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GUIDE

ENVIRONMENTAL
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REDUCING COSTS THROUGH WASTE MANAGEMENT: THE GARMENT AND HOUSEHOLD TEXTILES SECTOR

GOOD PRACTICE: Proven technology and techniques for profitable environmental improvement

REDUCING COSTS THROUGH WASTE MANAGEMENT: THE GARMENT AND HOUSEHOLD TEXTILES SECTOR

This Good Practice Guide was produced by the Environmental Technology Best Practice Programme

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SUMMARY

This Good Practice Guide is one of a series of four Guides on solid waste management in the textiles industry. Each of the four should be read in conjunction with a separate leaflet, *Waste Minimisation - Elements for Success (ET80)*, and each Guide can be read as a stand-alone publication for the sector concerned:

- worsteds and knitwear;
- woollens;
- cotton and man-made fibre;
- garment manufacturing and household textiles.

The garment and household textiles sector has high raw material costs and low profit margins. Substantial amounts of solid waste - fabric, threads, trimmings, yarn, plastic, cardboard and paper waste - are generated which account for a significant proportion of operating costs. **Reducing waste can therefore make a considerable difference to a company's profits and competitiveness**.

This Guide seeks to encourage companies to minimise their waste and, where waste is unavoidable, to dispose of it in the most cost-effective way. Practical measures are suggested to help companies in the different sectors reduce, re-use and recycle their solid waste. Various possible markets exist for fabric waste, including: textile merchants and reclaimers; felt manufacture; household textiles; geotextiles; and industrial applications. Card and paper waste can also be recycled, while the market for plastics waste is growing.

Fabric waste from garment cutting amounts to 10 - 20% of fabric consumption, while waste volumes from garment stitching are generally lower. Waste in the knitwear sector is typically 6% in the shaped knitwear area and up to 20% for traditional cut and sew manufacture. Fabric waste in the household textiles sector ranges from 4 - 10%.

Most companies in the garment and household textiles sector also generate large quantities of fabric roll tubes, reels, yarn cones, plastic bags and sheeting, cardboard cartons and other packaging. The landfill tax has increased the cost of waste disposal to landfill for all companies, while new regulations on packaging waste have given added impetus to the need to develop recovery and recycling schemes for packaging waste.

Industry Examples throughout the Guide highlight the cost savings and other benefits achieved by textile companies that have already adopted a structured waste management approach with an emphasis on waste minimisation, re-use and recycling.

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1 INTRODUCTION

section 1

Waste costs money. Each year, waste can cost the average UK manufacturing company 4% of turnover. Reducing the amount of waste your company produces will save you money which will increase your profits and help you to remain competitive. **Most companies can achieve savings of at least 1% of turnover through waste minimisation.**

Even companies which seem efficient produce waste. Waste is not just discarded solid materials. It also includes wasted time, loss of materials to air and to drain, excessive use of energy and water, and product giveway through overfilling packages and containers.

Raw material costs in the garment and household textiles sector generally represent a very high proportion of operation costs, while profit margins are generally less than 5% of turnover. With fabric costing **£3 - £30/metre** and yarn **£3 - £20/kg**, even a small percentage saving will make a significant difference to a company's profits.

Waste minimisation is a systematic approach to minimising the production of waste at source. A company can usually reduce the amount of waste it produces. Alternatively, there may be ways to put unavoidable waste to good use through re-use or recycling. Finally, a company may have to consider treating its waste to make it less harmful to people and the environment. Fig 1 summarises this 'waste management hierarchy'. **Remember, disposal should be considered only as the last resort.**

Fig 1 Waste management hierarchy

Waste reduction increases profits

Assume that a textiles company with a £4 million turnover makes 5%, or £200 000 profit each year. Waste costs the company around £120 000, or about 3% of turnover, as a result of unnecessary material costs (reduced yield) and disposal costs. Reducing these costs by only 10% will put £12 000, or an extra 6%, on the bottom line. In many companies it will be possible to reduce waste by 25% or more, adding at least 15% to the profit.

Sound waste management practices have many advantages for all companies in the garment and household textiles sector, including:

- Lower operating costs due to:
  - reduced fabric/yarn consumption, ie increased yield;
  - reduced consumption of other raw materials, eg packaging;
  - reduced waste disposal costs.
- Increased revenue from unavoidable waste.
- Improved site efficiency.
- Improved product quality.
- Enhanced public image. This will make your company more attractive to customers and investors and help it retain its place on approved suppliers' lists.

Benefiting from systematic waste minimisation

A large knitwear manufacturer has begun monitoring its various waste streams and systematically eliminating or reducing them. Waste minimisation opportunities have been prioritised and realistic targets set.

As part of its waste minimisation programme, the company produces computer-generated graphs showing the amount of waste generated each month as a percentage of production throughput. These graphs are then distributed to management.

This approach, part of a wider environmental and quality management system, has enabled the company to reduce waste to **3 - 4%** of throughput at both manufacturing stages - knitting and make-up. The company is committed to reducing waste even further through a programme of continuous improvement.

1.1 THE COST OF WASTE IN THE GARMENT AND HOUSEHOLD TEXTILES SECTOR

1.1.1 Fabric waste

Waste is purchased raw material that is subsequently not sold as product. This is particularly significant for companies in the garment and household textiles sector where raw material costs generally represent a high proportion of operating costs.

Although the industry has traditionally regarded itself as 'thrifty', fabric and packaging waste levels are still significant.

Cost of fabric waste in the garment and household textiles sector

Garment cutting Waste = 10 - 20% of fabric consumption, depending upon production techniques and product range.

For a garment manufacturer spending £100 000/week on fabric, waste from the cutting operation can cost the company as much as **£1 million/year** in terms of wasted material alone.

Garment stitching

Waste from stitching consists mainly of discarded thread and 'trimmings'. Although the volume of waste is generally lower than for cutting, some elements of the stitching operation can prove especially wasteful.

For example, where lace is used in the production of ladies lingerie, waste may vary from 10% (if used from a roll) - 20% (if part of the actual material lining). As lace is an expensive material - costing a typical lingerie manufacturer £100 000/week - the waste can cost up to **£1 million/year**.

Knitwear sector Waste = Typically 6% in the shaped knitwear area and up to 20% for traditional cut and sew manufacture.

For large or medium-scale manufacturers using expensive yarns, such as pure lambswool, this level of waste can represent a loss of **many hundreds of thousands of pounds each year**.

Household sector Waste = 4 - 10%. Again this can represent substantial amounts of money.

1.1.2 Packaging and other solid waste

Many companies in the garment and household textiles sector dispose of large quantities of plastic, cardboard and paper waste - often without recovering any revenue and sometimes at a significant cost.

These wastes include plastic bags, fabric tubes and cones (mainly polyethylene and polypropylene) used in fabric wrapping, transit and product packaging. Considerable amounts of cardboard waste are generated mainly in the form of cartons, fabric tubes and cones.

Garment cutting also involves considerable quantities of paper (including batch interleaving paper/tissue) and plastic (to create a vacuum on the cutting table). Transfer printing of household textiles also creates large quantities of waste paper. In addition, there are waste reels/bobbins from the thread, elastic and trimming materials.

Introduction of the landfill tax in October 1996 significantly increased solid waste disposal costs for all textile companies, while the UK Producer Responsibility Obligations (Packaging Waste) Regulations 1997 have implications for many companies.

UK Producer Responsibility Obligations (Packaging Waste) Regulations

These Regulations apply to companies that handle more than 50 tonnes of packaging a year and have a turnover greater than £5 million/year (this threshold will reduce to £1 million/year in 2000). Companies are required to take responsibility for the recovery and recycling of their 'obligation' amount for particular materials. The calculation of the obligation is complex and is a function of:

- the amount of obligated packaging handled;
- the activity obligation (raw material manufacturer 6%, converter 11%, packer/filler 36%, seller/final retailer 47%);
- the UK recovery/recycling targets (recovery: 40% by 1998 and 50% by 2001; recycling (by material): 8% by 1998 and 15% by 2001).

Many companies have some sort of obligation under more than one of the activity categories. A garment manufacturer, for example, would normally have responsibility for the packaging used to pack its product at the 36% **and** 47% obligation; the latter is where packaging is used for transit and has no further use (it is effectively 'sold' to the customer).

Companies can register individually with the Environment Agency or pass on their obligations to a collective scheme. In all cases, however, companies are required to collect data by weight.

For advice and information about current regulations governing the disposal of packaging and other solid wastes, contact the Environmental Helpline on 0800 585794.

1.2 COST SAVINGS FROM WASTE MINIMISATION

There are many no-cost and low-cost measures that your company can implement to manage its waste more efficiently and to reduce the amount of waste it generates. Recent waste minimisation initiatives in the UK, eg the Humber Forum Waste Minimisation Project, have demonstrated that waste minimisation saves money, making companies more profitable, more efficient and more environmentally sound.

1.3 THE PURPOSE OF THIS GOOD PRACTICE GUIDE

This Good Practice Guide provides a framework to help companies in the garment and household textiles sector save money and improve their environmental performance to become more profitable - achieved through a systematic approach to their solid waste management. A range of practical no-cost and low-cost measures - with an emphasis on waste minimisation - are suggested, both for the industry in general (Section 2) and for the woven garments, knitwear and household textiles sectors (Sections 3, 4 and 5). Possible markets for waste materials from the industry are also discussed in Section 6.

Generic measures applicable to all sectors of the industry are summarised in a separate leaflet, *Waste Minimisation - Elements for Success* (ET80), which should be read in conjunction with this Guide and is available free of charge through the Environmental Helpline on 0800 585794.

The Industry Examples in this Guide highlight the considerable cost savings and other benefits achieved by textile companies that have already followed a systematic approach to their waste minimisation.

The practical measures described in this Guide will be useful to companies of all sizes and to those seeking to reduce their waste within the framework of an environmental management system (EMS) such as ISO 14001 or the EC Eco-Management and Audit Scheme (EMAS).

This Guide is one of four stand-alone Good Practice Guides on solid waste management in the textiles industry. The four Guides, which are all available free of charge through the Environmental Helpline on 0800 585794, cover:

- worsteds and knitwear;
- woollens;
- cotton and man-made fibre;
- garment manufacturing and household textiles.

Make good practice your standard practice

2 WASTE MANAGEMENT OPPORTUNITIES IN THE GARMENT AND HOUSEHOLD TEXTILES SECTOR

This Section describes sound waste management practices of interest to companies in the garment manufacturing and household textiles sector. General measures applicable to all sectors of the textiles industry are summarised in a separate leaflet, *Waste Minimisation - Elements for Success* (ET80), available free of charge through the Environmental Helpline on 0800 585794.

section 2

Increasing waste disposal costs are having a significant impact on many companies in the garment and household textiles sector. Before disposing of any waste, you should consider all possible options for re-using or recycling the materials. If disposal is unavoidable, you should consider ways of reducing your costs.

2.1 QUALITY CONTROL AND PRODUCTION MANAGEMENT

- Set realistic and achievable targets to reduce all waste - including completed seconds - with the aim of achieving zero fault manufacturing.
- Train all new operators/machinists to operate the machinery correctly and to use materials efficiently.
- Train machinists to recognise faults and to distinguish between repairable and irreparable faults.
- Improve the consistency of fabric/yarn supplies by:
  - talking to your suppliers about quality control;
  - introducing measures such as 'order picking of fabric'. This system involves a trained manager/store manager selecting the most appropriate fabrics/yarns from a delivery vehicle, eg those fabrics which provide the closest match with batches of fabric already in stock.
- Ask your supplier to take back or provide compensation for fabric/yarn with significant faults.
- Plan production to ensure maximum fabric/yarn utilisation.
- Use the minimum amount of fabric for fabric testing and only test when absolutely necessary.
- Produce only the number of items ordered by customers. Some large retailers use the system of 'calling off' manufacturing requirements weekly to ensure supply meets demand. While a guaranteed long-term contract is easier to plan for, if your company works on unpredictable contracts, this type of close control can help avoid over-production and waste.
- Keep to customer requirements and specifications to reduce reject levels. Be aware of your capabilities and stay within them.
- Apply stringent quality control procedures at all stages of production and check completed items regularly to reduce the risk of a whole batch being returned, ie Return to Manufacturer (RtM). Check, for example, every one in five completed items as it is better to reject a number of these, which can often be sold as seconds, than risk a major RtM.
- Consider introducing teamworking, ie 'cells' producing an item from start to finish within an area of the shop floor.
- Motivate employees to reduce waste through training and feedback.
- Before authorising a re-cut, examine the faulty panels to find out why the problem occurred. This can help to avoid a repeat of the same problem.
- Negotiate contracts with your customers that do not impose conditions on the re-use or recycling of redundant materials.

Improved product quality through teamworking

A knitwear company has observed lower fault levels and improved product quality since introducing teamworking. The new production system has induced a feeling of ownership, with employees taking pride in their workmanship and in the quality of the final product.

Motivating employees through waste saving targets

A large company estimates that, on average, 30 - 35% of its sales turnover is wasted as a result of errors such as production mis-management, machinery breakdown due to inadequate maintenance, low yields and poor quality control. The company is now tackling these problems through staff training and motivation schemes.

Every year, the production manager calculates the percentage of sales turnover lost due to waste in the previous year. Employees are made aware of this figure and given targets to encourage them to improve inefficient working practices. Involving employees in this way has increased their pride in the job and, as a consequence, reduced waste and increased efficiency.

2.2 HANDLING AND RE-USE

- Train those employees handling fabrics, threads, etc on the need to avoid contamination and damage.
- Keep fabrics/yarn/trimmings covered whenever possible to avoid contamination.
- Keep all fabrics/yarn/trimmings segregated and clearly labelled in separate areas of the warehouse. Mix-ups, eg the accidental use of yarn of the same colour but different quality, can lead to wasted materials.
- Where possible, re-use all large plastic bags internally, eg to transport garment panels around, or between, sites. Alternatively, use plastic bags and carboard boxes to collect fabric, yarn and paper waste.

Successful re-use of plastic bags

All boxes of yarn delivered to a knitwear manufacturer are lined with a large plastic bag. Rather than dispose of these bags to the general waste, each bag is re-used to transport knitted garment panels around the factory, eg from the knitting rooms to the stitching area. The garment panels are kept as clean as possible at no extra cost to the company. The bags are put in the general waste skip only when they become damaged. This avoids contamination of the product and enhances the efficiency of the site.

- Talk to your suppliers about taking back waste fabric, yarn and thread for recycling.
- Talk to your customers about taking, and paying for, unavoidable over-production.
- Keep a careful record of all waste amounts. You will find it useful to know how much fabric, yarn, thread, trimming and packaging waste is being produced by each process/department.

  Record fabric consumption and waste either centrally or at the machines. Use this information to maintain an overall record of fabric/packaging consumption and waste production in a central 'waste management file' either on paper or, preferably, on a computer spreadsheet.

2.3 OBTAINING VALUE FROM YOUR WASTE

- Consider **all** wastes as a potential source of income. Where possible, give each waste quantity a financial value using the raw material and disposal costs of the relevant fabric or yarn. If you do not have space to store sorted wastes, sell the mixed waste for a lower price rather than have to pay disposal costs.
- Do not consider redundant stock as waste - try to find alternative customers.
- Separate all wastes **at source** in clearly labelled or colour-coded containers. Sort wastes as much as possible according to value. For example, separate out:
  - large pieces, eg fents, from small pieces (pattern off-cuts);
  - wool and pure cotton fabrics/yarns from man-made fibres and blends.
- Where possible, avoid contamination in each waste stream, eg remove collars and cuffs containing Lycra. An ultraviolet light source will help to separate polyester from cotton.
- If you are part of a multi-site company or group, enquire whether your site's wastes could be re-used or recycled by another site or part of the group.
- Consider setting up a factory shop on site to sell slightly imperfect items, eg garments and curtains, at a reduced price. Alternatively, contact local market traders to see if they would be interested in purchasing seconds, over-runs and other obsolete stock.
- Contact as many different waste merchants and recycling specialists as possible to obtain the best deal for the amount and type of waste your company produces. Specialist textile merchants may offer a better price for a particular waste.

2.4 PACKAGING WASTE

- Separate out cardboard cartons as they attract a higher price than general card waste. Flatten the cartons carefully to minimise storage volume and transport requirements.
- If you use cardboard cartons, buy second-hand ones from a carton merchant. If you have sufficient storage space, buy bulk quantities of frequently used sizes when the opportunity arises. If plain boxes are not available, stick your own labels over the printed area.
- Establish a separate storage area/container for plastic wastes such as worn-out fabric rolls, plastic bags and yarn cones. You may be surprised how quickly these build up into saleable quantities.

2.5 REDUCING DISPOSAL COSTS

- It may be possible to reduce waste disposal costs by reviewing the waste management services currently used by your company. Simple changes in the collection and removal of waste from site might suit better the needs of your company and could also bring cost savings.

Reducing waste disposal costs through segregation and use of a compactor

A large garment manufacturing company used to dispose of all its waste to the general waste skip - filling up to three skips/day. The fabric waste is now separated from the packaging and general waste and a compactor has been installed at each of the cutting sites. One of the cutting sites has reduced the number of skip lifts to one/week, with savings of around **£13 000/year**. Company-wide savings are estimated at over **£60 000/year**.

Switching from skips to front end loaders saves money

A garment cutting company in Wales used to dispose of seven skips/week of general waste at a cost of approximately £55/lift (excluding the landfill tax), ie £18 500/year. The waste management contractor suggested that the company should change to front end loaders (FELs), which are approximately the same size and supplied free of charge. Through more careful filling of the FELs, the company now needs only six FELs. These are emptied each week at a cost of £12 each (plus the landfill tax); a total cost of £3 500/year. This simple change has saved the company **£15 000/year** in waste disposal costs.

2.6 IMPLEMENTING A WASTE MINIMISATION PLAN

Waste Minimisation - Elements for Success (ET80) describes measures you can take to implement a waste minimisation plan and thereby reduce your waste disposal costs. The leaflet, which should be read in conjunction with this Guide, is available free of charge through the Environmental Helpline on 0800 585794.

3 WASTE MANAGEMENT OPPORTUNITIES IN WOVEN GARMENT MANUFACTURE

Most of the waste produced during garment manufacture arises from the cutting process as remnants/fents and off-cuts. This high level of waste, up to 20% of materials bought, costs companies hundreds of thousands of pounds/year, and some companies well over a million pounds/year. Many companies are not seeking secondary markets for these wastes and are often left with redundant stock for which they receive only a fraction of its value.

> Some companies dispose of over 20 km/year of redundant fabric.

Waste from stitching errors and faults found in completed garments is also significant, as is thread waste. Average amounts of thread waste can be as high as 15% of the total amount used, mainly due to inefficient buying practices. Although the amount of trimming waste is lower, its high value makes it a significant cost.

> Until recently, UK companies lost an estimated £11 million/year in thread waste.

Waste management in this sector varies enormously; some companies have succeeded in reducing their overall average waste levels to 10 - 14% for raw materials (depending on the garment design). This reduction (see Fig 2) has been achieved through measures such as those described below.

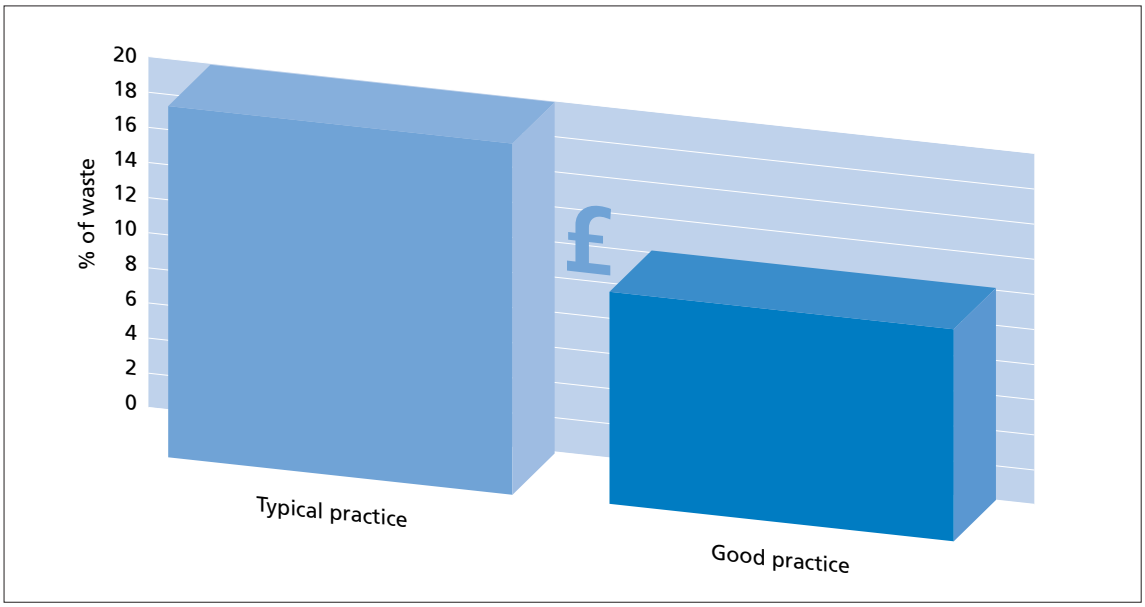


Fig 2 The potential for waste reduction through good practice in woven garment manufacture

3.1 COST-EFFECTIVE MEASURES TO PREVENT WASTE

3.1.1 Production management, lay planning and quality control

- Use the longest fabric roll possible. In general, the longer the piece of fabric used, the more complete 'lays' can be cut from the roll and less fent waste is produced.
- Discuss garment design issues with your customer. Small changes to the fabric or the design of a garment will often reduce significantly the amount of waste produced at the manufacturing stage.

  For example, changing from a one-way fabric to a uniform fabric can reduce cutting waste from 15% to 10% through more efficient lay planning.
- Keep to specifications for children's clothing. For example, use of the wrong type of fastening on a coat can contravene safety regulations and lead to the entire production run being Returned to Manufacturer for the fastenings to be replaced.
- Allow for the shrinkage characteristics of your fabrics during the lay planning/pattern-making process. Knowing how your fabrics 'behave' will help you to reduce sizing errors.
- Aim to beat the materials-used target set by your customer when costing the contract. These targets are usually fairly generous.
- Buy the best computerised lay planning system you can afford. For some designs, over 90% of the fabric is utilised when computer-aided design (CAD) is used to optimise the mix of garment pieces and sizes.
- Make use of the lay planning skills and experience of your CAD system operators rather than relying on 'best fit' software. Your operators may be able to achieve better fabric utilisation rates than the software.

3.1.2 Fabric laying and cutting

- Examine all fabric carefully for quality faults when it is 'spread' and 'laid'. Faulty pieces, eg with printing and weaving errors, can thus be removed early in the manufacturing process. **The further the pieces are along the production chain before the fault is spotted, the greater the value added and the greater the financial loss**.
- Fit appropriate tensioning equipment to the spreading table to avoid over-stretching (which can ruin large quantities of fabric) or incorrect sizing. However, it is important to:
  - maintain the equipment so that it always functions correctly;
  - train your operators to use the equipment properly.
- Insert batch papers between batch lays to avoid accidental mixing of different, but similar, batches of garment panels. Using coloured or numbered batch papers also minimises confusion. If possible, re-use batch papers.
- Mark stacks of garment pieces by size, using either the paper pattern marker or adhesive labels applied as the pieces are cut. This avoids confusion during stitching and hence reduces waste.
- Check the amount of plastic sheeting used on the vacuum cutting table. The length of plastic sheet used is often too long for the table or too wide (given the thickness of the lay, ie the number of ply). It may be worth keeping more than one width of plastic sheet in stock.
- Consider buying automatic, numerically controlled (NC) cutting machinery and linking it directly to a CAD lay planning system. An automatic cutter generally makes fewer errors than a manual operator.

Computerised lay planning and cutting equipment produces significant savings

Complete mechanisation of the cutting process has allowed one company to reduce its cutting waste from 20% using manual cutting to an average of 12%. This represents a saving of about **£100 000/year** in waste alone for an investment of around £300 000 in an integrated lay planning and NC cutting system.

- Even with computer-controlled NC cutting machinery, it is still useful to have a paper pattern marker because:
  - each stack of pieces needs labelling;
  - manual cutting is necessary should the machine break down;
  - this allows the machine operator to check for machine malfunctions.
- Keep up-to-date with developments in CAD lay planning and NC cutting techniques. Although such equipment can be expensive, it will soon pay for itself through reduced waste and improved product quality. Good Practice Guide (GG82) *Investing to Increase Profits and Reduce Wastes* explains how to carry out a simple financial appraisal for new equipment. This Guide is available free of charge through the Environmental Helpline on 0800 585794.
- When preparing 'bundles' or 'kits' of garment panels and trims to be stitched, make sure these kits contain only the exact quantities of the various component parts needed for that number of garments.

3.1.3 Stitching

- Before stitching, check all panels for previously unrecognised fabric or cutting faults. Rejecting imperfect panels before they are sewn into a garment will reduce waste.
- Encourage your machinists to report any stitching difficulties as soon as possible.

  For example, machinists should inform their supervisor immediately if they find a batch of garment panels where patterns do not align correctly after stitching or where cutting errors have produced badly fitting panels. You can then stop using those panels to produce garments and investigate the problem before wasting significant numbers of 'good' panels and trimmings.
- Talk to your thread supplier about the availability of stock control and 'use or return' schemes (see Appendix for relevant addresses). Such schemes avoid over-stocking by calculating the supply of thread in advance from production requirements. If necessary, additional supplies can be provided at short notice. Full, unopened reels can be returned. Most thread suppliers now offer this service.
- Ask your machinists to return all part-used reels of thread at the end of each batch/shift. Store these part-used reels in a thread cabinet and reallocate them as necessary. Do not allow new reels to be used when part-used ones are available. This procedure maximises thread utilisation. It may be necessary to keep the thread cabinet locked and allow only supervisors to dispense thread.

Control of thread use saves money

A large garment manufacturer has reduced thread use by 14% since introducing thread-saving practices, saving around **£195 000/year**.

- Control the use of fastenings, eg buttons, buckles and zips, by:
  - buying only the quantities needed (allowing for a small/acceptable degree of error);
  - allocating to machinists, at the beginning of each shift, the number required to complete the job;
  - supervising amounts given out because of operator errors.
- When using high value trimmings, eg ribbon, lace and elastic:
  - supply the operator with pre-cut lengths to avoid careless over-use;
  - give operators only the amounts needed to complete the number of garments expected to be produced in that shift.

Cost savings through frugal use of trimmings

Until recently, a large UK garment manufacturer ordered more trimmings than was strictly required for production - the intention being to make life easier for the machinists. Most of these 'extra' trimmings ended up on the floor with the sweepings. The company then set itself the goal of reducing the consumption of trimmings by 12%, through a tightening up on their allocation and use. In the first year of the project, trimmings consumption was reduced by 7% with an associated saving of **£329 000**.

- If sizing mistakes occur, 'size down' or 'size up' the batch of garments where possible. For example, garments can be sized down from 'medium' to 'small' and still be acceptable to the customer.
- Avoid label waste by counting out the exact number required by the machinists. This not only reduces label waste, it prevents labels falling into the hands of garment 'pirates'.
- If you make garments with pockets, consider buying a pocket-setting machine. Such machines can help to eliminate errors/waste and will increase productivity.

3.2 WASTE RE-USE, RECYCLING, SALE AND DISPOSAL

- Sort all cutting and stitching waste by material type/value, eg put printed pure cottons and man-made fibre in separate bags.
- Collect faulty panels at the end of each shift and sort them centrally by size, batch, etc. A significant number of garments can then be produced from rematched panels. This practice is not particularly time-consuming for someone with a trained eye.
- If there is a shortfall of a particular garment panel, eg due to a fabric cutting error, try to use remnants from the same batch of fabric to cut substitute panels.
- Where possible, re-use fabric roll tubes, eg to rewind fents/remnants for use at other sites. Alternatively, return fabric roll tubes to your supplier for re-use. This is particularly important for plastic roll tubes which are not generally damaged during unwinding and can be re-used many times.
- Ask your suppliers about returning elastic reels and thread reels. These reels are usually robust enough to be used for several round trips.
- If you are left with a sizeable quantity of redundant stock, perhaps due to an order being cancelled or reduced in size, consider storing the garments temporarily. Orders may soon pick up, allowing you to recover the full value of this material.
- If possible, sell garments produced in your factory's training department as seconds.

- Sell-on redundant fabric stocks for re-use or recycling. Some companies are even finding markets for off-cuts of material blends such as cotton/Lycra. You may find it useful to build up contacts with local small-scale manufacturers as such companies often pay a better price for redundant fabric than fabric merchants. Before selling redundant stock, check that you are not contravening the conditions of the contract with your customer. Some UK retailers require redundant stock be held for a certain period before it can be sold on.
- If your cutting and stitching operations are located on the same site, consider finding a merchant that will purchase the different wastes, eg fabric, lace, elastic and thread, as a package. Some merchants pay a premium for packaged wastes like these for sale overseas as component kits or bundles.
- Check with your merchant whether it is necessary to remove tissue paper from fabric waste before it is collected. Some merchants sort waste at their depot and therefore do not require textile waste to be free from paper.
- Store damaged cardboard boxes, fabric roll centres/tubes, etc and sell them to a local paper and cardboard recycler.
- Store plastic centres/tubes, reels, bags and sheeting (including that used on the cutting table) and sell them to a local plastics recycler.

4 WASTE MANAGEMENT OPPORTUNITIES IN KNITWEAR MANUFACTURE

The quantity and cost of waste produced by the knitwear sector varies enormously depending on the production method. For companies producing 'cut and sew' knitwear, waste typically totals 20% (8% in knitting and 12% in cut and sew). For those companies producing fully fashioned or shaped garments on state-of-the-art knitting machines, waste can be as low as 6% (3% in knitting and 3% in making up).

For a garment manufacturer producing 5 tonnes/week of garment panels, the two production methods would generate 1 tonne/week and 300 kg/week of waste respectively. This is a difference of 700 kg/week or nearly 34 tonnes/year. For companies using wools, switching from traditional cut and sew to shaped production would produce typical savings of **£300 000/year** in reduced yarn costs alone. This saving goes straight to the bottom line (see Fig 3).

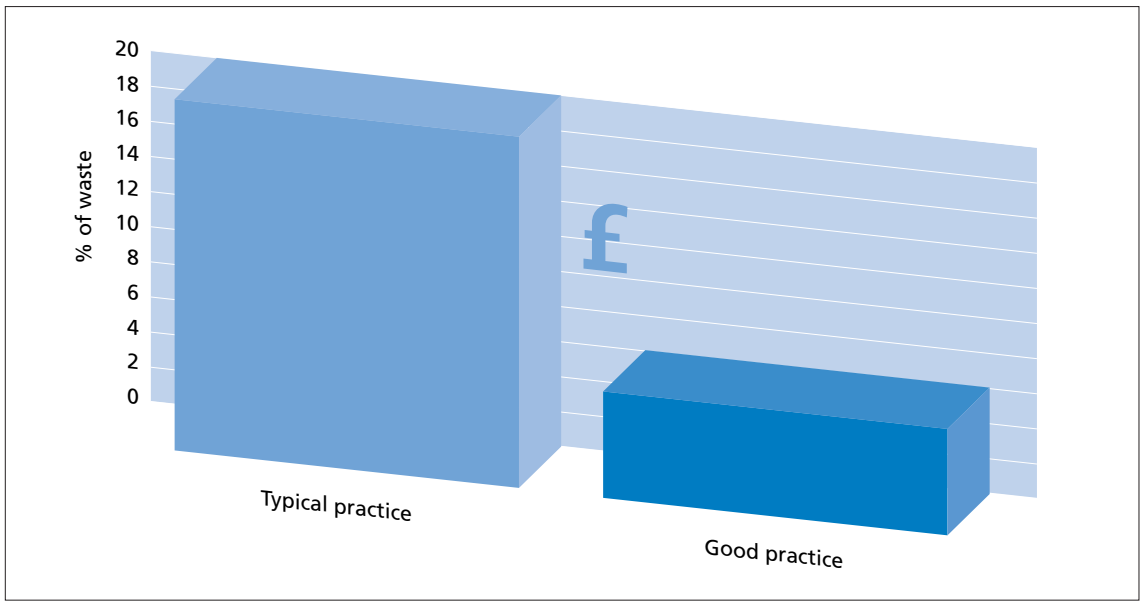


Fig 3 The potential for waste reduction through good practice in knitwear manufacture

4.1 COST-EFFECTIVE MEASURES TO PREVENT WASTE

4.1.1 Control of yarn stocks and deliveries

- Work out the quantity of yarn needed to produce the contracted order. Do not be tempted to over-order just to 'be on the safe side'.
- Only accept yarn that is clearly marked. Unmarked or poorly marked yarn will cause confusion.
- Talk to your supplier about minimising the amount of packaging used for delivering yarn. Consider accepting unwrapped yarn in sealed cardboard or returnable cartons. The risk of contamination with a well-sealed container is very low.
- Maintain an effective - preferably computerised - stock control system for both production and design room yarns. All unwanted/redundant yarns can then be sold for their maximum value. Yarns that are 'forgotten about' in the store room often deteriorate, thus reducing their re-sale value.
- If you are part of a multi-site company/group, even out gluts and shortfalls by transferring yarns between sites.

4.1.2 Production management and quality control

- Consider moving from cut and sew to shaped production. The latest knitting machines combine the benefits of fully fashioned knitwear (ie reduced need for cutting and stitching) with the design benefits of cut and sew manufacture (eg they allow the manufacture of lace or jacquard patterns).
- Blend yarns carefully to produce the specification and exact quantity required.
- Plan production to minimise waste. For example, avoid fibre cross-contamination by following one batch of yarn with another of similar quality/colour.
- Follow a set procedure or checklist every time knitting machinery is set up at the start of a garment batch run. This will save you from wasting time and materials in the long run.
- Install a humidity control system in the knitting room. Optimum humidity can reduce yarn breakages and thus reduce faults in the knitting process.
- In shaped manufacture, take care when programming the knitting machines to:
  - adhere to customer size specifications;
  - allow for natural garment shrinkage, eg due to the presence of Lycra.
- In cut and sew manufacture, consider customer size specifications very carefully when knitting panels to minimise the amount of waste produced when the panels are cut to shape.
- Ensure that knitting machine operators inspect their line of machines constantly for faults such as dropped stitches in the panels. When such a fault is spotted, machines should be stopped as soon as possible to minimise the amount of yarn wasted.
- Train machine operators both to recognise faults and to distinguish between repairable and irreparable faults.

  Where faults are retrievable, the panels should be mended as soon as possible to perfect or seconds quality. Repairable faults can otherwise become irreparable as a result of garment handling.

  Where faults are irretrievable, panels should be removed from the production process immediately to prevent further time and material being wasted.
- Label all panels entering the repair room with the correct batch number. This will allow them to be re-introduced to the manufacturing process alongside panels from the same batch.
- Ask the design department to use redundant yarn stocks when experimenting with new designs.
- At the start of a new batch, make test garments out of cheaper yarn or unpopular yarn colours left in store.
- Add the minimum number of extra rows to give the tab width needed to allow the machine operator to attach the pieces on to the joining machine. This minimises unroving waste. It is advisable to seek advice from the machinists when calculating the number of rows, as adding too few rows can be counter-productive.
- If sizing mistakes occur, 'size down' or 'size up' the batch of garments where possible. For example, garments can be sized down from 'medium' to 'small' and still be acceptable to the customer.

4.1.3 Machinery

- Keep up-to-date with machine developments via trade journals and equipment suppliers. For example, the latest generation of knitting machines manufacture fully shaped knitwear as fast as old machinery produce rectangular cut and sew panels. In addition, newer machines are fitted with the latest yarn tensioning and knot-sensing devices; these minimise breakages and garment faults. The latest electronically controlled machinery also allows the designer sitting at a remote personal computer to be linked directly to the knitting machine. This reduces the need for manual intervention and allows greater flexibility.

The benefits of advanced knitting machines

A medium-sized knitting company in the Midlands has replaced some of its older 1980s knitting machines with new machines capable of producing separate (rather than joined) and shaped pieces. Although these machines cost £80 000 each (less the revenue from the sale of the old machines), they have produced numerous benefits, including:

- an improved product with better shape;
- lower labour costs in garment preparation, with no need to remove the panel chain stitch, press the panel, cut the panel and over-stitch;
- reduced yarn/panel waste.

Material waste has fallen from 24% (including knitting and cutting wastes) to 5%. Given an annual use of 200 tonnes of yarn, this amounts to a saving of 38 tonnes/year. With lambswool costing £11/kg and panel waste usually worth less than £1/kg, the wool saving alone represents **£380 000/year**. The payback period is expected to be less than three years.

The company is now producing a better product more cheaply - the previous price of the product reflecting the high waste levels - making it more competitive in a difficult market.

- When considering investment in new machinery, ask suppliers about the waste production and energy consumption of the equipment.
- Buy new machines with built-in tension control (accumulators) and stop motions. Accumulators allow a greater variety of cone types/angles to be used without the risk of problems with yarn feed.
- Consider retrofitting accumulators, stop motions and other waste-saving devices to older machines.
- For more information about the role of machinery in waste management, see Good Practice Guide (GG82) *Investing to Increase Profits and Reduce Wastes.* This publication is available through the Environmental Helpline on 0800 585794.

4.2 WASTE RE-USE, RECYCLING, SALE AND DISPOSAL

- Sort all knitted waste by panel size and material. Also separate out the more valuable undyed waste from dyed waste. Store these wastes until you have enough to make it worthwhile for a waste merchant to collect them.
- Place labelled and accessible containers close to machines to allow easy sorting.
- Keep pure lambswool waste separate as this can be at least five times as valuable as mixed waste.
- Find the most profitable option for disposing of surplus wool. In some cases, single cones or part-cones can be sold through retail wool shops at a price approaching their original value.
- Consider buying an unroving machine to rewind valuable yarns from part-cones onto cones for re-knitting - some winding machines remove knots and splice the yarn to give a higher quality recovered yarn.
- Where possible, use small amounts of yarn - including part-cones - in the subsequent manufacture of patterned knitwear.
- When knitting unpatterned knitwear, use undyed yarns wherever possible. The completed garments can then be dyed to the colour ordered by the customer. This makes yarn re-use much easier and reduces waste significantly.

- Sell larger damaged panels to other textile manufacturers, eg those making children's knitwear and pet blankets. Before doing this, check the terms of the contract with your customer.
- Consider using surplus yarn, eg from the knitting of sweaters, for the knitting of socks, gloves and other small items. If your company or group does not manufacture small garments, establish contacts with companies in your area that do.
- If you have a dye house on site, consider over-dyeing coloured yarn-waste black for re-use or resale.
- Avoid using valuable wool waste for machine cleaning, etc.

The cost of misusing valuable panel waste

A knitting company in the Midlands uses about 240 damaged wool panels each week (approximately 50 kg) to mop up oil leaking from old knitting machines. These panels are, however, worth approximately £1/kg when sold on. Equivalent cotton rags from a merchant would cost only 20 pence/kg, thus saving the company £40/week or £2 000/year. If drip trays were used, the saving would be **£2 400/year**. There might also be an additional saving from re-using or selling the waste oil collected in the drip tray.

- Sell the often considerable amount of waste from the design room alongside production waste.
- Where practicable, re-use yarn cones on your own site. Plastic cones can be used many times while cardboard cones can be re-used two or three times. Label cones clearly (type, angle, size) to make re-use easier and avoid confusion.
- Where possible, return used cones to your original yarn supplier for re-use. If this is not practical (eg with a non-UK supplier), identify local spinners and dyers that use this type of cone and arrange to supply them.
- Where possible, standardise on one type of cone to make re-use easier. Urge your trade association and equipment suppliers (see Appendix) to consider an industry standard for cones.
- If you have a problem with cone-machine compatibility, talk to your equipment suppliers about the possibility of fitting adapter kits for specific cone types or to allow a wider variety of cones. Most modern knitting machines can accommodate almost any type of cone without affecting product quality.
- If you cannot return or re-use cones, store and sell them to plastic and cardboard recyclers.
- Stack cones inside one another to minimise the space required for storage and transport.

Benefiting from the sale of waste yarns and panels

Until recently, a knitwear company in the Midlands put all its yarn waste, and some of its panel waste, into the general waste skip for disposal to landfill. When the site engineer realised how much this practice cost the company, he started sorting and selling these valuable wastes.

The engineer began by selling redundant design yarns - approximately 800 kg/year - for about £1/kg to a local merchant. Since many of these sample yarns are given to the company, this represents £800 clear profit. Now the site engineer also segregates and sells make-up room waste, which can amount to 400 kg/week, at an average price of 9 pence/kg.

Sales of waste yarn and panels have produced revenue of around £2 500/year. In addition, waste disposal costs have fallen by about £3 000/year as only one skip lift/day is now needed.

The total savings of **£5 500/year** have gone straight to the company's bottom line.

5 WASTE MANAGEMENT OPPORTUNITIES IN HOUSEHOLD TEXTILES

Implementation of some of the practical waste reduction measures described in this Guide has allowed some companies in the household textiles sector to reduce fabric waste to 4% (see Fig 4), of which around 2% is sold on.

One company in the north-west of England estimates that recent reductions in cutting wastes alone are saving the company over **£100 000/year**.

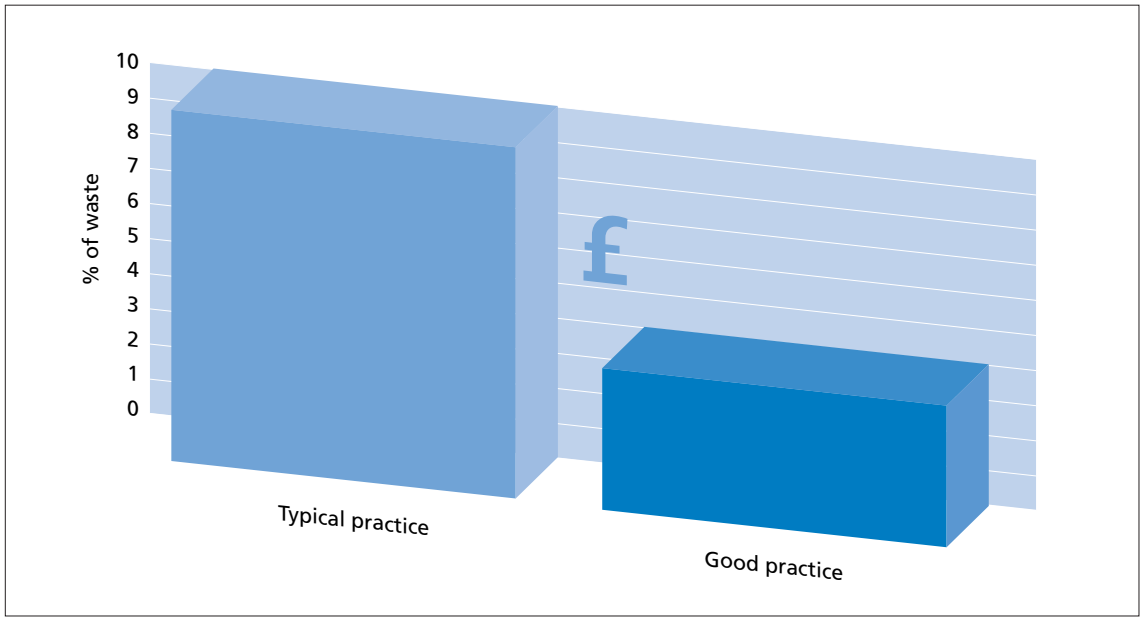


Fig 4 The potential for waste reduction through good practice in the household textiles sector

5.1 COST-EFFECTIVE MEASURES TO PREVENT WASTE

5.1.1 Production management and quality control

- Encourage your customers to place larger orders rather than frequent small orders. This will allow you to plan production and to use longer pieces, thus reducing overall waste.

The impact of piece length on fabric waste

With a curtain drop of 1.5 metres, a loss of 1 metre from a 100 metre piece, ie a 1% loss, is unavoidable. If the piece were 200 metres long, the waste would still be 1 metre - but this now represents a loss of only 0.5%. Fabric pieces of 150 metres, 300 metres, 450 metres, etc involve no waste because the length is an exact multiple of 1.5 metres.

- Try to limit your product range in terms of colour and pattern. As the product range expands, production batches and fabric pieces tend to get smaller to meet regular, but small orders. This increases waste.
- If you carry out your own fabric printing, try to eliminate printing and coating errors. For example, calibrate the temperature controls regularly and check that they are set correctly for transfer printing.

- Inspect the fabric carefully **before** cutting. Faults that are not detected until the product is complete - and when all the expensive components have been added - are significantly more costly than those discovered at an earlier stage.
- Match colours between batches carefully. Colour matching problems can occur when:
  - printing on different batches of textile;
  - printing one product to match another, eg coated blinds and uncoated curtains.

  Test small quantities of fabric to avoid wasting much larger quantities.
- Reduce pattern-matching waste by cutting larger patterned and custom-made curtains from two pieces (two-ply) at the same time. The only waste with this approach is unavoidable end remnants. Traditional sequence batch cutting from a single piece of fabric produces much more waste.
- Resist customer requests to produce each patterned item identical to the next and not just identical to its partner, eg in a pair of curtains. This makes the pattern-matching problem much worse and fabric is usually wasted on every single item (particularly if the main pattern object is large).

  Take for example, a child's duvet cover printed with steam trains (300 mm long) running along the length of the fabric. If the customer wants each cover to start with the front of a train and the covers are 2 metres long, 100 cm will have to be removed to allow the next cover to start at the front of a train. Even without pair matching, the waste is 5%.
- Avoid stitching single width curtains/blinds together to make double width. This creates trimming waste (in the form of selvedge that has been removed) and involves additional stitching and labour costs. For those making ready-made curtains of a fixed width, it is good practice either to buy double width material and cut it down into single widths (which will require hemming) as required or, more efficiently, to buy exactly the correct amount of each width. However, the latter relies on a good forecast of future demand.
- Minimise the number of threads on hems. Five threads are usually adequate for normal household use. Using more threads slows down production significantly and consumes much more thread.
- When preparing made-to-measure curtains and blinds, wait until a sufficient number of orders have built up and then manufacture a batch. This avoids over-handling pieces with the associated disruption to production and waste on each occasion.
- Minimise product returns by improving quality control procedures.

5.2 WASTE RE-USE, RECYCLING, SALE AND DISPOSAL

- Consider extending your product range in terms of product size. Small items such as cushion covers, pillow cases, pelmets/valances, tiebacks and handkerchiefs allow maximum use of fabric remnants.
- If this is not possible, sell larger remnants to small-scale manufacturers of cushion covers, etc. Full-width pieces as short as 400 mm can be sold for much higher prices than those obtained from a textile merchant (see Section 6).
- Sell only the smallest fabric wastes on to merchants and make disposal **the very last resort**.
- If you carry out your own transfer printing, contact different paper merchants to find one which will take the waste backing paper. You may find one that is prepared to take this grade of material.

6.1 FABRIC AND FIBRE WASTE

The market for textile waste varies considerably over time. While traditional markets for textile waste have diminished, new markets are developing. It is, therefore, worth keeping track of the latest developments and market prices.

The main markets for fabric and fibre waste are indicated below. Most companies deal directly with a waste merchant/reclaimer that passes on the waste and reclaimed 'flock' to the end-users. In some cases, it may be worthwhile approaching local end-users directly.

Mixed fibre fabrics, eg cotton/Lycra mixes, still have a value. A market can generally be found for even the lowest quality wastes.

6.1.1 Textile merchants and reclaimers

Textile shoddy merchants and reclaimers are located predominantly in Lancashire and Yorkshire, with a few in the Scottish Borders, Northern Ireland and elsewhere. A selection of these companies is listed in the Appendix.

Shoddy merchants trade in waste fibres and materials, while reclaimers take shoddy fabric waste - including garments - and other hard waste such as yarn. Reclaimers 'willow', 'pull' and/or 'garnet' this waste to produce separate fibres. These are then blended to produce flock, which can be re-used for lower quality products including certain felts and blankets. Some reclaimers produce higher quality fibre where the natural and man-made fibre content is tested and certified.

In some cases, there may be an advantage in dealing mainly with one company. Some merchants specialise in certain fibres and buy predominantly from a particular sector. Some companies offer six-month contracts, during which period they are obliged to collect all waste, albeit at a variable price. However, it is worth contacting the merchants occasionally to obtain the best price for your particular type and quantity of waste. Prices vary considerably as a result of instabilities in both UK and overseas markets. It is also in your interests to encourage your waste merchants to consider all possible markets for their waste, including those noted below.

6.1.2 End-use markets

Felt manufacture

Needle felt manufacturers produce felts for a variety of uses. They are important users of textile waste, particularly garments.

Many of these companies are keen to find new, secure sources of material to supplement their supply of used garments and are prepared to consider the use of fibre waste direct from textile companies. It is, therefore, worth contacting felt manufacturers directly.

Other textile manufacture

A significant quantity of textile waste ultimately ends up being re-used by spinners and by the chemical companies that manufacture fibres and filaments.

Natural fibres and, to some extent, man-made fibres can be reclaimed for re-use, eg in spun yarn blends. Additionally, chemical companies that supply man-made fibres can now reclaim fibres - eg polyester, nylon 6 and nylon 6.6 - through depolymerisation and subsequent repolymerisation of

the resulting monomers. These chemical companies, therefore, offer a market for certain types of pure waste.

Shoddy fabric for clothing and rugs

After a severe decline in the UK during the 1960s, 1970s and 1980s, a handful of new shoddy manufacturing companies were set up, particularly to supply ethnic-style clothing. Loom selvedge can be used directly in the manufacture of lower quality rugs. Another use for textile waste - around 5 000 tonnes/year - is for carpet underlay.

This sector has the potential to expand and should therefore be considered as a possible route for fabric and other textile wastes.

Paper manufacture

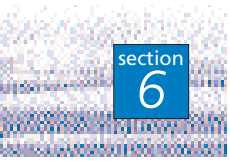
Cotton, sisal, manila and hemp are used extensively throughout Europe in the manufacture of paper products, including wet-strength papers/sacks and banknote-style papers. This market is extremely large.

Healthcare and surgical products

Cotton and viscose are used extensively in healthcare products, eg feminine hygiene, disposable nappies, dressing pads and wipes. Excluding the large market for nappies, over 24 000 tonnes of short cotton fibres (mainly first-cut linters from ginning) and viscose are used in the UK for such products.

Household textiles and toys

Flocks, felts and other reclaimed textiles are still used widely:



- as wadding for mattresses;
- as upholstery wadding and webs;
- in duvet and pillow fillings (new and recycled polyester);
- for the manufacture of dish-cloths, dusters and mops;
- to stuff toys.

The overall UK market is estimated at around 45 000 tonnes/year.

There is also a large market for remnants for making cushion covers in the UK.

Agricultural markets

Agricultural uses have traditionally offered an important outlet for textile wastes. Short-fibre waste - often referred to as 'shoddy manure' - is currently used as fertiliser, offering valuable nutrient content and good water retention characteristics. In the USA, cotton waste is used - with added supplements - as cattle feed. Textile wastes are also used for cattle bedding.

Seed-impregnated felt 'reclamation' blankets are now being employed, for example, in the innovative Landlife derelict land reclamation scheme on Merseyside. This market could increase, particularly if a derivative product can be developed for home gardeners. Production of a cheap peat substitute is another possibility for the use of textile waste in the garden, although it would be important to ensure that there was no risk of contaminants entering the food chain.

The presence of certain trace chemicals can limit the use of textile waste in agriculture and other land applications. Readers are advised to contact the Environmental Helpline on 0800 585794 for information about the current legislative position regarding the application of textile wastes to land.

Construction and landscaping

Woven and non-woven (bonded) textile meshes and webs - known as geotextiles - are used extensively in civil engineering and landscaping to provide soil stability, enhance plant rooting and screen out weeds. Even loose fibres can be used in conjunction with jute/hessian/polypropylene, providing a possible re-use route for bale sacks and short-fibre waste. Woven and non-woven textile wastes can also be used in sound-proofing and heat insulation products.

Automotive applications

Automotive applications such as upholstery, sound insulation, anti-rattle pads and mouldings for vehicles remain an important market for certain textile wastes. The automotive market relies increasingly on recyclable materials, eg polyester is used widely in the manufacture of moulded interior car parts.

Other industrial markets

A sizeable market for cloth waste exists within industry for use as wipes and, in some cases, in chemical spillage kits. It may be possible to sell certain wastes directly to local companies involved in engineering, printing, surface coating, road haulage, etc.

6.2 CARD AND PAPER WASTE

The UK has numerous card and paper waste merchants and recyclers, both large and small. Some are listed in the Appendix. However, the market for paper and cardboard waste tends to fluctuate greatly and this is reflected in the prices paid. The price can also vary considerably from company to company, depending on such factors as volume and degree of contamination. It is worth contacting paper/card merchants regularly to obtain the best deal.

There is a separate market for cardboard cartons and boxes, which attract a much higher price than normal card waste.

6.3 PLASTICS WASTE

The market for plastics waste is growing, and there are now many plastics recyclers operating throughout the country. The price paid depends on the type of plastic, cleanliness and quality/grade. Many recyclers have now invested in full washing equipment which should allow greater use of contaminated plastics, eg dirty 'tops' bags. In addition, processes are now available which allow dirtier feedstocks to be used for extrusion and compression moulding. Even if you have previously been unable to find a market for your plastics waste, it is worth contacting recyclers and waste exchange companies again in the light of these developments.

Although granulation machinery is expensive to buy or hire, it allows plastics waste to be sold direct to plastic moulding companies at a much higher price. However, this is only worthwhile for larger companies and for formal/informal company groupings.

6.4 WOOD WASTE

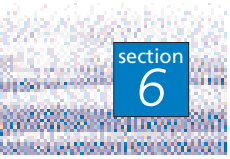
Most towns and cities have at least one pallet merchant who will be prepared to buy good quality pallets. Although good quality wooden pallets can be re-used, many pallets are designed to be single use only. Companies using cheap wooden pallets to manufacture chipboard products may be prepared to remove such one-way pallets, perhaps free of charge.

6.5 MARKETS WITHIN COMPANY GROUPINGS

Company groups are in an ideal position to re-use their wastes in other parts of the operation. This avoids the need to pay disposal costs or for waste exchange services. Material costs are also reduced.

The grouping need not be a commercial one. There may be scope for informal arrangements between local companies, perhaps using environment business clubs or waste minimisation clubs as the link. The aim should be overall minimisation of waste across the group of companies, preferably co-ordinated from a central point.

For more information about any of these markets, contact the Environmental Helpline on 0800 585794.



7 CONCLUSIONS AND ACTION PLAN

This Good Practice Guide describes a range of practical ideas to help you reduce waste, save money, and increase your company's revenue from unavoidable waste. Many of the measures involve little or no cost and are applicable to companies of all sizes. Measures that do involve some capital expenditure generally have a payback period of less than two years.

Many of these practical measures are already being implemented within the textiles industry. Examples throughout the Guide demonstrate how companies that have adopted this positive approach to solid waste management are achieving real bottom-line savings.

ACTION PLAN

The message is clear. If you want your company to stay ahead or at least keep up with the competition then:

'Make Good Practice YOUR Standard Practice'.

- Read *Waste Minimisation – Elements for Success* (ET80), available free of charge through the Environmental Helpline on 0800 585794.
- Decide which of the general waste minimisation measures described in ET80 and Section 2 of this Guide are appropriate to your company and begin to implement them *now.*
- Consider the waste management measures specific to your sector (see Section 3, 4 or 5). Identify those that are appropriate and begin to implement them *now.*
- If waste is unavoidable, keep up-to-date with market changes (see Section 6) and make sure you obtain the best possible price for your different wastes.

For large companies wishing to implement a waste minimisation programme, a detailed, systematic approach to waste reduction is discussed in a series of three complementary Good Practice Guides:

- (GG25) *Saving Money Through Waste Minimisation: Raw Material Use;*
- (GG26) *Saving Money Through Waste Minimisation: Reducing Water Use;*
- (GG27) *Saving Money Through Waste Minimisation: Teams and Champions.*

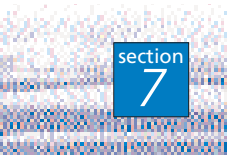
For smaller companies and growing businesses, further ideas may be found in:

- Good Practice Guide (GG38) *Cutting Costs by Reducing Waste*: *A Self-help Guide for Growing Businesses*;
- *Finding Hidden Profit - 200 Practical Tips for Reducing Waste (ET30)*;
- Good Practice Guide (GG82) *Investing to Increase Profits and Reduce Wastes*.

All these publications are available free of charge through the Environmental Helpline on 0800 585794.

The Environmental Helpline can also:

- arrange for you to be sent other relevant Environmental Technology Best Practice Programme publications;
- tell you about relevant environmental regulations that could affect your operations;
- arrange for a specialist to visit your company free of charge if you employ fewer than 250 people;
- signpost other sources of information.



Appendix

USEFUL CONTACTS

A list of useful contacts is given below. This listing is not exhaustive and has been compiled from information currently available to the Environmental Technology Best Practice Programme. The listing of an organisation should not be regarded as an endorsement of its services or products by the Programme. Similarly, the Programme makes no claim for the competence or otherwise of any organisation not listed.

Further advice may be obtained from the Environmental Helpline on 0800 585794.

Company	Telephone	Nature of business
Paper/card		
Bargain Box Company	01484 435322	Carton merchants
Biffa	01494 521221	Paper/card and plastics recycling
Blackburns of Dewsbury	01924 465958	Paper and card merchants
Davidsons Waste Paper	01924 475245	Paper and card merchants
Leicester Paper Processers (Midland Waste)	0116 289 3421	Carton recycling/general waste
M&B Haulage and Waste Paper Services (Dewsbury)	01924 498199	Paper and card merchants
General waste		
Biffa	01494 521221	General waste contractor Paper/card/plastics recycling
UK Waste Management Ltd (Northern Office)	0161 775 1011	General waste contractor
Waste Exchange Services Limited	01642 606055	National waste merchants
Plastics/cones		
AB Plastics	01274 394887	Plastics recycling
Quay Plus	01535 609194	Plastics recycling
S & G Ellis	01924 260167	Polythene bag recycling
Winding Cones	01535 275125	Yarn cone recycling
Textiles		
West Yorkshire		
J Bevan Robinson	01274 567476	Textile merchant
Clegg Wools	01484 435222	Textile merchant
J H Cockroft	01422 373311	Textile merchant
A N Cooke	01924 464361	Textile merchant
F Cordingley	01274 724680	Textile merchant
Henry Day & Sons	01924 464351	Textile merchants/reclaimers
Harr & Rhodes	01274 660018	Textile merchant
I & A Peacock	01274 602316	Textile merchant
James Robinson Fibres	01274 689400	Textile merchant
M J & G Stross	01924 465904	Textile merchant
T D Whitfield	01274 613106	Textile merchant

Company	Telephone	Nature of business
Lancashire		
Metex	01254 793893	Textile merchant
SRM	01257 475115	Textile merchant
East Midlands		
Haines Brothers	01455 845855	Textile merchant
Northern Ireland		
Jim Robinson (Belfast)	01232 851359	Textile merchant
Other textile waste buyers		
Edward Clay & Sons Ltd	01924 273994	Flock and felt manufacturer
A Clegg & Son	0151 428 1361	Flock and felt manufacturer
Evergreen	01924 453419	Shoddy garment manufacturer
Landlife (Merseyside)	0151 728 7011	Derelict land reclamation charity
Other		
Allertex	01274 723783	UK agents for Dornier and Benninger textile machinery
Irojex Ltd	0116 269 7989	Suppliers of accumulators
Coats Ltd	0116 275 2020	Thread manufacturer. Operates a 'use or return scheme'
Trade associations		
British Apparel and Textile Confederation	0171 636 7788	
British Association of Clothing Machinery Manufacturers	0171 323 0096	
British Clothing Industry Association	0171 636 7788	
Confederation of British Wool Textiles	01274 652207	
Knitting Industries Federation	0116 254 1608	
Local Action for Textiles and Clothing	01484 450146	
Nottinghamshire & Derbyshire Clothing and Textile Association	01623 440612	
Northern Ireland Textiles and Apparel Association	01846 689999	
Scottish Textile Association	0141 226 3262	
Silk Association of Great Britain	0171 636 7788	
Textile Finishers Association	0161 832 9291	
Technology development		
British Textiles Technology Group	0161 445 8141	
UMIST Textiles Department	0161 200 4128	

The Environmental Technology Best Practice Programme is a joint Department of Trade and Industry and Department of the Environment initiative. It is managed by AEA Technology plc through ETSU and the National Environmental Technology Centre.

The Programme offers free advice and information for UK businesses and promotes environmental practices that:

- **increase profits for UK industry and commerce;**
- **reduce waste and pollution at source.**

To find out more about the Programme please call the Environmental Helpline on freephone 0800 585794. As well as giving information about the Programme, the Helpline has access to a wide range of environmental information. It offers free advice to UK businesses on technical matters, environmental legislation, conferences and promotional seminars. For smaller companies, a free counselling service may be offered at the discretion of the Helpline Manager.

FOR FURTHER INFORMATION, PLEASE CONTACT THE ENVIRONMENTAL HELPLINE

0800 585794

e-mail address: etbppenvhelp@aeat.co.uk

World wide web: http://www.etsu.com/ETBPP/