under conditions that will preserve their shelf-life, e.g. film processing chemicals can be affected by both temperature extremes and exposure to light.</li> <li>• Keep solvents and solvent-based inks covered to avoid evaporative losses and air pollution. If possible (e.g. dedicated presses for large repeat colour jobs or black and white jobs) install a piped ink delivery system to press reservoirs.</li> </ul>



# WASTE MANAGEMENT

## Waste Management

After efforts have been made to reduce waste, further benefits can often be achieved through better management of the waste that does arise. The cost of waste management varies greatly from company to company. In the Irish medium to large print facilities that were visited, waste disposal ranged from a net cost of €90,000 per year, to net income €70,000 per year from the sale of waste streams. Good quality paper and cardboard, segregated plastics and metals can be of considerable value, while conversely substrate that is not easily recycled can be costly to dispose of.

Remember that even where there is a net revenue from the sale of waste materials, far greater profits can be achieved by reducing this wastage at source.

## Segregate Waste

Waste contractors will offer a cost effective service if materials are segregated at source, and presented to the waste management company in the streams which are valuable to the collector. In general, the better that materials are segregated from each other and kept clean of contamination, the higher the price that can be paid for these materials.

## Understand Waste Costs

It is useful to understand the contract terms you have with your waste contractors and to establish whether improved waste segregation and higher rebates can be achieved within the current contract. Where possible you should also ensure that waste management costs are transparent and show the unit costs (by weight or number of lifts) and the fixed costs around bin hire and handling.



## Waste Collection Permits

It is also important to ensure that contractors are operating legally. Under Irish Waste Management legislation, businesses, as producers of waste, have a 'cradle to grave' responsibility for the safe management and disposal of that waste. It is up to the producer to ensure that their waste contractors have the required collection permits, and are delivering the waste to a permitted or licensed waste facility.

Reduction of waste management costs starts on the factory floor with an improvement of waste segregation practices and better staff understanding of where to put each waste.

## Minimise Hazardous Waste

Many printing companies send unnecessarily high quantities of waste for expensive hazardous disposal. This is often due to non-hazardous items ending up in the hazardous bin (paper, plastics, food waste etc.), or non-hazardous materials becoming contaminated by solvent or inks and then having to be disposed of as hazardous.

In many instances, ink cartridges and tins are disposed of as hazardous waste when they do not need to be. Many inks are now based on vegetable oils or other non-hazardous formulations, so check the material data sheet of the inks before consigning the tubs to hazardous waste. In some instances ink suppliers will take back ink cartridges and tins. Where ink is supplied in steel tins these can often be taken for recycling if the amount of residue ink, even if hazardous, is small. The European Waste Catalogue defines packaging as hazardous only where significant levels of hazardous substances are present.



## Waste Management - TOP TIPS

Numerous measures can be taken to reduce waste and reduce costs.

WASTE TYPE	SUGGESTED ACTIONS
All	Investigate ink packaging return and refill options with suppliers. Some suppliers may even take substrate, such as label matrix, back for recycling.
All	Renegotiate rebates on recyclables with your current contractor and shop around for the best deal to cover your specific waste streams when renewing your waste contract/s.
All	Use appropriate bins indoors to segregate as much waste as possible at source to maximise the value of recyclables (paper, card and plastics in particular).
All	Make staff aware / incentivise the proper segregation of wastes to minimise contamination (keeping general waste and hazardous waste out of the recyclables) and maximise recycling (keeping recyclables out of the general waste).
All	Pay for landfill waste on a weight basis rather than a "per lift basis".
Ink	Negotiate with ink suppliers to arrange a take-back of empty containers (e.g. cartridges) for reuse. Most of the larger suppliers advertise container reuse policies.
Ink	Check whether ink tubs can be disposed as general waste, or require hazardous waste disposal.
Rags	Send solvent rags for cleaning / reuse, rather than disposal into hazardous waste skips.
Wood	Reduce wood waste by requesting suppliers to provide stock on reusable or lease pallets (e.g. CHEP). Reuse pallets for onward distribution of your products where possible.
Wood	Investigate the use of cardboard pallets for your supply to customers as these can be easily recycled.
Wood	If you have a lot of wood, hire or purchase a wood chipper unit. The chipped wood may then be used or sold as a mulch or fuel.
Hazardous Waste	Ensure that the hazardous waste bin only contains hazardous items. Clearly label.
Hazardous Waste	Use reusable rather than disposable items where possible, e.g. cleanable ink guides and spatulas/scrapers, rather than single use items which then become hazardous waste.
Hazardous Waste	Consider investment into a solvent recycling / distillation unit if solvent use is significant enough to warrant it.



# ENERGY EFFICIENCY

## Introduction

In printing plants, energy costs are often the third largest expenditure after labour and materials. In the medium to large Irish facilities visited, the energy costs ranged from €50,000 to €200,000 per year. Electricity provides power for the printing presses and other machinery, ventilation/air-conditioning, compressors and lighting while gas or oil often fuel space heating devices.

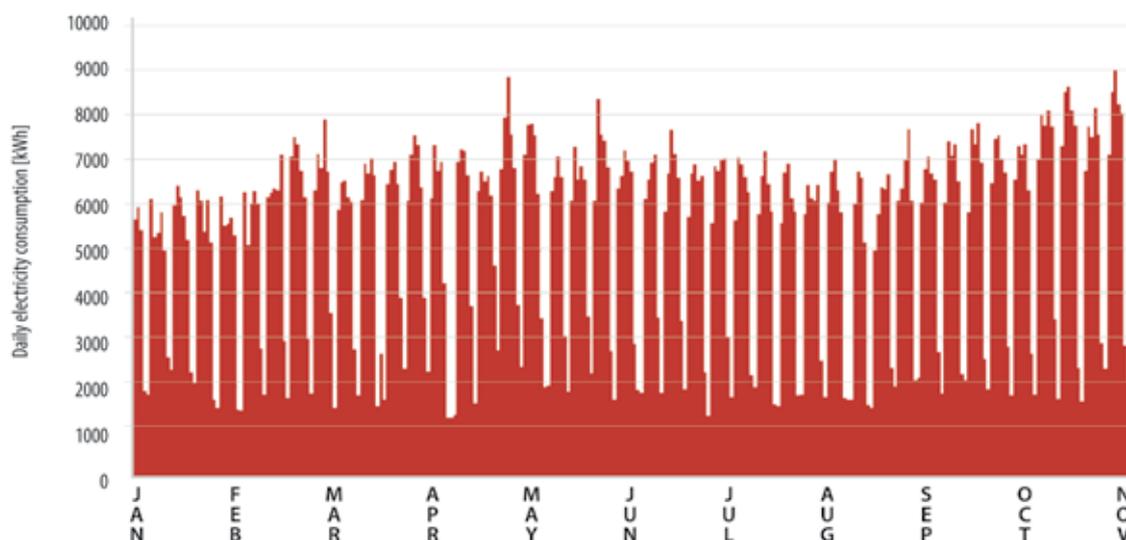
Production hall lighting often accounts for more than 10% of the electricity use in a print facility, with a similar amount covering the offices and canteen. Production therefore accounts for around 80% of the electricity bill.

It is often possible to reduce energy bills significantly through 'low cost' measures such as better housekeeping, and changing energy supplier and through 'no cost' measures which include the installation of energy efficient lighting with a payback of less than a year. Life cycle cost could be used as a criteria for ensuring efficiencies of lights.

The Energy Costs table above shows the typical indicative cost for different energy sources in Ireland in 2013.

Refer to: SEAI guidance document [www.seai.ie/Publications/Your\\_Business\\_Publications/Technology\\_Guides/General\\_Lighting\\_Guide\\_FNL.pdf](http://www.seai.ie/Publications/Your_Business_Publications/Technology_Guides/General_Lighting_Guide_FNL.pdf)

Example Energy Data over 11 month period for printing facility



## Typical Commercial 2013 Prices

Item	Cents per kWh
Electricity	16
Natural Gas	4
LPG	7
Oil	8
Wood Chip	3
Wood Pellet	4

## Energy Data

Good energy data, can allow different processes to be compared and unexpected usage to be identified. In order to better understand the main energy uses, it is recommended that electricity sub-metering is installed on each of the main printing presses and the larger users of energy, such as ventilation systems and compressors. Sub-meters can be purchased for a modest price of around €30 to €50 each.

Such data can identify high energy consumption at unexpected times, such as night-time or weekends when there are no operations. This data will help identify pieces of equipment that have been left on or potential short circuits. The graph below, for example, shows a 'base load' overnight and at weekends of over 1,500 kWh a day. This is equivalent to an average continuous energy demand of over 62 kW, 24 hours per day, costing ~ €71,000/annum.



## Energy Efficiency Hints and Tips

The main energy reduction opportunities identified in Irish print facilities are briefly discussed below and summarised in the table at the end of this section.

### Optimise your Maximum Import Capacity (MIC).

ESB Networks will have provided the electrical capacity of your connection based on the kilowatt (kW) or kilovolt-amperes (kVA) that were notified to the ESB Networks at the time of connection. This capacity level is set as the facilities Maximum Import Capacity (MIC), and is the upper limit on the total electrical load a site should use. If the operations actually require more electrical load, ESB Networks apply an 'Excess Capacity' charge on the bills. Conversely, if operations do not require as much load anymore, having a higher MIC means that you are paying for more capacity than you require. If MIC charges appear on your electricity bill, check with your supplier whether the MIC is set at the optimum level.

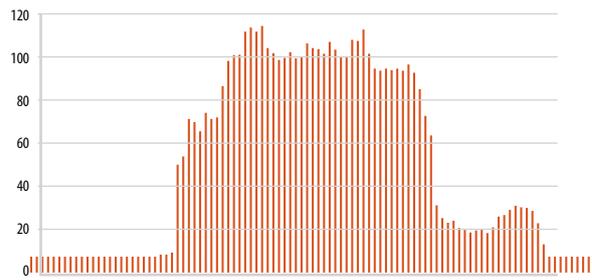
### Power Factor Correction (PFC) and Voltage Power Optimisation (VPO) technology

PFC counteracts the effect of wasted 'reactive' energy use (for example in motors and magnetic ballasts) in a three phase supply. To get 10 kW of useable power at 0.75 PF requires 13.3 kVA input supply, thereby wasting energy. PFC systems generally work using a combination of capacitors and electronics to reduce phase lags and harmonics.

In addition some equipment will operate perfectly well at a slightly lower voltage than the mains supply and hence a drop in supply voltage will reduce energy use. Note that some equipment, such as VSDs, laptops and modern lighting, that are electronically controlled, will use the same power even if the voltage is dropped.

Combining PFC with this approach is usually referred to as Voltage Power Optimisation (VPO) technology. This technology can result in a significant energy reduction (of the order of 10%) and offer other benefits such as surge protection.

## CASE STUDY

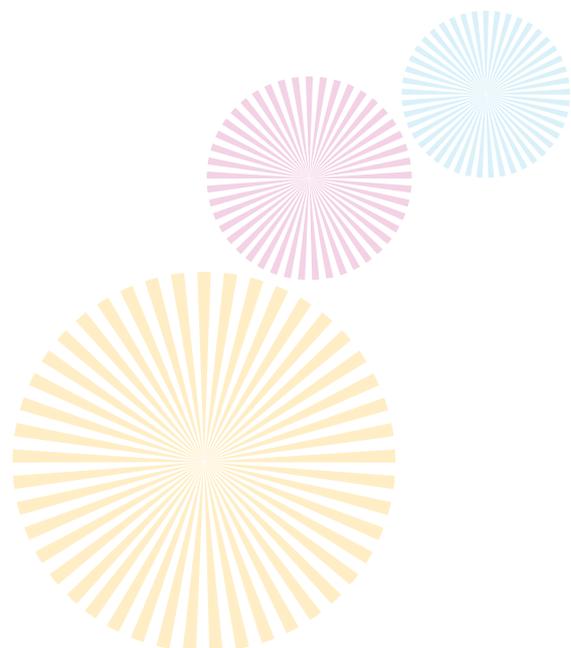


Example: 24 hr. Energy Profile for Print Plant (kW)

A typical daily use profile of a medium sized print facility is shown here, illustrating the usefulness of data to better understand energy demand during the production cycle.

### Potential savings at this company were as follows:

- Turning off unnecessary energy users 06.00 to 08.00 and 17.00 to 22.00 saves €5,640 per year.
- Slowing down conveyors and shutting down presses for 20 min every day at lunch time saves ~ €1,480 per year.
- Total potential savings: €7,120 per year.



# ENERGY EFFICIENCY

## Switch it off!

While some items of equipment may need to be left on 24 hours a day, many do not and can be put on digital timers so that they switch on in time to warm up for the day's production. Some equipment, such as air extraction (local exhaust ventilation) can be 'interlocked' (via a machine switch, pressure plate or occupancy sensor) to make sure that it is not used when machinery (e.g. presses) is not running. Certain equipment can be wired through a master 'off-switch' to allow all relevant equipment to be shut down in one go after the last shift.



It should be noted that older equipment can still consume up to 40% of the 'duty' electricity when on stand-by or idling. At one site, ancillary equipment such as PLC control units, guillotines/jogger units and folding machines were left on continuously using around 12kW and costing €1.70 per hour!

## Ink Drying/Curing

The energy used for drying of inks, whether it is for water-based coatings, UV curing banks, or solvent drying under hot air, can be as much as needed to run the printing presses themselves. There are various opportunities to reduce drying/curing costs, some being noted below. Specific details pertaining to your operations can be provided by specialist suppliers.

## Infrared and hot air drying (IR/HA) for water based varnishes and dispersion coatings

For water based coatings, investigate the installation of a combined infrared and hot air drying (IR/HA) unit, connected to a heat recovery system. IR/HA dryers are a combination of infrared lamps and hot air nozzles

that allow printing of water based varnishes.

The combination of IR to heat the varnish allows better heat penetration and also speeds evaporation. The use of a large volume of air together with high air temperatures allows for evaporation of water, which is exhausted to atmosphere, or preferably to a heat recovery system. The heat recovery systems then recycles the hot exhaust air back to the dryer where it is mixed with fresh ambient air. This minimises the temperature difference between the input air and the required drying temperature. Up to 30% of heating energy can be recovered to provide a rapid return on investment. Insulated air ducts will further reduce energy loss during distribution.

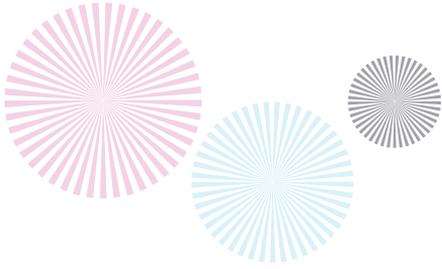
## UV curing for screen print presses

The correct UV dose is crucial to completely cure inks and coatings. Faster printing speeds mean that the required UV dose to the ink layer must be delivered in a shorter time. UV mercury medium pressure arc lamps were introduced in 1930 and are still the main curing technique in most screen presses. These are inefficient arc lamps where only about 30% of the electrical energy is converted into UV radiation, 10% is visible light and the remaining 60% needs to be extracted as heat. This heat cannot be directly reused, (as space heating) due to the ozone generated during UV curing, although it can be ducted through a heat recovery system.

Various efficiency improvements for UV curing systems can be considered for any equipment replacement, including the following:

- Water cooled UV modules with effective heat recovery systems.
- Dichroic reflectors to improve UV radiation reflection and absorption of IR radiation.
- Adaptation of UV spectrums to improve curing of specific inks, such as opaque white.
- Optimisation of reflector geometries to improve UV dose yield.
- Electronic power supplies which reduce energy use by ~10% vs. traditional systems.
- Light emitting diodes (LEDs) as an alternative to generate UV radiation. Their widespread use will be linked to the availability of more affordable LEDs.





## Motors and Variable Speed Drives

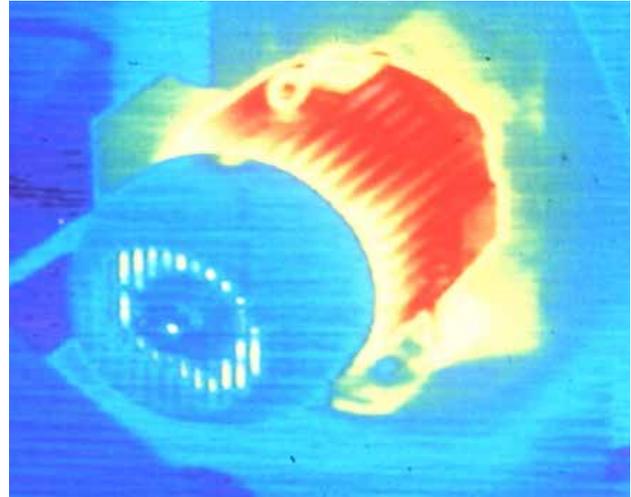
Motors are used in many places in a print works and can use a significant proportion of the power. Older motors are often very inefficient and waste energy through noise, vibration and heat loss.

The EU Energy Using/Related Products (EuP/ErP) Directive and related legislation requires that high efficiency motors (IE2 and 3 standard) be adopted according to the following timetable:

- IE3 by January 1, 2015 (for motors  $\geq 7.5$  to 375 kW) and IE2 only in combination with Variable Speed Drive (VSD).
- IE3 for all motors by January 1, 2017, (for motors from 0.75 to 375 kW) and IE2 only in combination with a VSD.

Using higher efficiency motors leads to big cost savings and carbon footprint reductions. EU 'preparatory' studies show that with an 11 kW motor running for 8,000 hours per year, the reduction in energy costs by using an IE2 motor instead of an IE1 motor would amount to around €2,700 per annum, and that CO<sub>2</sub> emissions over the same period would be cut by 15 tonnes. Using an IE3 motor instead of an IE1 motor results in a cost reduction of €4,600 and a 25 tonne reduction in CO<sub>2</sub>.

Most motors run at a fixed speed and this can be very efficient if the required output is also fixed. In some applications however, such as pumps and extraction fans, a fixed flow isn't always required and valves or 'dampers' are often used in pipework to control the flow. Putting an obstruction in the flow makes the motor work harder and certainly does not reduce energy demand. A better way is to control the speed of the motor directly via an electronic inverter circuit and Variable Speed Drive. In appropriate applications, VSDs can save 20% or more of the motor energy.



Motor Heat Loss

## CASE STUDY

### A Dublin Printer



Green Business identified a potential saving of €6,000 per annum by installing a power factor correction capacitor.



# ENERGY EFFICIENCY

## Compressors

Most of the equipment in print-shops is driven by compressed air, with centralised large compressors and small stand-alone compressors for ancillary equipment such as guillotines. Compressed air is the most expensive of all utilities and often costs €1.50 to €3 per kWh of power as used by machinery since as a means of generating power it can often be only 5% to 10% efficient.

Even at this price it is often misused, for example in cleaning down machines. Compressed air pressures are also often set too high, while systems are often poorly designed and maintained. In some systems leakage can account for over 20% of the load. Ideally the main compressor feeding various pieces of equipment should be a VSD type that can efficiently vary output according to demand from the shop floor, hence saving energy compared to a fixed speed machine that just cycles between on (full power) and off.

Often compressed air savings of 20% to 30% can be achieved through various measures. A 25 kW compressor, on 120 hours per week (5 day, 24 hour shifts = 6,000 hours per year), uses 150,000 kWh per year. At €0.14 per kWh this costs €21,000 per year, therefore a 20% saving is worth €4,200 and a 30% saving €6,300 per annum.

## Space Heating and Cooling

It is important to optimise the energy used for space heating and cooling. Firstly it's worth thinking about insulation. Can the windows be fitted with secondary or double glazing for example? Can the roof space be insulated better? Below the printer has installed a lower suspended ceiling with large amounts of insulation above it to reduce heating and cooling bills.



Suspended Ceiling to Reduce Heating



Warm Air Blower

During colder periods, printers often use hot air blowers fired by gas or oil-burners in an attempt to heat up the whole production area. In large spaces, directional infrared heater units, locally mounted near workstations and aimed at warming people rather than the space around them, are generally far more efficient. Similarly mobile chiller units can be far more efficient than air conditioning the whole space in the summer.

At one company, electrical radiant heaters on mobile frames next to workstations replaced oil-fired warm air cabinet heaters, saving ~€13,900 per year.

Another option is to duct warm/cool air directly to where it is needed. In high bays it is also worth having de-stratification fans in the ceiling, working from a thermostat, to help circulate air more effectively.



Suspended Air Ducts

Air conditioning in offices also needs to be controlled carefully, ideally through a centralised building management system (BMS). Centralised plant is generally far more efficient than the multiple units that are often used.



Multiple Air Conditioning Units



It is also worth thinking about heat recovery. The presses and compressors generate excess heat which is generally extracted to atmosphere. This heat can be captured in a heat exchanger, or, if clean, ducted directly into areas requiring heat. For example, heat from a compressor room can be used to preheat the boiler feed water or used to create a 'drying room' for screen drying for example. On process equipment, heat recovered from coolers (e.g. on laminators) can be used to heat other equipment (e.g. rollers). Payback periods for heat recovery can be less than a year.

Finally it is worth noting that in some situations, particularly if you generate significant wood and paper waste, it may be worth looking at a micro CHP biomass boiler, using the waste paper (milling dust and edge trim) and pallets (which could be chipped) to generate heat and electrical power.

### Lighting

Lighting is likely to account for less than 10% of typical electricity consumption in a printing facility. That said, simple measures, such as removing unnecessary lights and making the most of ambient light, can be very cost-effective in reducing energy costs.



Lighting Unnecessary with Roof Lights

In most facilities the majority of lighting is from fluorescent tubing of the standard T8 size. These are frequently supplemented by high-bay Metal Halide lamps in production areas and store rooms, as well as spotlights and downlighters in other areas. Large efficiency gains can be made through use of the latest T5 tubes and increasingly LED lights which are becoming far more cost effective. Although more costly to buy, these technologies reduce energy use and have a longer life, hence reducing maintenance cost.

If the overall production and office lighting requires 20 kW, a 20% saving over a 6,000 hr. working year would save ~€3,360 per annum at a cost of €0.14 per kWh.

When changing lighting, be careful to assess the luminance levels (lux) required in key work areas and colour rendering where this is important to ensure the quality of the print.

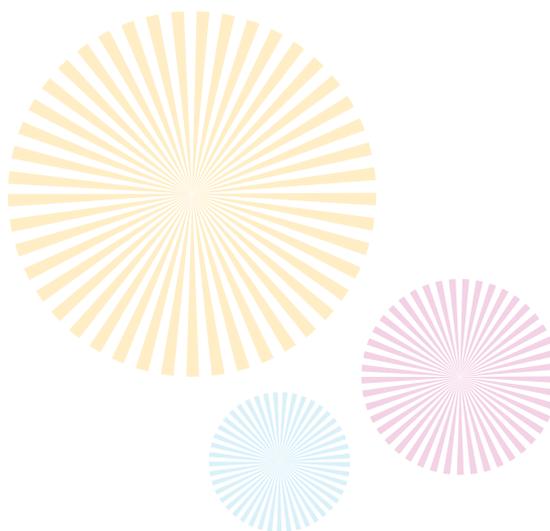
## CASE STUDY

### Fineprint Dublin



€116,000 potential savings were identified through a range of resource efficiency measures including the use of variable speed drives and power factor correction.

[www.greenbusiness.ie](http://www.greenbusiness.ie)



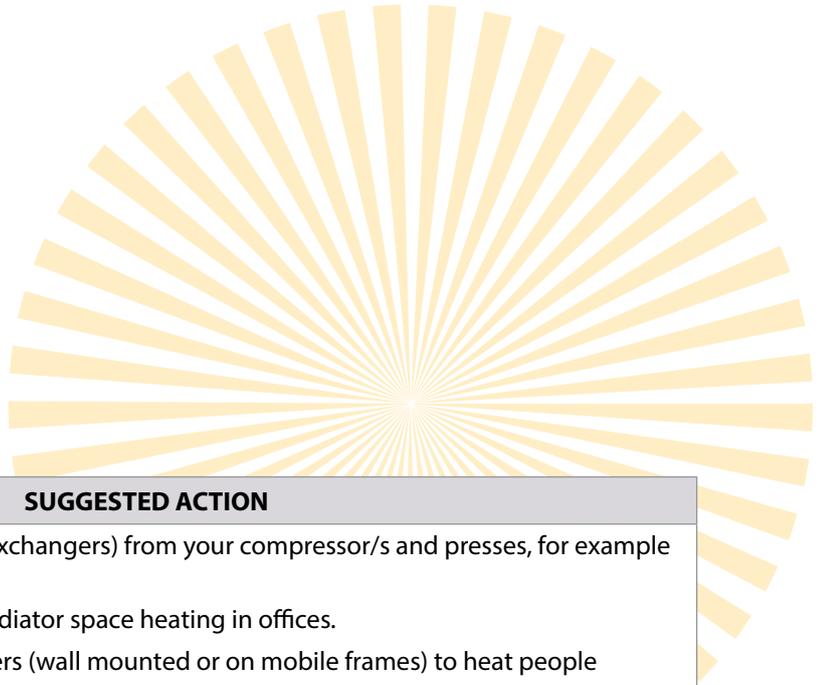
# ENERGY EFFICIENCY

## Energy Efficiency - TOP TIPS

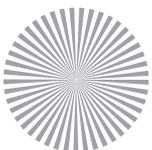
Numerous measures can be taken to reduce energy waste and reduce costs.

SUBJECT	SUGGESTED ACTION
Monitoring	<ul style="list-style-type: none"> <li>• Install electricity sub-metering and introduce regular energy reporting to incorporate energy management into the operation of the business.</li> <li>• Monitor the energy use 'base-load' by checking usage 'out of hours' (e.g. night time, weekends, shut down periods).</li> </ul>
Power Supply	<ul style="list-style-type: none"> <li>• Check your Maximum Import Capacity (MIC) with your supplier and review available tariffs to suit your needs.</li> <li>• Consider Power Factor Correction equipment if you don't already have it installed. This can be combined with Voltage Optimisation technology to drop the supply voltage slightly.</li> </ul>
Controls	<ul style="list-style-type: none"> <li>• Put all electrical equipment on timers or motion sensors, so they switch off when not in use, overnight, weekends etc.</li> <li>• Interdependent equipment, such as folding stations, conveyor belts and air extraction systems should have interlock switches, ensuring that when the main equipment is not in use, the ancillary equipment shuts off as well.</li> <li>• Install a master switch to turn off all electricity at night, with the exception of essential machinery/servers etc.</li> <li>• Where there is a Building Management System, optimise it to ensure that lights, heating, cooling, ventilation and HVAC are carefully controlled by area.</li> </ul>
Drying/Curing	<ul style="list-style-type: none"> <li>• Use the most energy efficient IR and UV equipment where appropriate for the inks and substrates.</li> </ul>
Motors	<ul style="list-style-type: none"> <li>• Make sure that motors are correctly 'sized'. Motors that run at partial load are far less efficient than those running at high load e.g. 80 to 90% of the design maximum.</li> <li>• Invest in high efficiency IE3 standard motors where possible and IE2 motors with VSDs if appropriate (i.e. where a variable output is required), e.g. on air extraction fans.</li> <li>• Don't fit VSDs on motors and pumps that have a fixed speed/output as it will slightly reduce rather than increase efficiency.</li> </ul>
Compressors	<ul style="list-style-type: none"> <li>• Make sure compressed air is only used for essential purposes and not for cleaning down equipment etc.</li> <li>• Reduce compressor pressure if possible. As a rule of thumb, there is a 4% saving for every 1 bar reduction of compressor output.</li> <li>• Undertake regular leak detection surveys using ultrasonic detectors. Various contractors provide these surveys.</li> <li>• Maintain systems regularly, including filter cleaning and replacement, refrigerant levels in driers, and condensate removal.</li> <li>• Invest in a new VSD compressor, or investigate if a VSD can be retro-fitted to the one that you have.</li> </ul>





SUBJECT	SUGGESTED ACTION
Space and Water Heating	<ul style="list-style-type: none"> <li>• Recover heat (using simple heat exchangers) from your compressor/s and presses, for example to pre-heat boiler feed water.</li> <li>• Invest in condensing boilers for radiator space heating in offices.</li> <li>• Invest in directional infrared heaters (wall mounted or on mobile frames) to heat people on the shop floor.</li> <li>• Where HVAC (heating cooling air conditioning) is used, consider a centralised plant rather than many small units as this will save energy.</li> <li>• Review heating/cooling controls to ensure that thermostats are set properly and that timers are used effectively, via a BMS or independently. Ensure that unauthorised staff cannot adjust temperatures themselves.</li> <li>• Adjust domestic water temperatures to ensure that water is stored at 60°C to prevent legionella. Mixer taps should be used where there is a risk of scalding.</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>• Keep skylights and windows clean to maximise natural light and paint walls a light matt finish to reflect light.</li> <li>• Ensure that fluorescent tubes have appropriate reflector fittings and keep these clean to maximise downward luminance.</li> <li>• Undertake a lighting review and remove unnecessary lighting. In some cases high-bay lighting is used in addition to low level lighting. In some cases half the tubes in a fitting can be removed.</li> <li>• Zone the lighting so that individual areas and rooms can be switched on and off. Where there is a BMS, control lighting through this.</li> <li>• Fit occupancy sensors in areas that are not in constant use and photocell sensors in areas with good ambient lighting to turn off lights on bright days.</li> <li>• Replace T8 and T12 tubes with T5 tubes, using adaptor kits where necessary. These will typically use at least 20% less energy to provide the same level of light.</li> <li>• Replace halogen downlighter lamps (e.g. GU10) with LED equivalents as and when they need replacing. LED lights use very little energy (e.g. 6W per lamp vs. 50W) for the same light output and are virtually maintenance free.</li> </ul>
Insulation	<ul style="list-style-type: none"> <li>• Install high-speed and insulated roller-shutter doors on the main exterior entrances where access is regularly required and where doors tend to be left open.</li> <li>• Install heavy plastic impact curtains in doorways between areas.</li> <li>• Fit suspended ceilings where possible and insulate above this to reduce heating and cooling demand.</li> <li>• Fit secondary glazing or invest in new double glazed A rated windows.</li> </ul>



# WATER MANAGEMENT

## Introduction

Water use is generally not a big issue for printers although water use reduction often goes hand in hand with reductions in solvent and chemicals use.

## Process Use

In many **lithographic** print facilities water use has decreased significantly since digital plating systems have been introduced. Where there used to be a requirement for large amounts of rinse water in developing the lithographic plates, now only small amounts of water are used in the final rinse bath of the digital plating units. In some cases this water undergoes balancing and is then discharged as process water to the foul sewer.

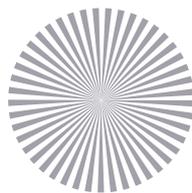
In **flexographic** printing chilled water is required to cool steel rollers to ensure that the film substrate does not get too hot in the printing processes. This chilled water is generally reused in a recirculated system.

In **screen printing** facilities water use is much higher, due to the screen washing machines and troughs used to clean and prepare screens for new design development. In addition, water is used in the standard 3-wash cycle screen developer generally utilises recycled water for 2 cycles and fresh water for 1 cycle. This fresh water rinse can often be reused to reduce water use in the other 2 cycles. The quantities of water discharged from a busy screen press will require a discharge licence and

wastewater charges will apply under the Mogden formula for discharges to sewer. It has been found that where effluent samples are taken infrequently it can lead to high charges based on spot samples with occasional high Chemical Oxygen Demand (COD) readings. It can be more cost effective to provide the Local Authority with larger more representative samples on a monthly basis, thereby reducing Mogden costs.

## Domestic Water Use

Other water use is generally confined to bathroom and canteen use, although small reductions can still be achieved through use of water saving devices.



## Water Reduction - TOP TIPS

Numerous measures can be taken to reduce energy waste and reduce costs.

SUBJECT	SUGGESTED ACTION
Monitoring	<ul style="list-style-type: none"><li>• Read your water meter on a weekly basis and compare consumption with production – benchmark your consumption and compare against industry standards.</li><li>• Monitor consumption over night when all water consumers are switched off. If water is consumed at night and the consumer can not be identified, you probably have a leak.</li><li>• Install sub meters on large users to determine consumption.</li></ul>
Process Water	<ul style="list-style-type: none"><li>• Use high pressure 'jet-washers' in screen cleaning rather than low-pressure hoses.</li><li>• Investigate whether the screen wash machine can be fitted with a high-pressure low-volume nozzle.</li><li>• Consider installing plumbing and a storage tank to allow the reuse of final rinse water in first and second rinse cycles in wash machines and troughs.</li><li>• Make sure that machine cooling water is recirculated (e.g. via a chiller unit).</li><li>• Investigate whether process water can be filtered and reused. As an example of a portable water recycling system see <a href="http://www.ultimatewasher.com/water-recovery-filtration.htm">www.ultimatewasher.com/water-recovery-filtration.htm</a>.</li></ul>
Domestic Water	<ul style="list-style-type: none"><li>• Install dual flush WCs or 'hippo bags' or similar cistern volume reduction devices in WC cisterns.</li><li>• Install waterless urinals or urinal flush controls.</li><li>• Install spray head and self-closing taps.</li></ul>



# 'Green' Procurement and Eco-Labels

Print and Packaging companies want to retain their current customers, and win new contracts. In a difficult market it is imperative to know what factors will help secure future work. Printers are suppliers to many different private, public and charitable organisations, many of whom are looking more closely at their own supply chains and the environmental performance of companies in it. This improves their own sustainability rating and can reduce supply chain risks associated with poor environmental management. Ireland have undertaken to reach European Commissions proposed initial target of 50% of all public tenders within the EU to include core green criteria.

Nationally and internationally buyers are increasingly using Green Procurement Criteria to assess tenders. In a recent US survey, 56% of print buyers said they looked for Green Credentials. Clearly it is increasingly important to both make environmental improvements and to tell people about your achievements in tender documents and more generally through marketing. Being able to demonstrate commitment to environmental improvement may be the difference between winning or losing a contract.

This Chapter looks at some of the developments in green procurement and the related area of eco-labels and standards.

## **Ireland Green Procurement Policy (GPP)**

The Irish Green Public Procurement Action Plan; Green Tenders, An Action Plan on Green Public Procurement launched January 2012 (GPP), sets out criteria and objectives to assist public authorities in successfully planning and implementing green public procurement (GPP). From 1st January 2014 the National Procurement Service (NPS) officially transferred from the Office of Public Works and was integrated into the Office of Government Procurement (OGP) under the Department of Public Expenditure and Reform.

Public authorities are major consumers, spending over €14 billion annually. This includes all the printing requirements tendered for by the government and public authorities. The OPWs National Procurement Service Unit (pre 2014) stated that in 2008 more than €10 million was spent on print contracts and €6.8 million was spent in 2009. The environmental considerations under the GPP therefore make better

environmental management practices worth serious consideration.

The inclusion of environmental and social criteria in public sector procurement was set out by EU Directives 17 and 18 of 2004, and transposed into Irish law by S.I.50 of 2007 and S.I.329 of 2006. These regulations provide that criteria adopted by public procurers contracting on the basis of most economically advantageous tender (MEAT) shall be 'linked to the subject matter of the contract' and may include environmental characteristics.

In the GPP context, and relevant to the Print and Packaging sector, the main areas of legal requirements concern energy efficiency; waste reduction and packaging waste; waste electrical and electronic equipment (WEEE); and volatile organic compounds (VOCs).

While the clearest way to include environmental criteria in the tender process (or contractually post tender) is by specifying it as part of the definition of the product or service, green credentials may also be requested for other selection criteria. For example, stipulations regarding the environmental performance of the bidders themselves may be among the selection criteria, or required as part of the minimum technical specifications. Environmental criteria may also be formulated as award criteria.

The GPP states that for the supplier, an environmental management system (EMS, such as ISO14001 or EMAS) can be used to demonstrate its own green credentials and to prove its capacity to perform the environmental aspects of a contract. Reference is made to the consideration that should be given to SMEs, for whom implementation of a fully certified EMS will be challenging. A positive intention and phased approach towards introducing environmental management in SMEs is encouraged, and the policy specifically mentions that involvement in the EPA's Green Business and Enterprise Ireland's GreenTech programmes should be considered positively by procuring bodies. ISO 14005:2010 provides guidance for all organisations, but particularly SMEs, on the phased development, implementation, maintenance and improvement of an environmental management system.

[www.infotrends.com/public/Content/INFOSTATS/Articles/2011/02.23.11.html](http://www.infotrends.com/public/Content/INFOSTATS/Articles/2011/02.23.11.html)  
[www.environ.ie/en/Environment/SustainableDevelopment/GreenPublicProcurement/](http://www.environ.ie/en/Environment/SustainableDevelopment/GreenPublicProcurement/)  
[www.opw.ie/en/LatestNews/Title,14744,en.html](http://www.opw.ie/en/LatestNews/Title,14744,en.html)  
[www.irishstatutebook.ie/2007/en/si/0050.html](http://www.irishstatutebook.ie/2007/en/si/0050.html)  
[www.irishstatutebook.ie/2006/en/si/0329.html](http://www.irishstatutebook.ie/2006/en/si/0329.html)





## Environmental Labels

There are hundreds of environmental labels, many of which have been developed in specific countries and for specific conditions, which may not apply to your market place. It can be very confusing for a company to decide whether achieving an environmental label is beneficial, and if so, which label to choose. Some of the main labels that apply to the Print Sector are outlined below.

### The EU Ecolabel for Print (“The Flower”)

The EU Ecolabel is a voluntary scheme to encourage businesses to market products and services that are kinder to the environment. At the heart of the EU Ecolabel is the idea of encouraging producers to go beyond legislation in reducing the impact of their production methods and the products they make. Products and services awarded the Ecolabel carry the “Flower” logo, allowing purchasers to identify them easily.

Criteria are not based on one single factor, but on studies which analyse the impact of the product or service on the environment throughout its life cycle, from raw material extraction through to production, distribution, life in use and disposal. The EU-approved core criteria for green public procurement are often based on Ecolabel criteria. Suppliers and services providers are permitted to show they meet the equivalent standard without possession of the label.

The Ecolabel for Print was approved in 2012 by EU Commission Decision No. 2012/481 of 16 August 2012 establishing the ecological criteria for the award of the EU Ecolabel for printed paper. Strict criteria are specified that have to be achieved across ten categories and apply to all processes undertaken at the site or sites (including subcontractors) where the printed paper product is manufactured, including printing, coatings and finishing processes. Specific assessment and verification requirements are specified within each criterion.

As this EcoLabel is a relatively new standard it is interesting to see the uptake across Europe. Due to the specifics of the verification requirements, it is thought that it may be most suitable for a large print house that has already achieved a formal Environmental Management System certification.

Ecolabel criteria will still need to be included in each tender in line with the ruling on the Dutch Coffee Case (case c\_368-10). Also, an ‘equivalent’ label will need to be accepted and/or verified by buyers.

## Criteria for EU Ecolabel for Printed Paper

- **Criterion 1** — Substrate: The printed paper product shall be printed only on paper bearing the EU Ecolabel
- **Criterion 2** — Excluded or limited substances and mixtures: This provides a list of restricted or prohibited hazardous substances, which cannot be used in the process if the EcoLabel is to be attained. This covers inks, glues, varnishes and laminates.
- **Criterion 3** — Recyclability: The printed paper product shall be recyclable, de-inkable and the non-paper components of the printed paper product shall be easily removable to ensure that those components will not hinder the recycling process.
- **Criterion 4** — Emissions: Emissions to water, to air must be limited to specified quantity of substances such as chromium and VOCs.
- **Criterion 5** — Waste: General Waste Management; a system for handling waste, as defined by local and national relevant regulatory authorities. Process Paper waste; Specifies maximum % of make-ready and other waste paper that may be produced in the printing processes (Screen Printing 23%, Digital 10%, etc.).
- **Criterion 6** — Energy use: Establish a register of all energy consuming devices (including machinery, lightning, air conditioning, cooling) and measures for improvement of energy efficiency.
- **Criterion 7** — Training: All staff participating in day-to-day operation shall be given the knowledge necessary to ensure that the Ecolabel requirements are fulfilled and continuously improved.
- **Criterion 8** — Fitness for use: The product shall be suitable for its purpose.
- **Criterion 9** — Information on the product: Specifies information that must be on the product, e.g. ‘Please collect used paper for recycling’.
- **Criterion 10** — Information appearing on the EU Ecolabel: Specifies what optional label may be displayed with the EcoFlower.



# Other Eco-Labels

The Nordic or White Swan Eco-Label is widely recognised and has a category for Printing Companies. Various mandatory criteria and points-based criteria apply across:

- Paper; Chemicals; Form of Reproduction (e.g. digital); Emissions; Energy and CO<sub>2</sub>; Waste; Number of Ecolabel Products; Occupational Health; Water; and Print Quality.

See [www.nordic-ecolabel.org/criteria/product-groups/?p=2](http://www.nordic-ecolabel.org/criteria/product-groups/?p=2) for further information.

The French Imprim'Vert® label is awarded to printers that meet the requirements of an environmental specification. The P2i (French Printing Innovation Centre), the owner of the Imprim'Vert®1 brand name, is responsible for harmonisation of standards within France. The label can be awarded to any producer of printed materials located within the European Union, whatever the printing process used.

More than 1000 graphic production sites are thought to have undertaken actions to include the Imprim'Vert® specification in their environmental protection procedures. The label is obtained by third party assessment. The actions implemented by the printer have to be audited in order to ensure they comply with the requirements of the specification.

The German Blue Angel, the world's oldest eco-label, includes standards for printing paper and printing devices but no standard for commercial printers as such.

It should be noted that the forestry stewardship council (FSC) certification and the similar Programme for the Endorsement of Forest Certification (PEFC) certification provide standards for paper but not for printing.

## ISO/FDIS 16759 Graphic Technology

Another new standard that will apply specifically to the print sector is currently being finalised. ISO 16759 sets out a standard method for calculating the carbon footprint of print media. It is being developed in response to print buyers who want to compare suppliers and products. This will improve accountability along the supply chain, and aid in the life cycle assessment of products.

The ISO 16759 carbon calculator framework outlines the criteria that a carbon calculator should fulfil, encouraging consistent calculation methodologies and further harmonisation in print markets. All market sectors across all geographies will be able to use a common set of parameters for carbon footprint calculations, making accurate comparisons simpler.

[www.imprimvert.fr/](http://www.imprimvert.fr/) or [www.brancher.com/-Imprim-Vert-.html?lang=en](http://www.brancher.com/-Imprim-Vert-.html?lang=en)



# Further Guidance and Links

## Resource Efficiency in Print Guides:

### UK Envirowise Guides

Envirowise EMS in Print EN344

Envirowise Printers Environment Policy EN322

[www.wrap.org.uk/content/envirowise-publications-archive-environmental-policy-and-management-systems](http://www.wrap.org.uk/content/envirowise-publications-archive-environmental-policy-and-management-systems)

### Solvent reduction through Good Housekeeping GG413

[www.wrap.org.uk/sites/files/wrap/GG413v5.pdf](http://www.wrap.org.uk/sites/files/wrap/GG413v5.pdf)

### Envirowise Green Printer EN281

[www.ccssxerox.com/download/Colorqube%20presentacion%20medioambiental.pdf](http://www.ccssxerox.com/download/Colorqube%20presentacion%20medioambiental.pdf)

**Best Practice Guide Cost-effective ink management** for printers (GG163)18 [infohouse.p2ric.org/ref/24/23100.pdf](http://infohouse.p2ric.org/ref/24/23100.pdf)

### Australia – Environment Action for the Print Industry, New South Wales

[www.environment.nsw.gov.au/sustainbus/printers.htm](http://www.environment.nsw.gov.au/sustainbus/printers.htm)

### Print City Guides; Lean & Green Guides Vol 1 and Vol 2

[www.printcity.de/index.php?site\\_id=60](http://www.printcity.de/index.php?site_id=60)

## Websites and External Resources

### [www.greenprinter.co.uk](http://www.greenprinter.co.uk)

A Green Printer website that gives practical environmental advice for printers. Funded by FujiFilms.

### [www.verdigrisproject.com](http://www.verdigrisproject.com)

Verdigris is the industry research initiative to provide authoritative information and comment on environmental aspects of print production.

### [www.printcity.de/index.php?site\\_id=60](http://www.printcity.de/index.php?site_id=60)

PrintCity is a unique integrated cross-industry alliance that fosters co-operation across the graphic arts value chain. Its goal is to help respond to some of the major on-going challenges facing the industry.

### [www.pneac.org/whatis.cfm](http://www.pneac.org/whatis.cfm) PNEAC is a partnership

between industry, government, and university technical assistance providers delivering current, reliable environmental compliance and pollution prevention information to printers, publishers, and packagers in the United States, North America, and the world. The PNEAC mission is to assist regulatory agencies and technical assistance providers by --also provides handy checklists.

### [www.intergraf.eu](http://www.intergraf.eu)

INTERGRAF – International confederation for printing and allied industries a.i.s.b.l.

### [www.ppe.uk.net](http://www.ppe.uk.net)

Paper Print info for green consumers (ex greenpeace facilitator)

### [www.ecoprintshow.com](http://www.ecoprintshow.com)

Information about the EcoPrint events and technical documents.

### EU GPP Tool Kit

[http://ec.europa.eu/environment/gpp/toolkit\\_en.htm](http://ec.europa.eu/environment/gpp/toolkit_en.htm)

## Further Signposting

The following contacts are able to help you with additional support and advice:

- Environmental Protection Agency - [www.epa.ie](http://www.epa.ie)
- Irish Print & Packaging Forum [www.printpackforum.com/](http://www.printpackforum.com/)
- Enterprise Ireland GreenTech Information and Financial Support - [www.envirocentre.ie/](http://www.envirocentre.ie/)
- SEAI Energy advice to Small and Medium Businesses [www.sei.ie/Your\\_Business/SEI%27s\\_services\\_for\\_SMEs/](http://www.sei.ie/Your_Business/SEI%27s_services_for_SMEs/)
- SEAI Accelerated Capital Allowances - [www.sei.ie/Your\\_Business/Accelerated\\_Capital\\_Allowance/](http://www.sei.ie/Your_Business/Accelerated_Capital_Allowance/)
- REPAK Prevent and Save – assistance with strategies to prevent packaging waste and to optimise their packaging systems [www.preventandsave.ie](http://www.preventandsave.ie)
- SMILE Resource Exchange Network [www.smileexchange.ie/](http://www.smileexchange.ie/)
- British Print Association [www.britishprint.com](http://www.britishprint.com)  
Resource for prices for metals/ paper/ recyclables [www.Letsrecycle.com](http://www.Letsrecycle.com)

## GRANTS

Grants for environmental improvement are available from SEAI in relation to energy, [www.seai.ie/Your\\_Business/SEIs\\_services\\_for\\_SMEs/](http://www.seai.ie/Your_Business/SEIs_services_for_SMEs/)

Enterprise Ireland offer Green Tech grants for assistance with Environmental Management Systems and Carbon Footprinting (see: [www.envirocentre.ie](http://www.envirocentre.ie)).

For further information email:  
[contactus@greenbusiness.ie](mailto:contactus@greenbusiness.ie)





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**NATIONAL WASTE  
PREVENTION PROGRAMME**



# RESOURCE EFFICIENCY IN THE IRISH PRINT & PACKAGING SECTOR

