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Practical Environmental Advice for Business

GG707

Measuring to manage: a 'how-to' guide

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This Good Practice Guide was produced by Envirowise

Prepared with assistance from:

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Summary

Achieving cost savings from adopting a systematic resource efficiency and waste minimisation programme depends on the regular measurement and analysis of the resources (raw materials, energy, water, packaging, etc) used by your company and the waste it produces.

This Good Practice Guide explains how a **measuring to manage** programme can help your company save money by improving the management of its processes to become more resource efficient. **Measuring to manage** can also help your company to improve its environmental performance and to identify opportunities to increase throughput without the need for major investment.

Taking regular measurements and analysing data will help you to:

- reduce the true cost of waste to your company;
- determine the benchmarks against which to judge the progress of your waste minimisation programme;
- control your process(es) more effectively;
- set achievable improvement targets;
- identify cost-effective opportunities to prevent and reduce waste.

This Good Practice Guide, which is applicable to companies of all sizes and from all sectors, provides practical advice to help you:

- gather relevant data;
- analyse your collected data;
- choose appropriate key environmental performance indicators;
- use the information to achieve cost-effective improvements to reduce waste and improve resource use.

Some useful facts about waste, water and energy to help you in your calculations are given on the sheets in the wallet at the back of the Guide.

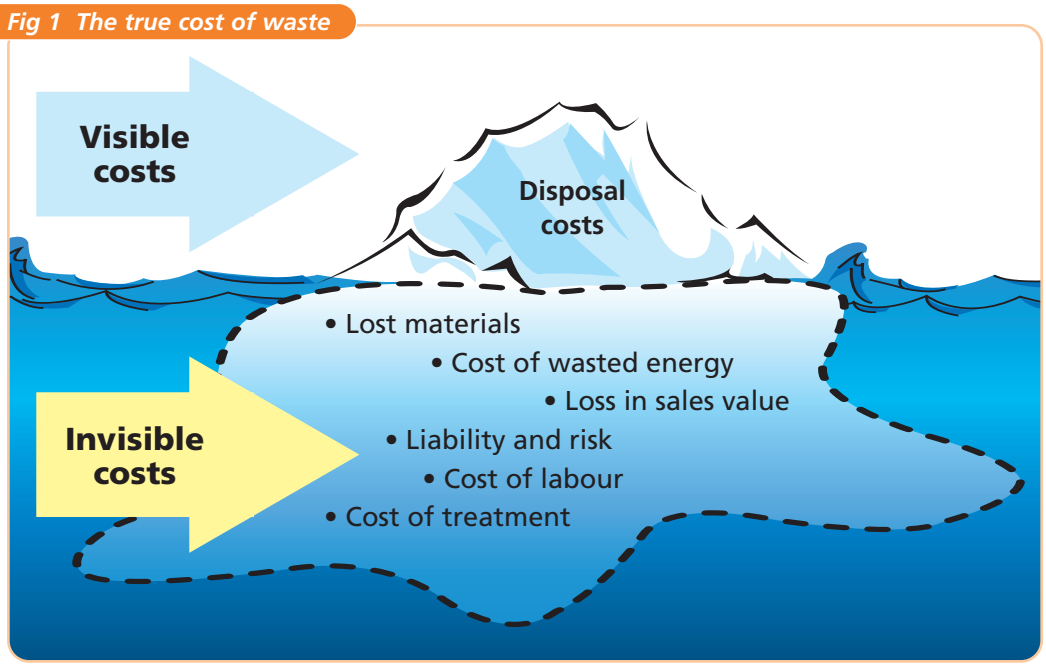
Contents

Why bother?

All companies produce waste - even small ones. It's a fact of life - almost 100 million tonnes in the UK each year. As businesses, we can't stop producing waste but we can change how much we produce, how we manage it and what we do with it. And this applies to both waste and the resources we use.

Many companies underestimate how much waste is costing; it could be as high as 4% of turnover. And the true cost of waste isn't limited to that for disposal (see Fig 1). It also includes wasted raw materials, energy and labour - which can be 5 - 20 times more than the cost of disposal.

Fig 1 The true cost of waste



Did you know your company could achieve cost savings and other benefits from adopting systematic resource efficiency? Success depends on **regular measurement and analysis** of the resources (raw materials, energy, water, packaging, etc) used by your company and the wastes it produces.

This Good Practice Guide explains how a **measuring to manage** programme can help your company save money by improving the management of its processes to become more resource efficient. **Measuring to manage** can also help your company to improve its environmental performance and to identify opportunities to increase throughput without the need for major investment.

Taking regular measurements and analysing your environmental and financial data will help you to:

- reduce the true cost of waste to your company;
- determine the base-line against which to judge the progress of your resource efficiency;
- identify cost-effective opportunities to prevent and reduce waste;
- control your services/processes more effectively;
- set improvement objectives and targets;
- measure progress towards your targets and set new ones.

The Guide is applicable to businesses of all sizes and from all sectors of industry. It describes:

- how to gather relevant data;
- the use of key environmental performance indicators;
- techniques you can use to analyse your collected data;
- how to make use of the information to achieve cost-effective improvements to reduce waste and improve resource use.

Some useful facts about waste, water and energy to help you are given on separate sheets in the wallet at the back of the Guide.

Gather data

The first step is to understand how your company uses resources (raw materials, components, water, energy, etc) and why waste is produced.

The key is to decide what measurements you need to take to monitor performance and then to gather these data regularly.

Your collected data will help you to:

- track your performance over time;
- highlight areas for improvement by comparing your data with established key performance indicators (see section 3).

Remember: if you don't measure it, you can't manage it.

2.1 Carry out an initial review

An initial review can help in gathering basic information. Use the information to highlight opportunities for quick savings from no-cost and low-cost measures, or measures with a short payback period.

- Walk around your site looking for areas of waste and potential improvement. Take photographs of obvious areas of waste with a digital camera.
- Draw up a checklist and talk to key people in all departments.
- Gather information on amounts and costs for raw materials, utilities and wastes from invoices and meters.
- Estimate the potential savings associated with a few of the more promising opportunities to reduce resource use.
- Identify gaps in your data and start thinking about how to address them.

2.2 Produce a process map

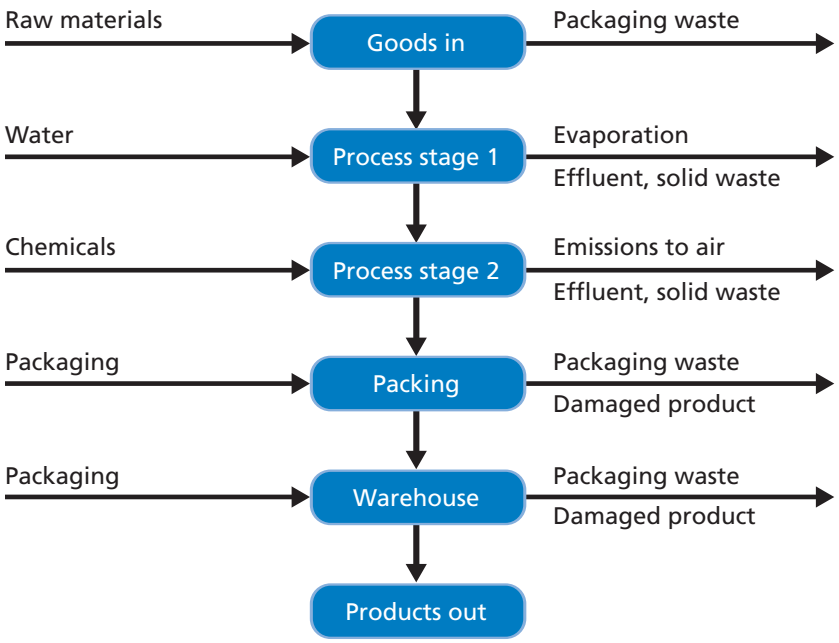
Producing a flow chart of material and waste flows (a process map) will help you to understand:

- how resources are used;
- which measurements will help you to save money by:
  - better control;
  - preventing and reducing waste.

To produce a process map:

- Identify your company's main inputs and outputs. Start by looking at your company or site as a whole:
  - identify the raw materials and utilities used;
  - identify the wastes produced.
- Present this information visually as a process map for the site. Fig 2 shows an example.

Fig 2 Example process map



As well as indicating the material and waste flows you need to measure, your process map will help you to identify:

- the areas of the business producing the most waste;
- the areas requiring priority attention;
- opportunities to reduce waste with the greatest potential for cost savings.

Your process map will act as the basis or framework for your measuring to manage programme. In terms of your process inputs and outputs, you now need to determine:

- what is being used/produced;
- how much is being used/produced;
- where inputs go;
- where outputs come from;
- how to measure and how often;
- who is going to be responsible for measuring.

2.3 Populate the process map with data

For all businesses, the first thing you need to know is how much you have in terms of inputs and outputs to and from your site. Some data may already be available on-site (eg from existing meters, invoices and purchasing records).

To allow meaningful comparisons, it is also important to be able to relate your data about raw materials, utilities and waste to a suitable area of occupancy (eg office) or unit of production (eg weight of product).

Measures should be SMART:
Simple - Measurable - Achievable - Relevant - clear Timescales

Table 1 indicates some typical sources of measured data (ie what can be obtained directly).

Some data may have to be collected and some may have to be estimated.

Table 1 Typical sources of measured data

Item	Potential sources of information
Process inputs	
Raw materials	Purchase records, stocktaking, dispensing records
Water	Invoices, main meter, sub-meters, portable meters
Energy	Invoices, main meter, sub-meters
Process outputs	
Products/by-products	Production/sales figures, stocktaking
Solid waste/process residues	Waste production records, invoices, disposal/Duty of Care documents, packaging waste forms, stocktaking (ie what waste is in the yard, in skips, etc)
Effluent	Meters, invoices, effluent discharge consents
Emissions to air	Meters, analyses (of composition), process authorisations, solvent inventories

2.4 Take simple measurements

There are likely to be various ways of obtaining the data you require. The more accurately you can measure these data, the easier it will be to identify areas of wastage and inefficiency.

Table 2 indicates the accuracy of various possible methods of measuring raw materials and wastes.

Table 2 Measuring quantities accurately

Item	Measurement technique	Accuracy
Deliveries	■ Weigh delivered materials on calibrated scales or a weighbridge (remember to subtract the weight of the vehicle and/or container).	***
	■ Count the number of bags/drums/tanker loads. If possible, avoid using this method as it is less accurate.	*
Dispensed material	■ Weigh small part-filled containers/bags on calibrated scales (remember to subtract the weight of the packaging).	***
	■ Fit piped systems with accurate flow meters and, where possible, use electronic data loggers.	***
	■ Count the number of metered doses, eg being added to a mixing vessel.	**
	■ Decant from large containers such as drums using set measures such as litre jugs.	**
	■ Count the number of part bags/drum loads/ shovel loads, etc. If possible, avoid using this method as it is less accurate.	*
Stock levels	■ Fit tanks/silos with calibrated electronic level meters (volume) or load cells (weight).	***
	■ Weigh small part-filled containers/bags on calibrated scales (remember to subtract the weight of the packaging).	***
	■ Mark transparent containers such as intermediate bulk containers (IBCs) to indicate fixed intervals and sub-intervals, eg 10 litres.	**
	■ Use dipsticks for containers. If possible, avoid using this method but, if used, make sure that they are straight, properly calibrated and placed vertically into the container (preferably through a fixed guide tube).	*
Wastes	■ Weigh your waste or get your contractor to weigh it, eg on a vehicle or use a weighbridge.	***
	■ Count the number of full or partly filled drums or skips. If possible, avoid using this method, as inaccurate volume measurements then have to be converted to even less accurate weight estimates.	*

*** Most accurate; *Least accurate.

2.5 If you can't take simple measurements, make simple estimates

The ideal situation would be to monitor every flow continuously and to measure every single discrete item. While it is possible to measure some items completely, it is generally far more practical to take occasional readings and samples, and to estimate unknowns. However, it is important to derive reasonably accurate estimates. The two main ways of doing this are outlined opposite.

The information on the sheets in the wallet at the back of the Guide may help you in your calculations.

2.5.1 Estimating through sampling and experimentation

Data sampling

Data sampling provides an approximation to the result for the whole 'population' of data.

However, care is needed to obtain a representative picture. For example, where taking samples in groups (eg four readings each day), the mean (or average) of the readings will give a representative figure for that period. The larger the sample size, the greater the confidence that can be placed in a value estimated from the mean. **Take samples as large as is practical.**

Carry out trials

Experiments or trials can be used to gather sample data. For example, data on liquid flow and evaporation can be gathered simply.

- Use a stopwatch to record how long it takes for the level to change in tanks/large containers of a known volume. This measurement allows the flow rate to be calculated.
- The 'bucket and stop watch' approach can be used for low-pressure flows. This involves disconnecting pipes or open valves, and timing how long it takes to fill a container of known volume.
- To estimate evaporative losses, time how long it takes for the liquid level to drop in a container at conditions (temperature and airflow) roughly equivalent to the process of interest.

2.5.2 Estimating using a mass balance

What goes into a process must come out in some form - as product, by-product, solid waste, liquid waste or gaseous emission.

Inputs must equal outputs in what is known as a '**mass balance**'; this can allow you to estimate the amount of an output that is difficult to measure. This technique is particularly useful for estimating leaks and losses due to evaporation.

Mass cannot be destroyed, so what goes into a process must come out. In addition, the inputs and outputs of a mass balance must be given as a common unit of weight (eg in tonnes or kilograms).

However, volume (eg litres or m^3) can be affected by temperature and pressure and, therefore, the inputs and outputs may not necessarily balance.

To prepare a simple mass balance:

- Determine, as far as is practicable, the quantities of raw materials used and wastes produced in a given period (eg a year, month, week or day). Mark these on your process map.
- Where possible, convert quantities to a common unit, eg:
  - tonnes or kg (1 tonne = 1,000 kg);
  - m^3 or litres (1 m^3 = 1,000 litres).
- Take account of stock. Mass balance calculations should include stock gains and losses, so use a period between stocktakes as the basis for your calculations.
- Use the data you have available to determine the total weight of inputs and outputs to the site as a whole or one stage of a process/production line. A mass balance can be applied to all materials combined or to an individual material.

- Any discrepancy in your mass balance should be accounted for by the materials or wastes you are trying to estimate.

Material consumption = Purchases + Opening stock – Closing stock

Production = (Sales – Rejects) + (Closing stock – Opening stock).

Water mass balance

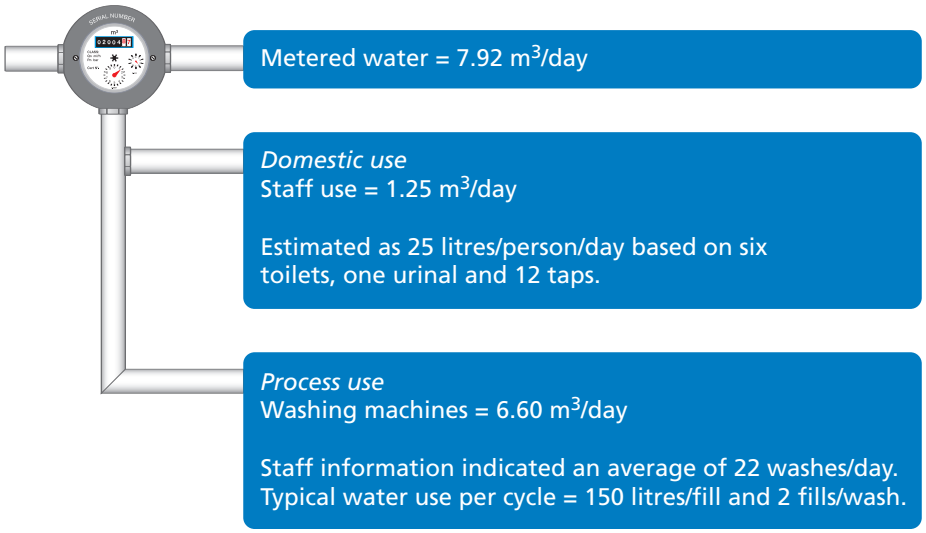
The mass balance technique is particularly useful when applied to water use. Water that comes into a process must either leave as effluent, evaporate or be retained in the product (chemically or temporarily as it dries out).

The water balance and typical daily consumption figures can be used to highlight:

- where possible water losses are occurring;
- where cost savings could be made.

Fig 3 shows a simple water mass balance for a knitwear manufacturer. In this example, consumption figures have been calculated from staff observations and measured use.

Fig 3 Example water mass balance



In the example, domestic and process use together account for 7.85 m^3/day, ie 99% of the water supplied (7.92 m^3/day) as recorded from actual meter readings. This small discrepancy suggests that there is unlikely to be a water leak or another loss to the system (eg evaporative loss, retention of water in product).

At this knitwear manufacturing company, water use could be reduced through:

- water-saving devices such as cistern volume adjusters in toilets and PIR controls in urinals;[1]
- improved process efficiency to optimise the number of garments washed in each batch, thereby reducing the daily number of washing machine fills.

[1] See GG522 *Cost-effective water saving devices and practices - for commercial sites,* available free of charge from Envirowise.

2.6 Measurement at a process/department level

If you are interested in a particular process, production line or department, it is also necessary to track where inputs (eg raw materials and water) go and where outputs (eg wastes) come from.

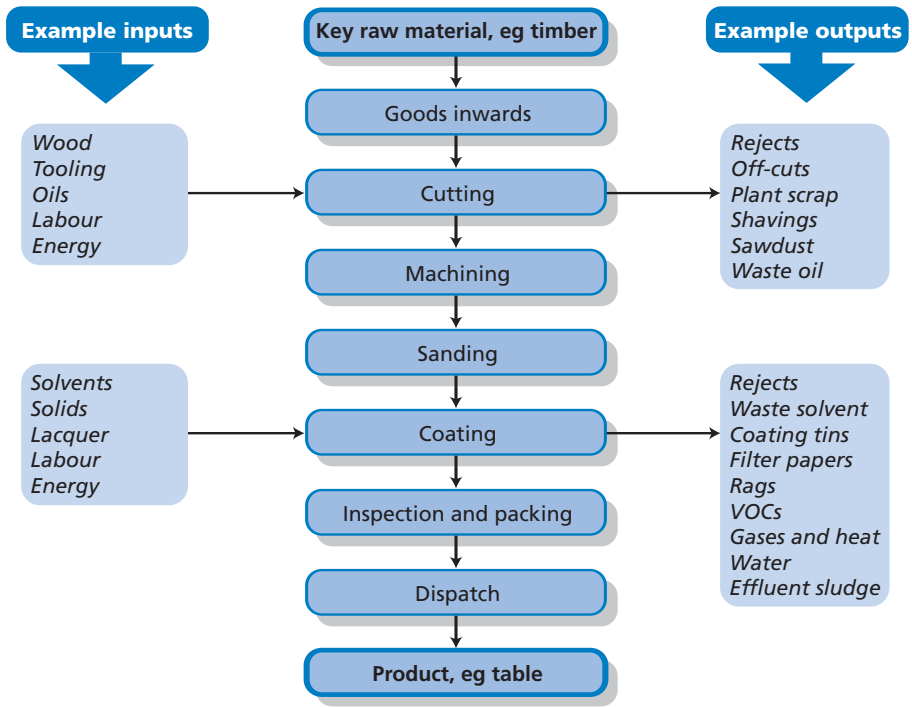
To do this you need to prepare a detailed site process map showing the individual inputs and outputs for particular processes.

Find out the quantities of materials used and the costs associated with different forms of waste. This will identify:

- the areas of business producing most waste;
- those which require priority attention.

Use readily available information or make best estimates initially. Fig 4 shows an example from a furniture manufacturing company.

Fig 4 Example detailed process map



2.7 Calculate value added

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) used in that process. **Can you calculate the value added costs of your wastes?**

Don't forget, waste is not just the cost of discarded materials. It includes the cost of:

- wasted raw materials;
- rework;
- lost production time;

- excessive use of energy and water;
- loss of materials to atmosphere and to drain;
- waste treatment costs;
- wasted labour.

The furniture manufacturing company featured in Fig 4 was able to calculate the value added to the product for each process (see Table 3).

Table 3 Example value added calculation

Item/process		Cost (£/product)	Value added to product (£/product)
	Raw material: timber		
1	Goods inwards	0.50	
2	Cutting	2.00	+1.50
3	Machining	3.20	+1.20
4	Sanding	4.50	+1.30
5	Coating	8.60	+4.10
6	Inspection and packing	10.00	+1.40
	End product: table	**10.00**	**9.50**

Timber, the main raw material, cost £0.50 for each product. After cutting, the product had cost the company £2.00 to produce. The company was able to complete these calculations for all six processes and calculated the value of the finished product as £10.00/product. The total value added to the product was £9.50 per table. The calculation showed that waste at the higher processes (eg coating) cost the company significantly more than that from the lower processes.

Key environmental performance indicators

3.1 How to use KPIs

Key performance indicators (KPIs) are the metrics deemed essential to understanding operational health. Measuring performance allows a company to determine objectively what is working and what is not. KPIs can be used to:

- establish base-line performance;
- track changes.

By setting KPIs, companies are encouraged to measure what they are doing and then establish targets to achieve. KPIs can also be used for external benchmarking, ie to measure the performance of a company or product against that of a similar company or product, or against 'best practice' data.

This Guide focuses on the use of KPIs for environmental aspects, ie key environmental performance indicators (KEPIs). KEPIs are selected criteria covering issues such as:

- water use, eg litres of water used per tonne of product manufactured;
- material use, eg kg of packaging used per item manufactured;
- generation of waste, eg kg of waste disposed of per item manufactured;
- carbon emissions, eg tonnes of carbon dioxide (CO_2) emitted per tonne of product manufactured.

Good KEPIs should:

- help your company understand how changing resource inputs and production parameters can bring about efficiency improvements and deliver cost savings;
- provide the information your company needs to satisfy its stakeholders, eg environmental reporting.

3.2 Types of KEPI

The three main categories of KEPI are:

- absolute indicators;
- relative indicators;
- weighted indicators.

3.2.1 Absolute indicators

These measure key resources without reference to any other factors, eg:

- litres of water used per year;
- tonnes of waste produced per month.

These indicators are inappropriate measures of production efficiency where the nature and/or 'volume' of production varies during the period of interest.

3.2.2 Relative indicators

For most companies, the use of relative indicators (sometimes called 'specific measures') is more appropriate. Examples include:

- litres of water used per tonne of product manufactured;
- kg of waste disposed of per item manufactured;
- kg of paper used per member of staff;
- litres of water used per prepared meal;
- litres of water used per member of staff;
- kg of solid waste recycled per member of office staff.

These indicators attempt to eliminate the 'natural' variation caused purely by production changes and measure only genuine changes in efficiency.

Relative indicators can also be expressed as percentages. In this case, the production throughput becomes irrelevant, eg:

- percentage of raw material (input in tonnes) that becomes product (output in tonnes), ie a measure of raw material yield;
- percentage of effluent re-used.

3.2.3 Weighted indicators

Many companies produce a wide variety of products using a range of processes or process variations.

For example, a powder coating company might coat door handles one day and whole doors the next day. Measuring production throughput simply as the number of items coated would be meaningless in terms of judging how efficiently the company uses powder coatings. In this case, what is important is the area of the object coated.

Another example is when a company wants to measure the efficiency of water use but some products are solvent-based and others are water-based (and thus use more water in their manufacture).

In these circumstances, factors can be applied to give a weighted indicator.

3.3 Choose appropriate KEPIs

Choosing the right KEPIs for a process is important. Using the data gathered for your company, you need to develop your own individual sets of KEPIs and then aim to improve them.

The choice of KEPIs depends on the type of operation/product, the company's priorities and those of key stakeholders. Choose appropriate KEPIs covering the full range of issues that are of interest to you and your stakeholders.

Advice on the best choice of KEPIs for your site or process and details of 'accepted' sector KEPIs may be available from your trade association.

The choice of useful KEPIs requires a good understanding of the manufacturing process. Producing a process map (see section 2.2) will help you to achieve this. When drawing up your KEPIs, it is important to bear in mind:

- which data are available;
- what it is practical to measure.

Table 4 lists some typical KEPIs.

Table 4 Typical KEPIs

KEPI	Units
Total raw material use	tonnes per tonne of product
Total product yield	% (by weight)
Chemical consumption	litres per tonne of product produced
Water consumption	m^3 per tonne of product
Atmospheric pollutant concentration	mg/m^3
Biochemical oxygen demand (BOD)/ chemical oxygen demand (COD) discharged	kg/tonne of product or kg/m^3 effluent discharged
Total solid waste disposed of to landfill	tonnes or tonnes per tonne of product produced
Total solid waste recycled	tonnes or tonnes per tonne of product produced
Net packaging use	kg/tonne of product (exclude re-use)
Total energy use:* Natural gas Electricity Oil Coal Butane/propane	kWh/tonne of product or tonnes of CO_2/tonne of product
Fuel efficiency**	miles/litre by transport mode or quantity of products (m^2 or kg) per mile or per litre by each mode

* For free advice on reducing energy consumption, contact the Carbon Trust (www.carbontrust.co.uk) or, in Scotland, the Scottish Energy Efficiency Office (www.energy-efficiency.org).

** For free advice on improving fleet efficiency, contact the Energy Saving Trust (www.energysavingtrust.org.uk/fleet) or Freight Best Practice (www.freightbestpractice.org.uk).

3.4 How can KEPIs help you save money?

Having set up systems to collect KEPI data, the next step is to ask the following questions when analysing these data:

- Is the KEPI moving towards target? If not, why not?

- Is there an external 'best practice' benchmark comparable to your KEPI? If so, what is it and how do you compare?
- Have there been clear periods of inefficiency? If so, what could the causes be? How can a repetition be avoided?
- Have there been periods of high efficiency? If so, what were the possible causes? Can adjustments be made to always achieve this higher performance?
- Does the value of the KEPI vary much? If so, why?
- Is the KEPI variation random or systematic? What might the causes be?
- How do other processes/departments/lines compare (internal benchmarking)?
- How do similar time periods compare, eg the same period last year?

Use the graphical techniques described in section 4 to help you answer these questions easily and quickly.

The answers will help you to understand what is happening and identify what you need to do to maintain and improve performance by reducing waste and increasing resource efficiency.

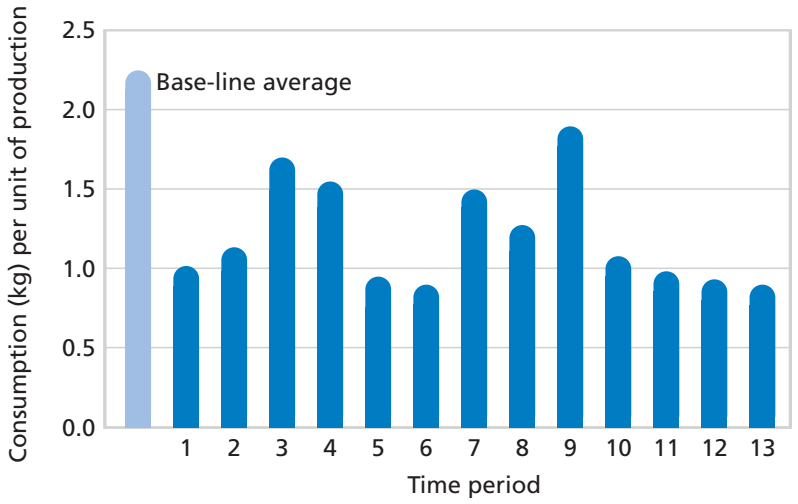
Simple graphical techniques for analysing data

Many of the different types of graph described in this section can be produced quickly and easily using a computer spreadsheet.

4.1 Bar charts

The best approach generally involves the use of graphs such as a simple bar chart (see Fig 5) where a comparison is being made against a 'base-line' average or mean. While the graph shows significant improvement, there is considerable variation over the year. For example, there appear to have been particularly high levels of relative consumption (per unit of production) in periods 3, 4, 7 and 9 (and possibly 8).

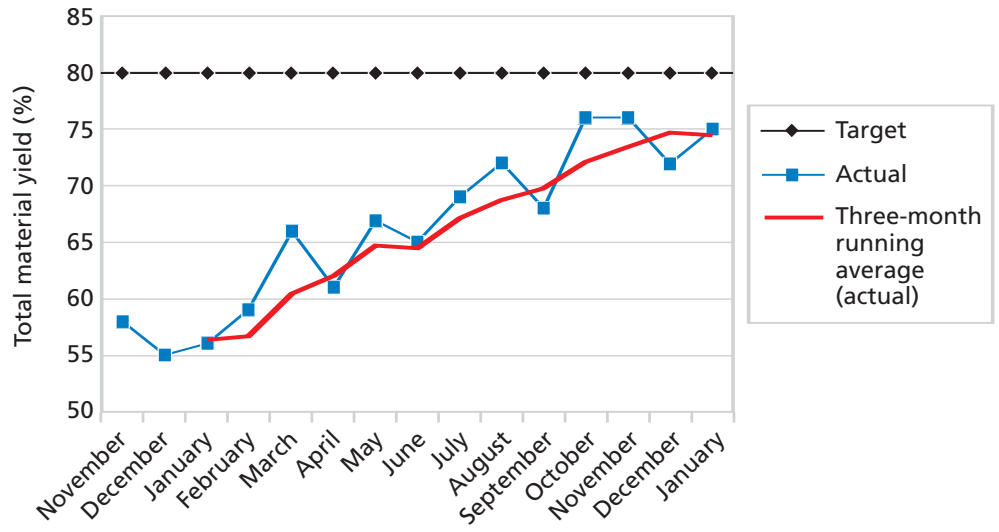
Fig 5 Example bar chart



4.2 Trends

It is also useful to look at trends. Fig 6 overleaf shows progress towards a target for percentage yield. The raw data alone show large variations from month to month, but the trend line shows a more reassuring upward trend, albeit one that is perhaps levelling off below the target of 80%. This trend line is produced by plotting the three-month running average; this is a plot of the mean of the three months prior to and including the present one (ie 3, 2, 1; 4, 3, 2; 5, 4, 3; etc).

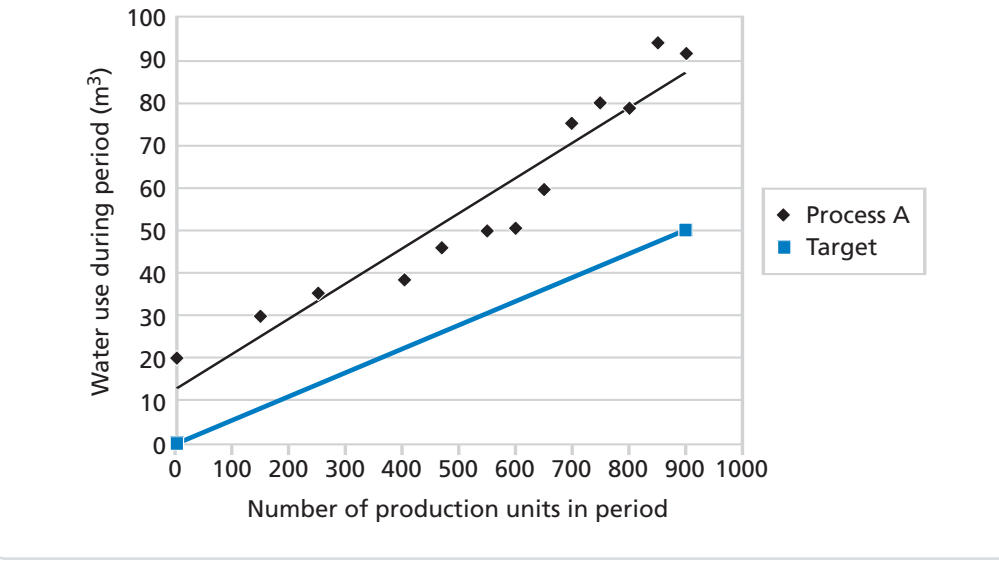
Fig 6 Using moving averages to show trends



4.3 Scatter graphs and linear regression

Data can also be plotted as a scatter graph (or scattergram) like the one shown in Fig 7. Scatter graphs are useful when investigating the relationship between material consumption and production, and determining progress against an improvement target. In this type of graph, the various time periods of data collected are scattered about rather than ordered chronologically.

Fig 7 Example scatter graph



Having collected and analysed your data, the next step is to do something with the information you have gained to reduce waste and improve resource efficiency. More consistent and long-term savings will be achieved by adopting a systematic approach to waste minimisation. This involves:

- identifying and evaluating potential improvement options;
- deciding priorities;
- setting targets;
- drawing up an action plan;
- reviewing progress.

Use the data you have gathered and the results of your analysis as a basis for your decision-making.

Do not underestimate the importance of senior management commitment as this can mean the difference between success or failure - no matter how good your plan.

5.1 Set up a team

A team approach is another vital element for the success of any waste minimisation or continual improvement programme. Where practicable, it is best to establish a team that includes:

- environmental, health and safety manager(s);
- manufacturing and product development manager(s);
- appropriate shop-floor staff (who often know the process best);
- procuring and purchasing manager(s).

In very small companies, the 'team' may involve just one or two key people. Even in larger companies, most team members will be part-time and only called upon as necessary. Additional people can be brought in as required.

Any improvement team needs an empowered and enthusiastic co-ordinator or '**champion**' to lead and facilitate its tasks.

5.2 Brainstorm

Brainstorming sessions, involving a small number of people, can be a useful way of generating ideas and getting the most from a team. The sessions should allow a creative flow of ideas without imposing a hierarchy or an initial judgement.

Thinking about the causes of an 'effect' (eg wastage or poor yield) can help to stimulate and structure ideas.

Most of an effect is often due to only a handful of causes. This is often referred to as the Pareto or 80:20 rule; what it means is that, as a rule of thumb, 80% of the effect is due to 20% of the causes. Concentrate your efforts on the 20% of causes.

5.3 Decide your priorities

Armed with information on likely causes and potential costs and benefits, the next stage is to decide which improvement option(s) should have priority.

5.3.1 Ranking options

Fig 8 shows a simple approach to the prioritisation problem, which ranks and compares the relative cost, chance of success and environmental benefit of a number of improvement options.

Fig 8 Simple priority matrix

	Relative cost	Chance of success	Benefit	Overall priority
Option 1	£££££	✓✓	✓✓✓✓	6
Option 2	££	✓✓✓✓	✓✓	1
Option 3	£	✓✓✓✓	✓	2
Option 4	£££££	✓✓✓✓✓	✓✓✓✓	3
Option 5	£££	✓✓✓	✓✓	5
Option 6	£££	✓✓✓	✓✓✓	4

5.3.2 Screening

Screening is a subjective technique that can be used.

For example, if assessing in relation to environmental benefit, this involves awarding points 1 to 5 to the options based on the waste hierarchy. Elimination of waste scores 5 points, reduction 4 points, re-use 3 points, recycling 2 points and recovery 1 point.

A similar screening process can be used to assess the cost and chance of success. For cost, the points are based on payback periods of one to five years, with the shortest payback receiving the greatest number of points. For chance of success, screen the options in relation to 1 awareness, 2 staff training, 3 operational procedures, 4 monitoring requirements and 5 technology improvement - with the options requiring least intervention scoring more points.

5.4 Set targets

Targets should be SMART (simple, measurable, achievable, relevant and with clear timescales). They should also relate to your key environmental performance indicators (see section 3).

5.5 Develop an action plan

Having considered the various options and identified priorities for improvement, the next step is to prepare an action plan. This should set out:

- the major problem areas/causes identified by the measuring to manage programme;
- clear overall aims and objectives;

- targets, eg to improve raw material yield by 10% over the next year;
- proposed priority improvement measures;
- key implementation steps for each measure;
- relevant equipment/material needs, costs, etc;
- team roles and responsibilities;
- timescales for action;
- the date of the next review.

It is important to be ambitious but realistic, and to aim for evolution rather than revolution.

5.6 Review progress

While a regular programme of data gathering and analysis is essential for the success of your measuring to manage programme, it is also necessary to occasionally stand back and review progress against targets.

Progress should be reviewed regularly, say every six months or year.

- Review progress against targets and, if necessary, revise your targets.
- Review your action plan in terms of changes to the process, production line, product, site, etc.
- Look at how successful process monitoring and data gathering have been.
- Look at how successful the waste minimisation team itself has been. It may be necessary to change team members and even the co-ordinator as the work progresses.

Measuring to manage is a continual improvement programme and things can take time. However, significant improvements and savings help to gain support for further work.

5.7 Free help and advice from Envirowise

If you need further advice or have any specific questions about measuring to manage, the Envirowise Advice Line on 0800 585794 can put you in touch with relevant technical experts. The Advice Line can also:

- provide free, up-to-date advice on environmental issues;
- tell you about relevant environmental and other legislation that could affect your business;
- send you copies of relevant Envirowise publications which are free to UK businesses;
- suggest other sources of information;
- arrange other appropriate support - workshops, training events, on-line tools and site visits.

You can also visit the Envirowise website at **www.envirowise.gov.uk** to:

- download publications;
- request a site visit;
- find out about forthcoming events;

- learn more about Envirowise and its free services including, for companies in Scotland, the Scottish Measurement and Benchmarking Service (www.envirowise.gov.uk/scotlandmeasurement).

5.7.1 Useful publications

The following Envirowise publications also offer practical advice and guidance:

- *Measuring to manage: the key to reducing waste costs* (GG414)
- *Tracking water use to cut costs* (GG152R)
- *Saving money through waste minimisation: reducing water use* (GG26R)
- *Key environmental performance indicators in the whiteware sector* (EN461)
- *Key environmental performance indicators in the electronics sector* (EN462)
- *Key environmental performance indicators in the food and drink sector* (EN463)
- *Key environmental performance indicators in the furniture sector* (EN464)
- *Key environmental performance indicators in the printing sector* (EN465)
- *Key environmental performance indicators in the surface finishing sector* (EN466)

Envirowise - Practical Environmental Advice for Business - is a Government programme that offers free, independent and practical advice to UK businesses to reduce waste at source and increase profits. It is managed by Momenta, an operating division of AEA Technology plc, and Serco TTI. Envirowise is funded in England by Defra's Business Resource Efficiency and Waste (BREW) Programme and supported by BERR; the Scottish Government in Scotland; the Welsh Assembly Government's Materials Action Programme (MAP) in Wales; and Invest Northern Ireland in Northern Ireland.

Envirowise offers a range of free services including:

- Free advice from Envirowise experts through the Envirowise Advice Line.
- A variety of publications that provide up-to-date information on waste minimisation issues, methods and successes.
- Free, on-site waste reviews from Envirowise advisors, called *Fast*Track visits, that help businesses identify and realise savings.
- Guidance on resource efficiency clubs across the UK that provide a chance for local companies to meet regularly and share best practices in waste minimisation.
- Best practice seminars and practical workshops that offer an ideal way to examine waste minimisation issues and discuss opportunities and methodologies.

envirowise
Practical Environmental Advice for Business

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