HOW TO PROFIT FROM LESS WASTE AND LOWER ENERGY USE IN THE TEXTILES INDUSTRY

Textiles Workbook

ET184

The Environmental Technology Best Practice Programme (ETBPP) is a joint Department of Trade and Industry and Department of the Environment, Transport and the Regions programme managed by AEA Technology plc through ETSU and the National Environmental Technology Centre.

The Department of the Environment, Transport and the Regions' Energy Efficiency Best Practice Programme (EEBPP) provides impartial, authoritative information on energy efficiency techniques and technologies in industry, transport and buildings. The Programme is implemented through BRECSU (buildings) and ETSU (transport and industry).

For more information on both the Energy Efficiency Best Practice Programme and the Environmental Technology Best Practice Programme, contact the Environment and Energy Helpline on 0800 585794 (e-mail: etbppenvhelp@aeat.co.uk; world wide web: http://www.etsu.com/etbpp/).

Prepared with assistance from Symonds Group Ltd.

SUMMARY

All sectors of the textiles industry produce significant amounts of waste and use processes, eg scouring, bleaching, dyeing and finishing, that are very energy and water intensive. Implementing no-cost and low-cost measures to reduce waste and energy use could reduce water and effluent costs by 20% or more and energy costs by 10%. These cost savings will go straight to the bottom line. Companies are also faced with increasingly stringent legislative controls and rising water and other raw material costs. Efficient and effective use of raw materials and improved process operations are vital if textile companies are to remain competitive.

This Workbook is intended to provide busy people in all sectors of the textiles industry with the tools and information they need to implement a systematic programme to reduce waste and energy use. The Workbook, which was originally produced to support a series of workshops, can also be used as the basis for a presentation on waste minimisation.

The financial and environmental benefits of a systematic approach to reducing waste and energy use are easily achievable. To be successful, waste minimisation programmes must begin with commitment and active support from senior management. Many companies have found it helpful to appoint a Champion to co-ordinate and facilitate the programme. Involving everyone in the company is another key element for success.

Having obtained commitment, the next stage is to review the existing situation. The assessment phase involves:

- identifying and measuring waste and energy use;
- calculating the true cost of waste to your company;
- identifying priority areas for action.

The Workbook contains practical tools to help you get started in your company, including a waste opportunity checklist, example process maps, blank inventories and a data assessment table for ranking options. Industry Examples are used to illustrate the savings that can be achieved through a systematic approach to reducing waste and energy use. Tips for quick results and advice on how to prepare an Action Plan are also given. Companies are urged to document and publicise savings to gain commitment for the programme and ensure continual improvement. A programme to reduce waste and energy use can be carried out as part of continual improvement within the framework of an environmental management system.

CONTENTS

1 INTRODUCTION

This Workbook is intended to help companies from all sectors of the textiles industry save money by minimising waste and using energy efficiently. The Workbook, which was originally produced to support a series of joint ETBPP/EEBPP workshops, explains the fundamental principles of waste minimisation and energy efficiency.

Reducing waste and energy use in the textiles industry can produce cost savings, improve performance, prevent non-compliance with environmental legislation and reduce adverse impacts on the environment.

The Workbook's concise layout is intended to help people with limited time who wish to:

- gain an understanding of the benefits of waste minimisation;
- take positive action to reduce waste and energy use and thus improve their company's overall performance.

Space is provided for you to make your own notes as you read the Workbook.

The Workbook can also be used to provide source material for a presentation or workshop on waste minimisation in your company. Please use the transparency templates given in the Workbook to prepare your own overheads.

The main objectives of the Workbook are to:

- explain the fundamentals of a waste minimisation programme;
- show how a systematic approach can be used;
- provide you with useful tools and techniques;
- demonstrate how a programme to minimise waste and use energy efficiently can save money, improve efficiency and safeguard the environment.

Further help and advice

The Environment and Energy Helpline (0800 585794) can:

- Send you copies of relevant ETBPP and EEBPP publications (see Sections 6.1 and 6.2 respectively).
- Tell you about environmental and other regulations that could affect your operations.
- Provide free advice and up-to-date information on environmental and energy issues, equipment suppliers and technologies.
- Arrange for a specialist to contact your company if you employ fewer than 250 people, at the discretion of the Helpline manager.

2 WASTE MINIMISATION - WHAT DO YOU NEED TO KNOW?

2.1 KEY ISSUES AND BENEFITS

PRESENTATION TRANSPARENCIES

PLEASE USE THIS SPACE FOR YOUR OWN NOTES

WASTE MINIMISATION

The systematic reduction of waste at source:

- Raw material consumption
- Water and energy use
- Emissions to air, land and water
- Direct use of materials and services

Waste minimisation is more than just the material that ends up in a skip. It covers all aspects of the company. The true cost of waste (materials, energy, labour and treatment) is often 5 - 20 times the cost of disposal.

THE WASTE MANAGEMENT HIERARCHY

- Prevention — *Starting point and best option*
- Reduction
- Re-use
- Recycle
- Treat
- Dispose

Finishing point and least preferred option

Prevention is better than cure. The nearer reduction is to the source, the more cost-effective it is. Recycling and treatment cost more and can lead to pollution, while landfilling or discharge usually costs most.

By implementing no-cost and low-cost measures, you could reduce your water and effluent costs by 20% or more and your energy bill by 10%.

HOW IS WASTE MINIMISATION ACHIEVED?

- Prevention at source
- New process technology
- Re-use and recycling
- Examining supplier and customer links
- NOT end-of-pipe, NOT added costs

For the best long-term benefits, look for solutions in this order.

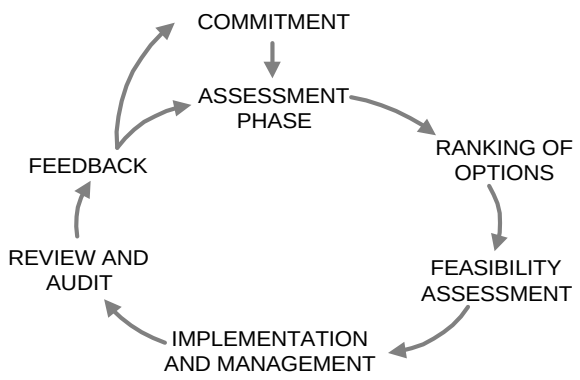
BENEFITS OF WASTE MINIMISATION

- ✓ Financial
- ✓ Process performance
- ✓ Compliance
- ✓ Environmental
- ✓ Risk and liabilities
- ✓ Public and company image
- ✓ Competitive edge and sustainability

Reducing the amount of waste not only saves the cost of managing the waste, but reduces production costs more. Minimising waste is essential to maintaining business competitiveness and sustainability.

Dryers are often badly controlled, resulting in over-drying and off-specification product. Tighter control can reduce energy costs by 10%. A detailed audit can produce energy savings of up to 20% without any major capital expenditure.

STEPS IN WASTE MINIMISATION



Successful waste minimisation programmes always begin with top level commitment and the formation of a waste minimisation team led by a Champion. The next step is to quantify and cost your wastes. This involves planning and organising your colleagues to assist in data collection. The best options can then be costed and implemented.

REMEMBER:

- Waste can always be reduced
- What comes in must go out
- Every waste has its source
- Every effect has a cause
- Understanding waste leads to control, efficiency and quality

Waste minimisation will give you more control over disposal costs, make it cheaper and easier for you to comply with environmental regulations, and will improve your reputation with customers.

Waste minimisation will save you money - typically up to 1% of business turnover, either as extra profit or in reduced operating costs. A **£** saved equals a **£** of extra profit!

SUMMARY

- Systematic reduction of waste and energy use at source produces cost savings.
- Financial and environmental benefits are easily achievable.
- Successful programmes always begin with staff commitment.
- A Champion and project teams are needed to plan and organise the programme.
- The assessment phase involves identifying, quantifying and costing energy use and waste.
- Feasibility analysis will identify the options and priorities for cost-effective waste and energy reduction.
- Implement quick and economic measures first to make a fast start.
- Don't forget to publicise success - this leads to further improvements.

Key Action:

Identify the key benefits of developing a systematic waste minimisation and energy efficiency strategy for your company and obtain commitment.

3 OVERCOMING BARRIERS AND GETTING STARTED

3.1 WINNING SUPPORT WITH TEAMS AND CHAMPIONS

PRESENTATION TRANSPARENCIES

PLEASE USE THIS SPACE FOR YOUR OWN NOTES

WHAT ARE THE BARRIERS?

- Senior management commitment
- Money
- Resources
- Time
- Holidays and shutdowns

The success of any waste reduction programme depends on active support from senior management. To overcome barriers, you may need to provide evidence that worthwhile savings can be made.

THE CHAMPION'S ROLE

- Co-ordinator
- Communicator
- Team builder
- Project manager
- Leader

Most companies find it helpful to appoint a team leader or Champion, whose role is to co-ordinate and facilitate.

Publicise the success and progress of your waste minimisation programme on notice-boards or in the company newsletter.

CHAMPION PROFILE

- Enthusiasm
- Credibility at all levels
- Organisational skills
- Ability to motivate others
- Ability to communicate

Depending on the size and structure of your company, the Champion could be the managing director, production manager, quality manager or environmental manager.

VALUE OF TEAMS

- Involvement creates ownership
- Cross-functional benefits
- Removes barriers for change
- Provides self-training

To integrate waste minimisation into your company's culture, you need to involve employees from all areas. Remember involvement creates ownership.

Employee suggestion leads to savings of over £15 000/year

At a textiles manufacturer, excess latex mix is now re-used rather than being disposed of to landfill. Cost savings in the first year were over £15 000, giving a payback period of 12 weeks. The improvements and savings were the direct result of an employee suggestion. For more details, see Good Practice Case Study (GC63) *Latex Recycling Achieves Substantial Savings for Little Cost*. GC63 is available free of charge through the Environment and Energy Helpline on 0800 585794.

WINNING SUPPORT

- Emphasise potential for cost savings
- Publicise senior management commitment
- Involve others and ask for ideas
- Publicise achievements
- Provide feedback

Use the Industry Examples in this Workbook to convince senior management that worthwhile savings can be made. ETBPP and EEBPP literature (free through the Environment and Energy Helpline on 0800 585794) also provides a useful source of information. Identify one or two areas within your company where savings can be made simply and easily. Once you've obtained commitment, publicise the project within your company so that others can get involved.

Demonstrate to senior management that waste reduction provides an excellent opportunity to cut costs. Stress that it can also help the company to comply with environmental legislation, enhance product quality and improve the efficiency of the whole business operation.

Good practice saves water and money

In the knitted cloth sector, a survey found that specific water consumption ranged from 70 m^3/tonne to 206 m^3/tonne of cloth produced. For a company producing the sector's average output, the difference in water costs between the worst and the best performance is nearly £474 000/year.

For more details of water use in the woven cloth, fibre and yarn, knitted cloth and garments sectors of the textiles industry, see Environmental Performance Guide (EG98) *Water Use in Textile Dyeing and Finishing*. EG98 is available free of charge through the Environment and Energy Helpline on 0800 585794.

SUMMARY

- Successful waste minimisation programmes depend on senior management commitment.
- Active support from management will overcome barriers to waste minimisation.
- Appoint a project Champion to co-ordinate and facilitate your waste minimisation programme.
- Set up a project team to help gather information and implement the programme.
- Win support from staff and senior management by emphasising the potential for cost savings.

Key Action:

Get a statement of commitment from senior management.

3.2 IDENTIFYING AND MEASURING WASTES

PRESENTATION TRANSPARENCIES

PLEASE USE THIS SPACE FOR YOUR OWN NOTES

STEP-BY-STEP APPROACH

- Make someone responsible
- Obtain information about your site
- Establish how much waste is produced
- Identify waste and energy costs
- Identify opportunities for reducing waste
- Prepare an Action Plan and set targets
- Review progress

Waste minimisation covers many areas - raw material use, water and energy use, effluent production, packaging, consumables and wasted effort. Once someone has been made responsible, the next stage is to identify and gather information about waste and energy consumption.

GATHERING AND ORGANISING INFORMATION

- Find sources of information
- Identify the true costs of waste
- Use appropriate tools for the job

You need to establish how much waste your company generates and how much this costs each year.

Regular monitoring produces significant energy savings

An energy efficiency campaign at a textiles manufacturer reduced energy consumption by 27%. Half of the savings were achieved with little or no capital expenditure. The key elements were good housekeeping, staff involvement and regular monitoring. For more details, see Good Practice Case Study 254 *Implementing an Energy Management Programme in a Textile Finishing Company*. GPCS254 is available free of charge through the Environment and Energy Helpline on 0800 585794.

INITIAL ASSESSMENT

- Compile an inventory of inputs and outputs
- Collect information on quantities
- Collect information on costs

The aim of the initial assessment is to determine - or at least estimate - the cost of waste. To do this, you need to examine inputs and outputs to your process(es). Start with your main raw materials.

WHERE DO YOU FIND INFORMATION?

- Company records and reports
- Flow diagrams of unit operations
- Meter readings and energy bills
- Water company and waste disposal bills

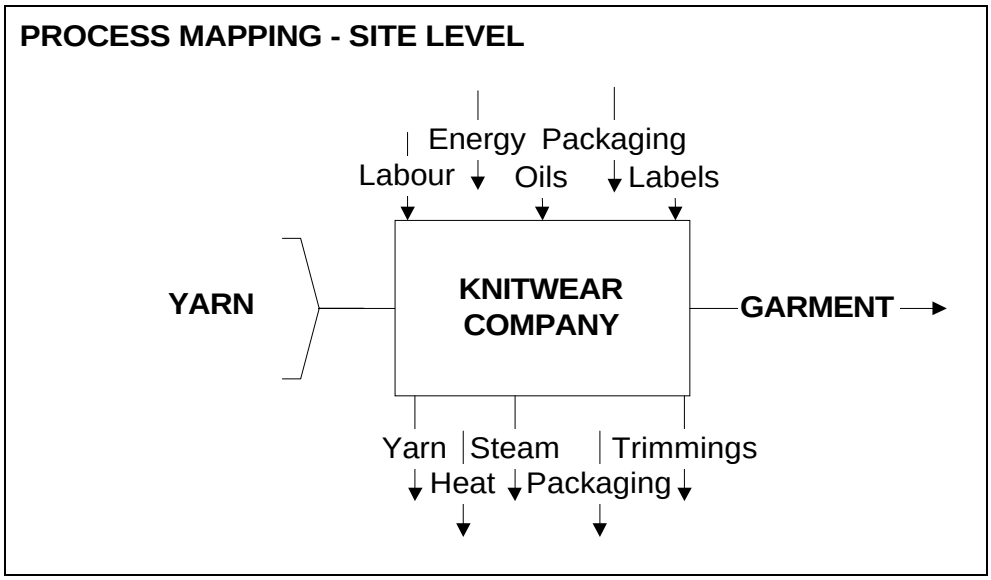
Start with your company's own records.

OTHER SOURCES OF INFORMATION

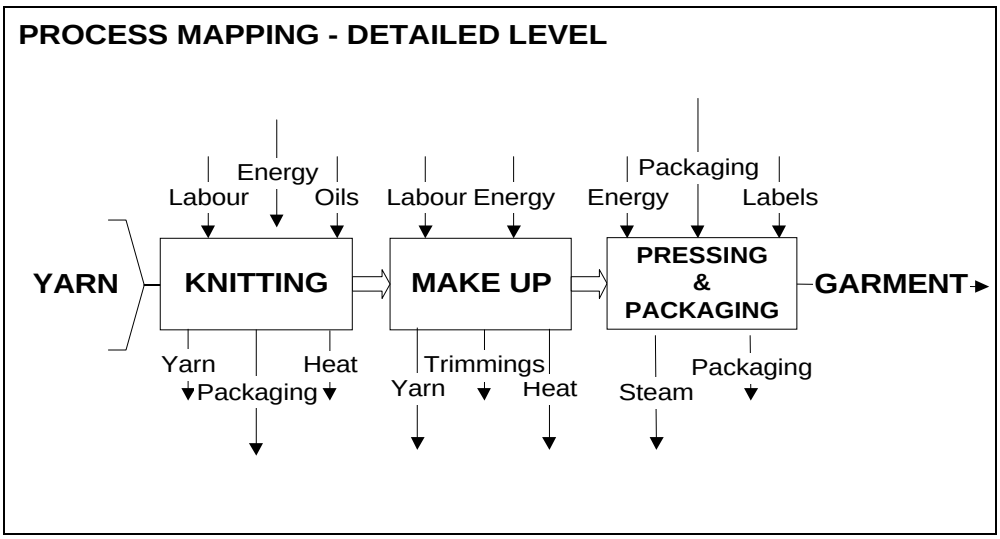
- Effluent discharge consents
- Water abstraction licences
- Process authorisations
- Duty of Care documentation
- Packaging waste regulations data

Focus on a few major areas where the largest financial savings can be made.

PRESENTATION TRANSPARENCIES



Use a process flowsheet to map your company's inputs and outputs. Start by looking at your company or site as a whole - identify the main raw materials, utilities and wastes. Do you know the cost of each input and output?

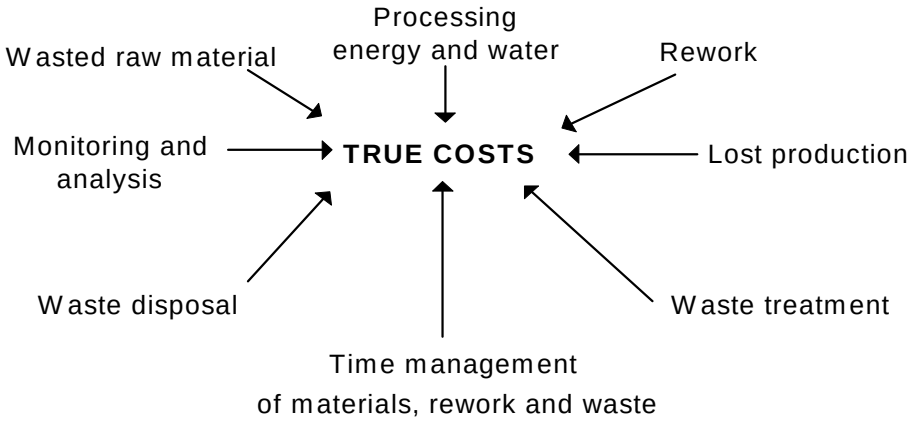


Then use the same technique to map individual processes and gain more detailed information. Each step of the process adds value to a product and incurs a cost from the labour, materials and utilities (gas, water, electricity, compressed air, etc) used in that process. Use the example in Section 3.4 to help you calculate the value-added costs of your wastes.

Waste survey finds true cost of waste is three times more than expected

Do you appreciate the true cost of your waste? A Leicestershire-based dyer estimated effluent disposal costs to be around £50 000/year. In fact, the true cost was found to be over £150 000/year. Implementing a systematic waste minimisation programme subsequently reduced water and effluent costs by 19%, ie £28 500/year.

IDENTIFYING THE TRUE COST OF WASTE



Waste is not just discarded materials. It includes wasted money, time, loss of materials to air and drain, and excessive use of energy and water.

RECORDING INFORMATION

- Inventories
- Data assessment table
- Computer or paper records

Make sure the information you collect is recorded in a systematic manner. The inventories and data assessment table provided in Section 3.4 will help you analyse your information to identify and prioritise opportunities to reduce waste and energy use.

Monitoring shows machine using twice as much water as expected

A dyer in the woven cloth sector assumed that a scouring machine was using 120 litres/minute of water as stated in the manufacturer's specifications. When water consumption was monitored, actual use was found to be 240 litres/minute. Setting the machine correctly halved the cost of water for this machine, saving around £15 000/year.

INVENTORIES

- Process or site level
- Inputs
- Products
- Wastes and emissions

To determine how much waste is being produced, keep regular records of all inputs, products and waste quantities. Inventories can be used either for a site or individual processes.

DATA ASSESSMENT TABLE

Material	**Quantity**	**Units**	**Rank**	**Cost (£/year)**	**Rank**
Yarn	100	tonnes	2	1 000 000	1
Labels	2	tonnes	3	4 000	3
Packaging	200	tonnes	1	10 000	2
Energy	**Quantity**	**Units**	**Rank**	**Cost (£/year)**	**Rank**
Electricity	5	MWh/year	1	90 000	1
Gas	1	MWh/year	2	30 000	2
Wastes	**Quantity**	**Units**	**Rank**	**Cost (£/year)**	**Rank**
Packaging	75	tonnes	1	4 000	2
Yarn and trim	5	tonnes	2	9 000	1

The blank data assessment table given in Section 3.4 will help you rank options for waste and energy reduction in your company and identify priority areas.

Chart production and waste regularly. For example, use wipe-clean boards positioned close to the relevant process.

MEASURING TO MANAGE

- If you don't measure it - you can't manage it

As part of your Action Plan, make sure appropriate measuring systems are in place.

MEASURING AND ESTIMATING WASTE

- Make your best estimates
- Monitor the number of skip lifts, and waste volumes and weights
- Meter energy and water use
- Calculate energy and water consumption per output of product
- Compare with industry best practice, eg ETBPP and EEBPP

Good Practice Guide (GPG148) *Monitoring and Targeting in the Textiles Industry* shows how to establish straightforward systems that track energy consumption and identify opportunities to reduce costs. Environmental Performance Guide (EG98) *Water Use in Textile Dyeing and Finishing* will help you benchmark your company's water use against others in your sector. GPG148 and EG98 are available free of charge through the Environment and Energy Helpline on 0800 585794.

Energy teams help to achieve cost saving targets

An ongoing policy of minimising energy and utility costs at an organic chemicals manufacturer had resulted in numerous cost-saving modifications and practices. The company then decided to set targets for all management levels as part of a company-wide initiative. Energy teams established for each unit successfully harnessed previously untapped interest in energy efficiency. Additional ideas for reducing energy use saved the company £212 000/year - an overall saving of 9%.

For more details, see Good Practice Case Study 331 *Energy Management Within a Strategic Framework.* GPCS331 is available free of charge through the Environment and Energy Helpline on 0800 585794.

WIDER BENEFITS OF ONGOING MEASUREMENT

- Demonstrates that savings have been made
- Targets for future waste reduction
- Ongoing monitoring of achievements

Record measurements and retain them for future reference. This will enable you to demonstrate achievements.

SUMMARY

- Adopt a systematic approach to waste minimisation.
- Carry out an initial assessment of the amount of raw materials, water and energy used and waste produced.
- Compile an inventory of inputs and outputs for your site (with quantities and costs).
- Use a process mapping technique to identify systematically the true cost of waste.
- Summarise your information in a data assessment table to help you identify priorities for cost savings.
- Ensure systems are in place for measuring energy and waste.

Key Action:

Establish how much waste is produced, how much energy is used and how much this costs your company each year.

3.3 TOOLS FOR THE JOB

PRESENTATION TRANSPARENCIES

PLEASE USE THIS SPACE FOR YOUR OWN NOTES

TOOLS FOR THE JOB

- Waste opportunity checklist
- Process mapping
- Calculation of costs and value added
- Inventory tables
- Data assessment table

Practical tools are provided in this Workbook - together with examples - for you to use in the assessment phase of your waste minimisation programme.

WASTE OPPORTUNITY CHECKLIST

- Incoming materials
- Storage
- Production
- Energy
- Water
- Support services

The waste opportunity checklist (see Section 3.4) lists typical wastes which occur in the textiles industry. Use the list to help you identify wastes relevant to your operations.

Consider all wastes from your production processes as a potential source of income. Try not to regard all your waste as general waste just because no alternative comes to mind.

PROCESS MAPPING

- See the examples in Sections 3.2 and 3.4

Use a process flowsheet to map your company's inputs and outputs. Don't forget to calculate the value added for each process. This will help you determine the true cost of waste.

RECORDING INFORMATION

- Inventories
- Data assessment table
- Identifying priorities for quick results

Collect information in a systematic manner. Use the inventories and data assessment table in Section 3.4 to identify early opportunities for waste minimisation and cost savings at your site.

MEASURING WASTES

- Check bills
- Use simple measuring systems
- Meter the site
- Meter individual processes and machines

Decide on the level of measurement needed to check progress.

Despite the cost, large amounts of compressed air are lost from compressed air distribution systems through leaks. Simple checks can reduce energy use by air compressors by up to 20%.

FURTHER INFORMATION

- Free advice on energy and all other environmental business issues
- Free publications:
  - Good Practice Guides
  - Environmental Performance Guides
  - Energy Consumption Guides
  - Case Studies

Contact the Environment and Energy Helpline on 0800 585794.

Assistance is available to provide encouragement and ideas. For companies employing fewer than 250 people, the Helpline can sometimes arrange for a free visit from a specialist.

SUMMARY

- Use the waste opportunity checklist to help you identify your main wastes.
- Use the practical tools described in this Workbook to organise information about your inputs and outputs.
- Record information systematically either on paper or on a computer.
- Identify monitoring requirements and measure wastes and energy use.

Key Action:

Use process mapping and inventories to collect information in a systematic manner. Use the data assessment table at the end of this Section to rank options for reducing energy consumption and waste.

3.4 MAKING A START IN YOUR COMPANY

- Use the waste opportunity checklist (see pages 21 - 22), blank inventory sheets (see pages 25 - 28) and data assessment table (see page 29) to identify waste and energy use. Please photocopy these pages, as necessary, for use in your company.

- Apply the process mapping technique to your site. This will help you identify your inputs and outputs in a systematic manner.

- Use the systematic approach described in Section 3.2 to complete the data assessment table. This will allow you to rank options and identify opportunities for both quick savings and sustained long-term benefits.

- Remember that each step of a process adds value to a product and incurs costs from the labour, materials and utilities (gas, water, electricity, compressed air, etc) used in the process. Look out for wet processes where there is often a close link between water and energy use.

- If possible, calculate the true cost of waste for your site.

HINTS:

Identify major sources of waste, eg fibres, cuttings, trimmings, packaging, energy, water and rework.

Don't be put off if you don't have all the information. Make your best estimate, but note that you need to make simple measurements later.

Use the tools provided to help you get started. Ask for assistance if you need it by contacting the Environment and Energy Helpline on 0800 585794.

Significant savings from reducing water consumption

A company manufacturing fibre yarn reduced its water consumption by 660 m^3/week and thus saved approximately £30 000/year. This was achieved by using countercurrent washing in the washing range, recycling rinse water, collecting and re-using cooling water, and using wash-off water for dyeing.

More examples of what can be achieved by implementing good practice are given in Good Practice Guide (GG62) *Water and Chemical Use in the Textile Dyeing and Finishing Industry*. GG62 is available free of charge through the Environment and Energy Helpline on 0800 585794.

WASTE OPPORTUNITY CHECKLIST

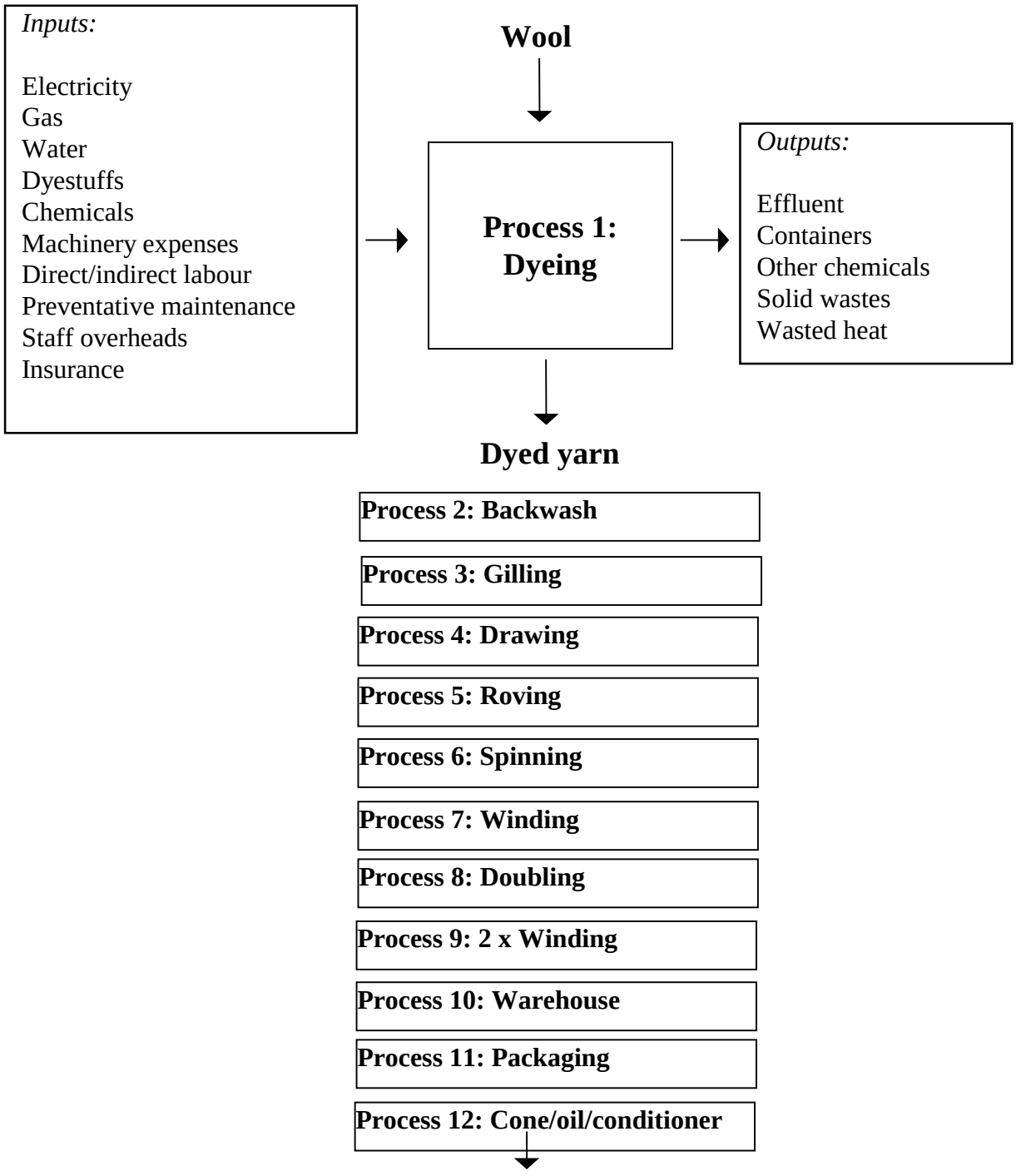
Department/service	Area	Possible waste	
Incoming materials	Loading docks, pipelines, receiving areas	Packaging/containers	☐
		Off-spec deliveries	☐
		Damaged containers	☐
		Spill residue	☐
		Cleaning rags, etc	☐
		Pallets (non-returnable)	☐
		Gloves, overalls, etc	☐
Storage (raw materials, parts, final products)	Tanks, silos, warehouse, drum storage, yards, storerooms	Tank bottoms	☐
		Off-spec materials	☐
		Excess materials	☐
		Damaged containers	☐
		Empty containers	☐
		Leaks from pumps/valves/pipes	☐
		Out-of-date materials	☐
		No-longer-used materials	☐
		Damaged products	☐
Production	Dyeing, spinning, winding, washing, scouring, bleaching, finishing, weaving, tufting, knitting, sewing	Washwater	☐
		Solvents evaporating	☐
		Still bottoms in tanks	☐
		Off-spec product rejects	☐
		Dyes	☐
		Empty containers	☐
		Sweepings	☐
		Ductwork clearout	☐
		Additives, bleach, etc	☐
		Oil	☐
		Process solution dumps	☐
		Rinse water	☐
		Excess materials	☐
		Filters	☐
		Leaks from tanks/pipes/valves	☐
		Spill residue	☐
		Off-cuts	☐
		Trimming, fibres	☐
		Dust	☐
		Packaging of dispatched goods	☐

WASTE OPPORTUNITY CHECKLIST (CONTINUED)

Department/service	Area	Possible waste	
Energy	Buildings, processes, boiler plant and plant distribution system	High temperatures	☐
		Lights left on	☐
		Taps left running	☐
		Doors left open	☐
		Air leaks from compressor lines	☐
		Heat loss through roof/doors/windows	☐
		Money wasted through buying electricity, gas and water at high tariffs	☐
		Lamps beyond economic life	☐
		Poorly controlled or inefficient heating/hot water systems	☐
		Electric motors over five years old	☐
		Process heat not re-used	☐
Water	Processes, toilets, kitchens	Urinals flushing continually	☐
		Underground leaks	☐
		Taps left running	☐
		Wasteful wash-downs	☐
Support services	Laboratories, maintenance shops, garages, offices	Chemicals	☐
		Samples and containers	☐
		Solvents	☐
		Cleaning agents	☐
		Lubricating oils and greases	☐
		Scrap metal, wood	☐
		Caustics	☐
		Filters	☐
		Acids	☐
		Batteries	☐
		Office paper, etc	☐
Other	Consumables	Detergents	☐
		Overalls	☐
		Gloves	☐
			☐
			☐
			☐
			☐

EXAMPLE PROCESS MAP FOR A WORSTED YARN DYEING COMPANY

The example shows the inputs and outputs for **one** of the 12 separate processes which form the company's manufacturing operation. Ideally, all 12 processes should be mapped.



Use the blank inventories on pages 25 - 28 to help you produce your own process map.

EXAMPLE CALCULATION OF VALUE ADDED TO PRODUCT FOR EACH PROCESS

The example is for a worsted yarn dyeing company. It shows clearly how raw material waste produced in later processes, eg spinning and packaging, is of significantly higher value.

Item/process		**Value added to product for each process**
Raw material:	**Wool**	£2.50/kg
Process 1:	Dyeing	(+0.83) £3.33/kg
Process 2:	Backwash	(+0.14) £3.47/kg
Process 3:	Gilling	(+0.19) £3.66/kg
Process 4:	Drawing	(+0.16) £3.82/kg
Process 5:	Roving	(+0.17) £3.99/kg
Process 6:	Spinning	(+0.57) £4.56/kg
Process 7:	Winding	(+0.36) £4.92/kg
Process 8:	Doubling	(+0.34) £5.26/kg
Process 9:	2 x Winding	(+0.26) £5.52/kg
Process 10:	Warehouse	(+0.14) £5.66/kg
Process 11:	Packaging	(+0.70) £6.36/kg
Process 12:	Cone/oil/conditioner	(+0.07) £6.43/kg
End product:	**Finished yarn**	**= £6.43/kg**

Do you know the value added to your product?

INVENTORY OF PROCESSES	
Organisation	**Page of**

Process number	Process name

INVENTORY OF INPUTS		
Organisation	**Process**	**Page of**

Input number	Input name	Input use

INVENTORY OF PRODUCTS		
Organisation	**Process**	**Page of**

Product number	Product name	Product use

INVENTORY OF WASTES AND EMISSIONS		
Organisation	**Process**	**Page of**

Waste/emission number	**Waste/emission type**	**Waste/emission use (if any)**

DATA ASSESSMENT TABLE

To make ranking easier, if possible use the same unit of measurement for the different categories of inputs and wastes, eg tonnes/year for materials and wastes, kWh/year for energy and m^3/year for water.

Organisation			**Input/output**		
Prepared by			**Process/site**		
Inputs and wastes	**Annual quantity**	**Units**	**Rank (by quantity)**	**Cost (£/year)**	**Rank (by cost)**
Raw materials					
Water					
Energy					
Wastes/emissions					

4 WORKSHOP: MAKING AN ACTION PLAN FOR YOUR COMPANY

PRESENTATION TRANSPARENCIES

PLEASE USE THIS SPACE FOR YOUR OWN NOTES

The aim of the workshop is for you to write an Action Plan for your company. This will help you to make a fast start with your systematic approach to waste and energy reduction and convince your colleagues of the savings possible.

The Action Plan should contain no more than ten points. Share your ideas with other people. They will benefit from your own experiences and be able to help you, too.

HINTS

Do you need to convince senior managers about the benefits and savings possible from waste minimisation?

Who would be the best person to champion the initiative? Is it you?

Do you need to overcome any barriers before you can get started?

Could your company benefit from installing more meters?

In a survey of the amount of water used in the UK textile dyeing and finishing industry, it was found that the more water meters installed at a site, the lower its specific water consumption.

For more information about the survey results, see Environmental Performance Guide (EG98) *Water Use in Textile Dyeing and Finishing*. EG98 is available free of charge through the Environment and Energy Helpline on 0800 585794.

5 WHERE DO YOU GO FROM HERE?

5.1 TEN POINT ACTION PLAN

PRESENTATION TRANSPARENCIES

PLEASE USE THIS SPACE FOR YOUR OWN NOTES

SUMMARY - THE TEN POINT PLAN

1. Obtain senior management commitment
2. Appoint a Champion and project team
3. Publicise the project
4. Establish quantities and costs of wastes
5. Set up an auditing system and identify monitoring requirements

Prepare an Action Plan to implement your step-by-step approach to waste minimisation.

SUMMARY - THE TEN POINT PLAN

6. Collate raw material, product, energy use and waste data sheets
7. Identify waste and energy reduction opportunities
8. Prepare a plan for improvements
9. Set waste and energy reduction targets
10. Review progress against targets and publicise results

The Action Plan should include realistic and achievable waste and energy reduction targets which have been agreed by senior management. When implementing the Action Plan, involve everyone and provide regular feedback. Review progress against targets at least annually.

Use returnable packaging rather than cardboard and shrink-wrap. Ask your suppliers to do the same.

5.2 ENVIRONMENTAL MANAGEMENT SYSTEMS

PRESENTATION TRANSPARENCIES

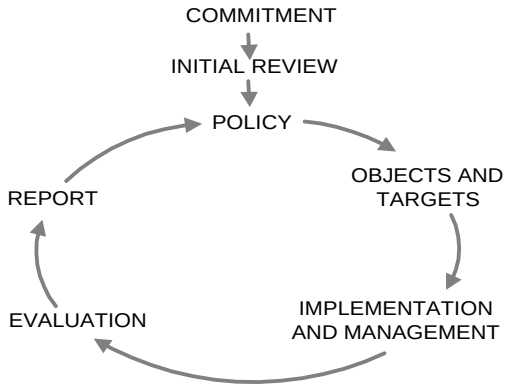
PLEASE USE THIS SPACE FOR YOUR OWN NOTES

WHAT IS AN EMS?

- Voluntary, systematic approach to managing your company's impact on the environment
- Informal system
- Accredited system, eg ISO 14001 or EMAS

An environmental management system (EMS) shows a company's approach to managing its environmental effects and demonstrates its commitment to continual improvement.

STAGES IN AN EMS



An environmental policy explains the company's commitment to understanding its impact on the environment and improving its performance. Improvement can be measured through progress against objectives and targets. As with any management system, an EMS requires documented procedures, effective implementation, regular evaluation and reporting.

Find out whether your waste could be re-used or recycled by another site or part of your group.

WHY DOES MY COMPANY NEED AN EMS?

- Increasing environmental pressures
- Increasing cost of compliance
- Increasing market pressures:
  - Supply chain
  - Public perception
- Leads to reduced operating costs

Good Practice Guide (GG137) *How to Set Up Environmental Management Systems in the Textiles Industry* provides practical advice applicable to all sectors and companies of all sizes. GG137 is available free of charge through the Environment and Energy Helpline on 0800 585794.

WASTE REDUCTION AND EMS

- Synergy of approach
- Waste reduction targets could form part of EMS
- Involves measuring and monitoring progress against targets
- Provides a stepping stone towards EMS

Many waste minimisation initiatives could be included in your company's EMS. When setting targets, be SMART (Specific, Measurable, Achievable, Realistic and Time-bound).

Materials costs in the worsted industry are high, with yarns typically costing £8 - £12/kg. Make sure that operators are aware of the value of the materials they are handling and the consequences of waste. Aim for maximum impact. 'We will save £5 000/year' has much greater impact than 'We would reduce waste by 1%'.

5.3 TIPS FOR QUICK RESULTS

PRESENTATION TRANSPARENCIES

PLEASE USE THIS SPACE FOR YOUR OWN NOTES

FAST START

- Identify priority areas for action
- Make a fast start on obvious opportunities to reduce waste and energy use
- Identify quick and cheap cost-saving measures

You should now be in a position to take positive action in your company to reduce waste and energy and improve performance.

Seek ideas from free ETBPP and EEBPP publications. Section 6 lists publications of interest to the textiles industry.

Discuss with your customers the minimum level of packaging acceptable to them. Then minimise the amount of packaging used to protect your product.

5.4 INDIVIDUAL ACTION

PRESENTATION TRANSPARENCIES

PLEASE USE THIS SPACE FOR YOUR OWN NOTES

THINK GLOBALLY - ACT LOCALLY

- Individual actions
- The bottom line for your company
- The environment

There are many ways in which individuals can contribute to improving the global environment through local actions, however small they appear. What's important is to think globally and act locally.

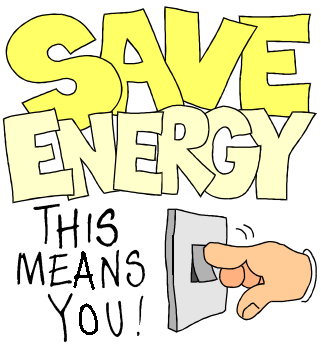
INDIVIDUAL ACTIONS

- Turn it off
- Reflect on it
- Watt's up
- Don't be a drip
- Copy right
- Just the fax
- A package deal

Overleaf are a few facts which will certainly make you think.

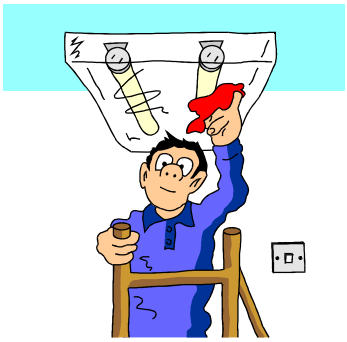
Ensure that machine start-up procedures and settings are properly documented and that operators are trained to use these procedures.

PRESENTATION TRANSPARENCIES



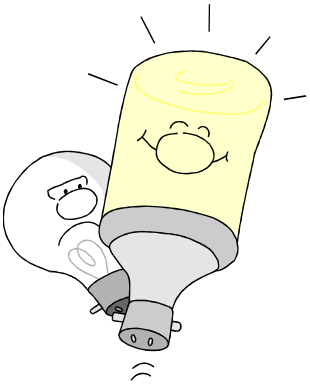
Turn it off

Inefficient use of office machines costs UK businesses up to £400 million/year in electricity charges. Turning off just ten monitors when they are not being used could save you £200/year in energy costs.



Reflect on it

A typical company has more fluorescent tubes than employees. If all fluorescent lighting fixtures in UK businesses used reflectors, up to 10 billion kWh of electricity could be saved.



Watt's up

Lighting accounts for over one-third of the energy used in commercial spaces. Many lighting improvements have a short payback period Energy efficient lighting can also reduce air conditioning costs by 8 - 10%. If all UK businesses used high efficiency lighting techniques, about 5% of all the electricity used in the UK could be saved.

Don't be a drip

UK office workers use enough water every day to fill 150 Olympic-sized swimming pools. If just 1 000 businesses with 100 employees installed tap regulators, the UK could save 15 million gallons of water every year.

Copy right

In the UK, we make nearly 500 billion photocopies a year - that's around 930 000 copies every minute of every day. According to one expert, an average company with 100 employees uses about 250 000 sheets of copier paper a year. That amount would make a stack of paper stretching nearly five floors high.

If each copier in the UK made five fewer copies every business day, up to 2.5 million sheets of paper could be saved. This would save the equivalent of 200 000 trees and keep more than 3.7 million cubic feet of paper out of landfills.

Just the fax

There are now over one million fax machines in use in the UK. If everyone switched from full-page to half-page cover sheets, about 120 000 miles of fax paper would be saved without reducing the number of faxes sent. Alternatively, don't use a fax cover sheet at all. Buy fax transmission stickers and just stick one on the first page before you send it.

A package deal

The UK produces about 7.6 million tonnes/year of packaging waste - that's enough to fill nearly 19 000 jumbo jets. Each year we use the equivalent of 140 corrugated cardboard boxes for each person in the UK - enough to make a pile as big as a football pitch and one and a half times as high as Nelson's Column. UK businesses use an estimated six million cubic feet of polystyrene beads a year - enough to fill the Canary Wharf tower nearly three times.

Separate all wastes at source. Label or colour-code waste containers and provide clear instructions on their use.

SUMMARY

- Prepare a ten point Action Plan to implement your systematic approach to waste and energy minimisation.
- Waste minimisation initiatives can be included in your company's EMS. Contact the Environment and Energy Helpline on 0800 585794 and ask for a free copy of Good Practice Guide (GG137) *How to Set Up Environmental Management Systems in the Textiles Industry*.
- Get quick results to demonstrate the effectiveness of the waste minimisation programme.
- Think globally - act locally.
- Every individual can contribute to improving the environment through local actions.

Key Action:

Identify opportunities for waste and energy reduction, particularly quick and inexpensive cost-saving measures.

5.5 ACTION CHECKLIST

This checklist summarises the actions needed to establish a successful waste minimisation programme. Not all of these actions will be appropriate for your company - use the checklist as a prompt to choose the ones that are.

Action	**Person responsible**	**Completion date**
Look at waste costs.		
Identify quick savings.		
Get a Statement of Commitment from senior management.		
Publicise the project.		
Appoint a Champion and set up the project team.		
Overcome barriers to progress.		
Educate and train staff.		
Map your processes.		
Compile an inventory of processes.		
Compile an inventory of inputs, including water and energy.		
Compile an inventory of products.		
Compile an inventory of wastes and emissions.		
Complete the data assessment table.		
Rank priorities for reducing waste and energy use.		
Identify monitoring requirements.		
Identify opportunities for reducing waste and energy use.		
Set targets.		
Develop an Action Plan to achieve continual improvement.		
Publicise quick results.		
Talk to suppliers, customers, contractors, etc.		
Contact the Environment and Energy Helpline on 0800 585794.		
Your own ideas:		

6 USEFUL PUBLICATIONS FOR THE UK TEXTILES INDUSTRY

6.1 ENVIRONMENTAL TECHNOLOGY BEST PRACTICE PROGRAMME

All ETBPP publications are available free of charge through the Environment and Energy Helpline on 0800 585794.

Guides specific to the textiles industry

- Good Practice Guide (GG62) *Water and Chemical Use in the Textile Dyeing and Finishing Industry*. This Guide describes how companies can reduce their water and effluent costs, often by as much as 20% or more, through implementing no-cost and low-cost changes. Overall cost savings can be doubled or trebled when the associated saving in raw materials is taken into account.

- Environmental Performance Guide (EG98) *Water Use in Textile Dyeing and Finishing*. This Guide provides a benchmark for assessing specific water consumption compared to other companies. It is divided into four sub-sectors: woven cloth, fibre and yarn, knitted cloth and garments. The Guide, which should be used in conjunction with GG62, is intended to alert companies to the benefits of implementing a water minimisation action plan.

- A series of four sector-specific waste minimisation Good Practice Guides that seek to encourage companies to minimise their waste and, where waste is unavoidable, to dispose of it in the most cost-effective way. Simple no-cost and low-cost measures to reduce waste are described.

  Each of the four Guides should be read in conjunction with a separate leaflet, *Waste Minimisation: Elements for Success* (ET80). Each Guide can be read as a stand-alone publication for the sector concerned.

  - Good Practice Guide (GG42) *Waste Management in the Worsteds and Knitwear Sectors*

  - Good Practice Guide (GG79) *Reducing Costs Through Waste Management: The Woollen Sector*

  - Good Practice Guide (GG84) *Reducing Costs Through Waste Management: The Cotton and Man-made Fibre Sector*

  - Good Practice Guide (GG86*) Reducing Costs Through Waste Management: The Garment and Household Textiles Sector*

  ET80 provides general waste minimisation advice, including tips to reduce packaging and packaging waste, reduce disposal costs and good housekeeping.

- Good Practice Guide (GG137) *How to Set Up Environmental Management Systems in the Textiles Industry.* This Guide provides textile companies with the tools needed to implement an environmental management system (EMS) to address specific environmental issues and reduce their environmental impact. The Guide, which stresses the benefits of an EMS, is applicable to all sectors of the textiles industry and companies of all sizes.

Case Study leaflets specific to the textiles industry

- Good Practice Case Study (GC63) *Latex Recycling Achieves Substantial Savings for Little Cost.* This Case Study at Ulster Carpet Mills Ltd demonstrates the economic and environmental benefits of using a latex recovery system in carpet manufacturing.

- Good Practice Case Study (GC89) *Reduced Packaging Brings Significant Savings.* This Case Study at Ambler of Ballyclare demonstrates the significant financial and environmental benefits of implementing a packaging waste minimisation programme.

- Good Practice Case Study (GC110) *Water and Cost Savings from Improved Process Control.* This Case Study at Welbeck Fabric Dyers demonstrates the financial and environmental benefits of improved process control and good housekeeping to reduce water consumption.

- New Practice Case Study (NC139) *New Technology Reaps Cost and Product Benefits.* This Case Study at Shrigley Dyers Ltd demonstrates the economic and environmental benefits to a textile dyer of investing in cleaner technology. (See also EEBPP New Practice Case Study 109.)

- New Practice Case Study (NC145) *Removing Colour from Effluent Benefits Textile Company*. This Case Study at Courtaulds Socks demonstrates the economic and environmental benefits of removing colour from dye-house effluent and recycling the clarified water.

- Future Practice Profile (FP70) *Optimised Process Reduces Formaldehyde Emissions.* This future practice study aimed to reduce the formaldehyde emissions released during the application of a flame retardant finish to cotton fabrics.

Generic Guides useful to the textiles industry

- Good Practice Guide (GG37) *Cost-effective Separation Technologies for Minimising Wastes and Effluents.* Using separation technologies as part of the production process can prove more cost-effective than using a larger effluent treatment plant. The Guide describes proven techniques for the separation of dissolved substances from liquids and the separation of gases from liquids.

- Good Practice Guide (GG54) *Cost-effective Membrane Technologies for Minimising Wastes and Effluents.* This Guide explains the basic principles and describes applications of the main membrane technologies - ultrafiltration, reverse osmosis, nanofiltration and microfiltration. Advice on membrane selection and details of other commonly available technologies are also given.

- Good Practice Guide (GG67) *Cost-effective Water Saving Devices and Practices*. This Guide describes a range of cost-effective water saving devices and practices applicable to industrial and commercial sites. It highlights the typical water savings that can be achieved for industrial and commercial applications and explains how to identify the most appropriate devices and practices for specific equipment, processes or sites.

- Good Practice Guide (GG71) *Cost-effective Reduction of Fugitive Solvent Emissions.* This Guide describes techniques that can be used to reduce the cost of organic solvents lost as leaks from pipework components. It indicates the many sources of fugitive emissions and presents a fugitive emission control strategy.

  For more publications about reducing and managing solvent use, ask the Environment and Energy Helpline (0800 585794) for a copy of the solvent management publications list.

- Good Practice Guide (GG82) *Investing to Increase Profits and Reduce Wastes.* This Guide describes the cost savings and other benefits associated with investment in technology that produces less waste. It explains how to assess the financial benefits of cleaner technology and outlines ways of financing capital investments. A simple worked example shows the use of investment appraisal techniques to select the cleaner technology options that generate the most financial benefit.

- Good Practice Guide (GG109) *Choosing Cost-effective Pollution Control.* This Guide describes a step-by-step approach designed to help companies save money by choosing the most suitable pollution control measures for their site as part of an overall waste management strategy. It is primarily concerned with airborne emissions and aqueous effluents.

- Good Practice Guide (GG140) *Cutting Costs and Waste by Reducing Packaging Use.* This Guide, which is applicable to companies of all sizes, provides practical advice on how to save money by managing packaging effectively. It explains the principles of packaging management, monitoring and minimising the amount of packaging waste produced.

- Good Practice Guide (GG141) *Choosing and Managing Re-usable Transit Packaging.* This Guide is intended to help companies achieve cost savings by redesigning packaging specifically for several journeys between particular suppliers and consumers. It also considers the logistics of managing a re-usable packaging scheme effectively.

- Good Practice Guide (GG152) *Tracking Water Use to Cut Costs.* A water balance is a management tool which provides managers with an overview of the major uses of water on their company's site. This Guide describes a five-step procedure for constructing a water balance and explains how a water balance can help to identify water and cost saving opportunities.

Generic waste minimisation publications

- A series of three complementary Good Practice Guides on waste minimisation which describe a systematic approach that can be incorporated within existing management systems. Tools and techniques for identifying opportunities to reduce waste are described.
  - Good Practice Guide (GG25) *Saving Money Through Waste Minimisation: Raw Material Use*
  - Good Practice Guide (GG26*) Saving Money Through Waste Minimisation: Reducing Water Use*
  - Good Practice Guide (GG27) *Saving Money Through Waste Minimisation: Teams and Champions*

- *Saving Money Though Waste Minimisation: Getting Started* (GS25) This leaflet helps companies take the first steps towards a waste minimisation programme. It describes how to carry out an initial review to determine - or at least estimate - the true cost of waste to the company.

- *Finding Hidden Profit - 200 Tips for Reducing Waste* (ET30) This compilation of short practical tips based on industrial experience is intended to stimulate ideas for reducing waste.

- Good Practice Guide (GG38C) *Cutting Costs by Reducing Waste: A Self-help Guide for Growing Businesses.* This Guide contains practical advice to help a company develop its own waste reduction programme.

- Good Practice Guide (GG125) *Waste Minimisation Pays: Five business reasons for reducing waste.* This Presenter's Guide contains everything you need to make a 40-minute presentation on the key financial reasons for making a commitment to waste minimisation. It includes handouts and overheads on templates and on disk.

- Good Practice Case Study (GC16) *Sites Set on Cost Savings.* This Case Study at Merck Ltd demonstrates the financial and environmental benefits of a corporate approach to waste minimisation.

- Good Practice Case Study (GC18) *Minimise Waste - Improve the Bottom Line.* Results from the Humber Forum Waste Minimisation Project demonstrate the success that can be achieved by involving financial managers/directors in company waste minimisation initiatives, and by networking with other local companies to share experiences.

- Good Practice Case Study (GC19) *Waste Minimisation Pays Major Dividends.* This Case Study at Walkers Snack Foods Ltd demonstrates the economic and environmental benefits of a structured approach to waste minimisation at a major manufacturing site.

- Good Practice Case Study (GC20) *Environmental Review Helps Raise Profits.* This Case Study at Mold Hygiene Chemicals Company Ltd demonstrates the cost savings and other benefits that a small company can achieve through an in-house environmental review.

- Good Practice Case Study (GC49) *Environmental Management System Improves Performance.* This Case Study at Wolstenholme International Ltd demonstrates the economic and environmental benefits of implementing an environmental management system (EMS) at a medium-sized manufacturing company.

- Good Practice Case Study (GC59) *Environmental Improvements Reduce Costs.* This Case Study at RHP Bearings Ltd demonstrates how incorporating environmental issues into existing management systems can result in cost savings and environmental benefits.

- Good Practice Case Study (GC131) *Profit from Packaging Changes.* This Case Study at Polaroid (UK) Ltd demonstrates the significant financial and environmental benefits of making simple changes to reduce incoming and outgoing packaging.

- Good Practice Case Study (GC149) *Waste Minimisation Brings Benefits to All.* This charts results from the Don Rother and Dearne Waste Minimisation Project and demonstrates how companies of all sizes and many different business activities used membership of a regional waste minimisation club to make cost savings and environmental improvements.

Waste minimisation software

- WMIT (**W**aste **M**anagement **I**nteractive **T**ools) (IT96) This PC-based software tool helps companies identify the sources of their waste, calculate its true cost and take action to reduce waste and thus save money.

All ETBPP publications are available free of charge to UK companies through the Environment and Energy Helpline on 0800 585794.

6.2 ENERGY EFFICIENCY BEST PRACTICE PROGRAMME

All EEBPP publications are available free of charge through the Environment and Energy Helpline on 0800 585794 or from the Energy Efficiency Enquiries Bureau, Harwell, Oxfordshire OX11 0RA (Tel: 01235 436747; Fax: 01235 433066; e-mail: etsuenq@aeat.co.uk).

Good Practice Guides

- Good Practice Guide 168 *Cutting Your Energy Costs - A Guide for the Textile Dyeing and Finishing Industry.* This Guide provides practical advice to the textiles industry on how to improve the efficiency of their energy-intensive dyeing and finishing processes. Energy use in dyeing and finishing is described and a range of energy-saving ideas is presented for both processes.

- Good Practice Guide 126 *Compressing Air Costs.* An estimated 30% of the compressed air used in industry is wasted and could be saved by introducing simple, cost-effective energy efficient measures. This Guide provides advice on practical ways of improving energy efficiency in plants distributing and generating compressed air.

- Good Practice Guide 148 *Monitoring and Targeting in the Textiles Industry.* This Guide provides an introduction to the basics of Monitoring and Targeting (M&T), with specific examples from the textiles industry.

- Good Practice Guide 231 *Introducing Information Systems for Energy Management.* This Guide describes the basic elements of an energy information system and discusses data collection, analysis techniques and communication methods.

Good Practice Case Studies

- GPCS287 *Energy Saving Through Re-use of Water in the Textiles Industry.* At The Standish Company, effluent from the washing phase of the bleaching process was diverted to provide scouring wash water. This resulted in a halving of water consumption, with a subsequent reduction in water and effluent costs.

- GPCS254 *Implementing an Energy Management Programme in a Textile Finishing Company.* A structured energy management programme at Toray Textiles (Europe) Ltd reduced energy use by 27%. Half of the savings were generated through measures which involved little or no capital expenditure.

- GPCS233 *Energy and Cost Savings from Air Compressor Replacement.* A single, larger unit installed instead of two of the oldest compressors at the yarn processing plant operated by J H Ashworth & Sons Ltd now supplies most of the factory's compressed air requirement. Greater efficiency, plus a small but significant saving from a 'leak reduction' exercise, justified the capital cost of the new compressor. The more consistent system pressure has also improved product quality.

- GPCS228 *Using Infra-Red Pyrometers on a Stenter for Improved Energy Efficiency.* Significant energy savings and production rates have been achieved at Somercotes (Fabric Dyers) Ltd following the installation of four infra-red pyrometers on one of the factory's stenters. The pyrometers measure the surface temperature of the fabric in the stenter, thus allowing the dwell time to be controlled precisely.

- GPCS226 *Energy Savings by Total Quality Management Techniques.* An energy task force at Courtaulds Fibres, formed as part of the Company's TQM programme, generated significant energy savings through improved operations and management. Minimal capital investment was required and most of the savings resulted from improved operating and maintenance procedures.

- GPCS181 *A Novel Use for Recycled Textile Fibres.* When recycled fibre is used in the production of woollen material, the more energy-intensive processes such as scouring, carbonising and dyeing are not required. Evergreen demonstrated that high quality products can be produced using a high proportion of recycled fibre. Raw material, water and effluent costs have all been substantially reduced.

- GPCS031 *Heat Recovery from Contaminated Effluent.* This Case Study at Drummond Group plc describes the energy and cost savings achieved by installing a self-cleaning, rotating central element heat exchanger to recover heat from process water containing soluble and solid contaminants.

- GPCS030 *Heat Recovery from Contaminated Effluent*. This Case Study at Patons & Baldwins Ltd demonstrates that plate heat exchangers can operate at high heat transfer rates without becoming blocked by contaminated effluents, provided the effluent is filtered. The recovered heat is transferred via the mains feed to the hot water tank, thus reducing the mill's process steam requirements.

- GPCS028 *Heat Recovery from Contaminated Effluent.* This Case Study at Naylor Jennings describes the successful operation of a central element rotating heat exchanger to recover heat from a contaminated effluent. The hot effluent is used to pre-heat water cascading from the cold wash to the hot wash.

New Practice

- New Practice Case Study 109 *New Plant Saves Money and Increases Competitiveness at Textile Dyer*. Installation of a state-of-the-art enclosed dyeing machine at Shrigley Dyers Ltd significantly reduced steam consumption and water use. Average steam demand fell as did the variation in steam use between batches. The considerable saving in batch time allowed the Company to increase capacity at no extra cost. (See also ETBPP New Practice Case Study NC139.)

- New Practice Final Profile 036 *Direct Gas Firing in the Textiles Industry.* Introducing a number of gas-fired direct contact heaters to provide heat for wet processes at Strines Textiles Ltd eliminated energy losses associated with a central steam generation and distribution system.

- New Practice Final Profile 026 *Suction Slot Dewatering in Textiles Finishing* This project at Shirley Dyeing & Finishing Services demonstrated the economic viability of using suction slot dewatering equipment to improve moisture removal from the textile web before it enters the stenter drying section.

- New Practice Final Profile 025 *ARFA Drying of Heavy Textiles.* Installation of an air/radio frequency assisted (ARFA) dryer to dry heavy textile webs, at TBA Industrial Products Ltd, cut residence in the drying plant from 90 minutes to 10 minutes. Benefits included significant energy savings, increased production and improved product quality.

- New Practice Report 023 *Heat Recovery and Pollution Control in Textile Finishing.* Installation of new filters and heat recovery equipment at Burlington Fabrics achieved significant energy savings while greatly improving pollution control. Existing electrostatic plant was replaced with a dry filter system designed to reduce fume emissions from the stenters while recovering energy from the exhaust to heat hot water for the dye-house.

Publication lists

A number of lists are available from the Energy Efficiency Enquiries Bureau and on the EEBPP website (http://www.etsu.com/eebpp/) with details of other relevant publications. These include:

- Combined Heat and Power Publications List;
- Management Techniques Publications List;
- Motors and Drives Publications List;
- Industrial Boilers Publications List;
- Fuel Efficiency Booklets: Complete List;
- Textiles Energy Efficiency: Set of Six Fact Sheets.

Software

- EnergyManageMent Advisor - known as EMMA for short - is a PC-based software package designed to help UK businesses save money by saving energy. Companies can use EMMA to:
  - find out how to save energy;
  - to look at the financial benefits of energy efficiency;
  - to motivate employees;
  - as a training tool.

International Case Studies from CADDET

The Centre for the Analysis and Dissemination of Demonstrated Energy Technologies (CADDET), an international dissemination programme sponsored by the International Energy Agency (IEA), also offers free publications on energy efficiency. In the UK, these are available from the Energy Efficiency Enquiries Bureau, Harwell, Oxfordshire OX11 0RA (Tel: 01235 436747; Fax: 01235 433066; e-mail: etsuenq@aeat.co.uk).

Publications of interest to the textiles industry include:

- R179 *Heat Recovery System Saves Energy in a Textile Plant* (Host country USA);
- R029 *Heat Recovery from Exhaust Air* (Host country Canada);
- R138 *Energy Efficiency in a Carpet Mill* (Host country Canada).

All EEBPP publications are available free of charge to UK companies through the Environment and Energy Helpline on 0800 585794 or the Energy Efficiency Enquiries Bureau on 01235 436747.