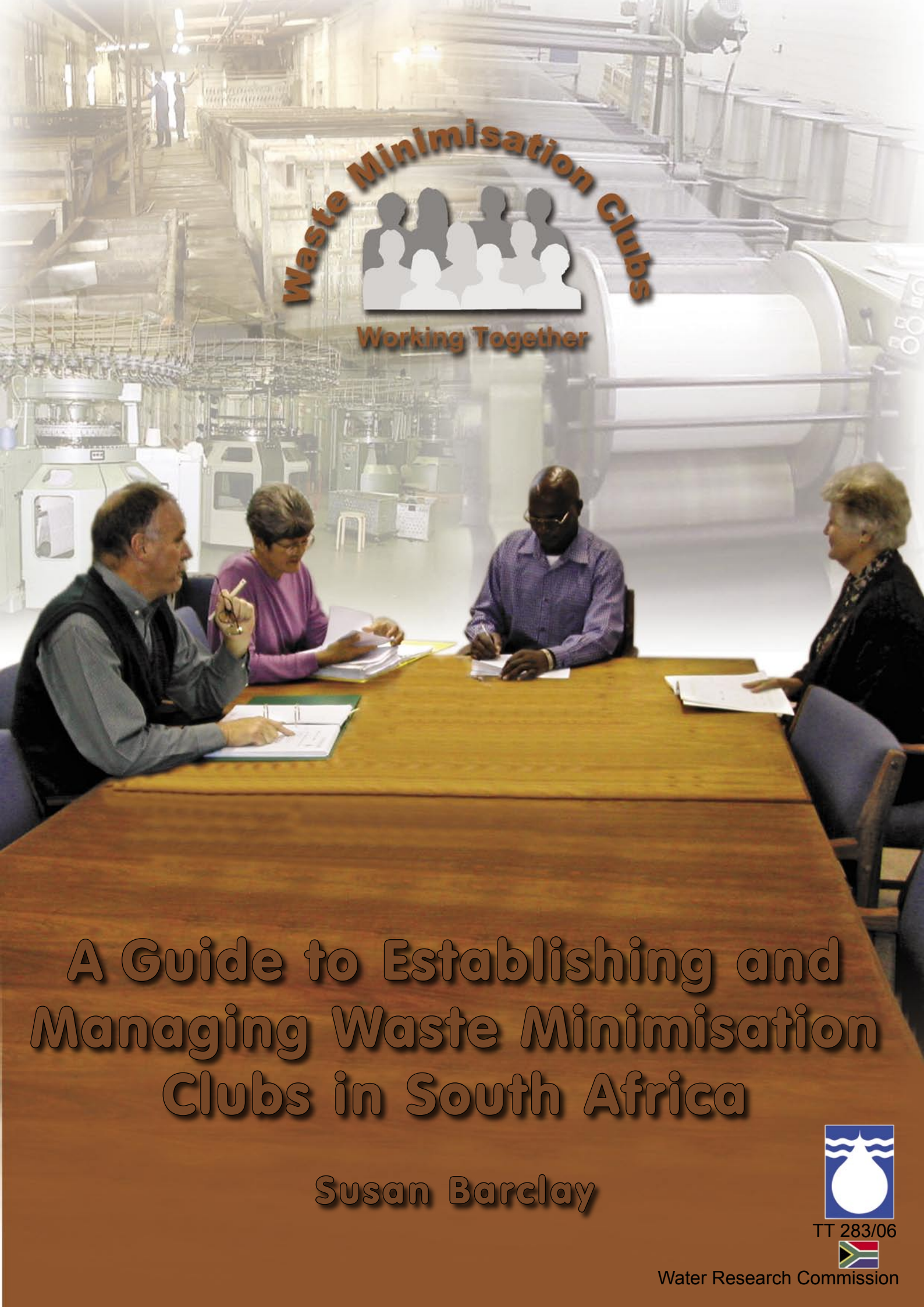

A Guide to Establishing and Managing Waste Minimisation Clubs in South Africa

Susan Barclay

TT 283/06

Water Research Commission

A Guide to Establishing and Managing Waste Minimisation Clubs in South Africa

Report to the Water Research Commission

by

Susan Barclay & Chris Buckley

on behalf of

Pollution Research Group

University of KwaZulu-Natal

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Preface

The Water Research Commission sponsored a project from 1998 to 2000 to investigate the feasibility of establishing waste minimisation clubs in South Africa to promote cleaner production to industry. This project was carried out by the Pollution Research Group (PRG) and two pilot waste minimisation clubs were established – one in the Metal Finishing sector in the greater Durban Metropolitan Area, and the second one, a cross-sectoral club in the Hammarsdale region. These clubs proved to be a success, with open sharing of information and ideas amongst the club members, financial benefits to the companies and a reduction in their environmental impact. A report on this project has been completed and is available from the WRC on request (Project Number K5/973). The experiences gained during the course of this project are important lessons for others who wish to establish and manage further waste minimisation clubs in South Africa and for this reason the WRC have sponsored the development of this manual to guide future facilitators.

The Manual is aimed at a person / organisation that wishes to initiate a waste minimisation club and requires guidelines for undertaking such a project. It addresses aspects such as how to form a club, call meetings, determine the level of contributions from companies, identify some of the problems that can occur, and explains the various roles of the people involved. It also provides sample letters and presentations, and provide sources of information.

This Manual draws on the experiences gained in the previous project and also that gained from facilitators of other waste minimisation clubs in South Africa. These clubs are being facilitated by varying organisations, such as consultants, University researchers and in one case, by the company itself as an in-house club.

Training is essential for a successful waste minimisation project and for this reason a second manual is also available which provides the basic material required to train club members in waste minimisation and is based on the training material developed by Enviros Consulting, UK. This training manual provides information on waste minimisation in general, how to conduct a waste minimisation audit, how to identify waste minimisation options, guidelines on conducting a feasibility analysis, and the importance of monitoring and targeting.

We trust that these Manuals provide the necessary guidance for those wishing to establish waste minimisation clubs. Any feedback is welcome and we hope to see the waste minimisation club concept growing in South Africa.

Susan Barclay

Project Leader

Pollution Research Group

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Sincere thanks are extended to the following organisations and people for their valuable input to the Facilitator's Manual and for allowing the use of their information and material.

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Mr GN Steenveld	Water Research Commission
Mr JN Bhagwan	Water Research Commission
Mr L du Preez	Water Research Commission (Committee Secretary)
Mr B Kothuis	BECO-Institute for Sustainable Business
Mr L Bredenhann	Department of Water Affairs and Forestry
Mr T Aab	Department of Water Affairs and Forestry
Mr CE Fennemore	Umgeni Water
Mr WH Smith	Industrial Development Council of South Africa
Ms SY Dittke	City of Cape Town
Ms K Lundbo	Royal Danish Embassy
Mr M Koefoed	Royal Danish Embassy
Ms M Pressend	Environmental Monitoring Group
Ms SA Freeman	Durban Solid Waste
Mr B Pfaff	eThekwini Municipality
Mr R Loots	Department of Water Affairs and Forestry
Mr M Mitchelson	Department of Trade and Industry
Mr I Ndlovu	Department of Environmental Affairs and Tourism
Dr AR Pitman	Johannesburg Water (Pty) Ltd.

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Section 1:
Improving the Bottom Line through Waste Minimisation

Waste Minimisation is an ongoing process - one thing leads to another.

When I started this I never really thought I'd get any savings.

Metal Finishing Club Members, Durban

This section serves to introduce you to the concept of waste minimisation, why a waste minimisation programme is beneficial to a company and how to go about implementing a programme on-site. As a facilitator you will require this information in order to motivate companies to become club members.

1.1 What is Waste Minimisation?

Waste minimisation can be defined as:

The application of a systematic approach to reducing waste at source

In other words, preventing the waste from occurring in the first place rather than installing expensive end-of-pipe treatment systems to solve the problem.

Waste minimisation is an activity that relates to all inputs and outputs from an industry, business, site or process (see **Figure 1**). It applies to:

- ✓ Water
- ✓ Energy
- ✓ Chemicals
- ✓ Raw materials
- ✓ Liquid effluent
- ✓ Air emissions
- ✓ Solid waste

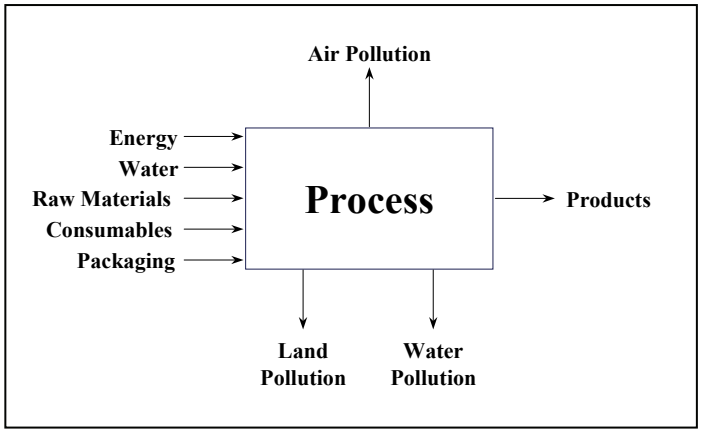


Figure 1: The Process Model

Anything that goes into a process that does not come out as product is termed waste. This can be in the form of emissions to air, land and water, rejects and so on (see **Box 1**). Waste is not simply materials excess to requirements, but represents a loss in profits.

Waste can reflect as much as between 1% and 4% of a company's turnover.

Waste Minimisation involves investigating all methods of reducing material / utility use at source and improving process efficiency, thereby reducing emissions to the environment and saving money.

Box 1 - The True Cost of Waste

disposal costs	raw material costs	energy costs	labour costs
water costs	transport costs	company image	capital depreciation
clean-up costs	management time	loss of profits	rejects

1.2 The Benefits of Waste Minimisation

Why should a company implement waste minimisation? Besides the fact that minimising waste at source will lead to a reduction in the amount of waste generated, there are numerous other benefits to implementing a programme of waste minimisation. These include:

- ✓ environmental improvement as there is less impact on the environment due to a reduction in waste;

- ✓ cost savings due to increased operating efficiency and reduced production costs;
- ✓ risk reduction due to a better understanding, control and management of present risks and future liabilities;
- ✓ a competitive advantage through an improvement in the company image;
- ✓ improved communication within the company as waste minimisation requires team effort; and
- ✓ Eliminating, or reducing, the need for effluent treatment as there is less waste that will require treatment prior to disposal. In addition, the size of an effluent treatment plant will be significantly reduced due to the lower volumes requiring treatment.

Based in both local and international experience, a company can potentially save as much as 80% of their water use, 5% of raw material consumption, and 50% of solid waste disposal (see **Table 1.1**).

Table 1.1: Scope to save (Enviros March, 1999)

Utility	Scope for Saving (%)
Raw materials	1 to 5
Packaging	10 to 90
Ancillary materials	5 to 20
Consumables	10 to 30
Electricity	5 to 20
Heat for process and space heating	10 to 30
Water	20 to 80
Effluent	20 to 80
Solid Waste	10 to 50

These advantages and potential savings need to be stressed to companies to encourage them to join a waste minimisation club and realise the benefits. The majority of companies will sit up and take notice if they realise there is financial benefits to making changes.

A number of local companies have achieved significant financial savings and reduced their environmental impact by implementing simple, low-cost changes (see **Box 2**).

Box 2:

A medium-sized metal finishing company in Durban, South Africa, saved in excess of R500 000/ annum in chemicals through:

- Increased monitoring – logs are now kept on chemical additions to the baths
- preventing unnecessary dumping of solutions
- Increased supervision
- more frequent visits by supplier
- Investigating alternative sources of chemicals

In total, this company saved over R1 million per annum.

1.3 The Basis of a Waste Minimisation Programme

Within any process, there are five main aspects that should be taken into account when considering the implementation of waste minimisation (see **Figure 2**).

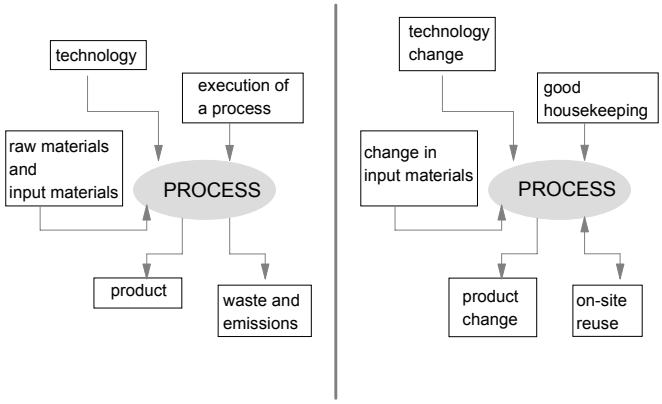


Figure 2: The five possible changes that can be made to a process or business operation to reduce waste at source (UNEP, 1994)

The basics of a waste minimisation programme are therefore to:

- Effect source control by changing raw materials, i.e. change to non-toxic or purer materials, use renewable raw materials or materials with a long service lifetime.
- Change production technology and equipment, e.g. improved process automation, process optimisation, equipment re-design and process substitution. This can create less hazardous wastes and emissions.
- Improve housekeeping by making changes to procedures and management in order to eliminate waste, e.g. spill prevention, improved worker education and training.
- Redesign or reformulate products by changing the product characteristics such as shape or composition. The product life may be extended or it is made easier to repair. The manufacturing process may become less polluting. This also includes changes in packaging. Changes to product design often requires a life cycle assessment approach, the details of which are outside the scope of this manual.
- On site recycling: i.e. useful application of waste material produced by the company, e.g. reuse as raw material, recovery etc. Only on-site recycling is considered to be a source reduction technique. Off-site recycling is seen as pollution control measure.

In most cases, over 50% of the savings can be made from the low- or no-cost housekeeping issues.

In a waste minimisation club for 24 metal finishing companies in the Durban region, 158 waste minimisation options were implemented, of which the majority had either an immediate return on investment, or paid back the investment within one year. Of these, housekeeping changes accounted for the majority of the options (72%), followed by technology changes (16%) and recycle options (9%).

1.4 How to Implement a Waste Minimisation Programme on-site

Step-by-step action plans for implementing an effective waste minimisation programme are shown in **Figure 3**.

Commitment from top management is crucial to the success of a waste minimisation Programme.

If management does not allow time and resources for the programme to be implemented, and does not encourage a change in mind-set and process operation, waste minimisation will not become entrenched in the day-to-day operation of the company. Any gains made will soon be lost as people revert to previous bad habits.

One person should be designated to manage the waste minimisation projects on-site. This person is responsible for organising teams to collect and analyse data relating to water, chemical, energy, raw material, etc. use and to identify where the losses are occurring. This baseline data collection is an essential stage in the programme as the company needs a reference point with which to compare the situation once changes have been made. Team members are also responsible for brainstorming waste minimisation options and selecting those that are felt to be suitable.

Options can then be priorities into those that *have to* be implemented (due to legislative reasons for example) and those that would be *nice to* implement, but are not urgent. Feasibility analyses can then be carried out to determine if these options are technically, economically and environmentally feasible. If there are options are easily implemented and do not require a feasibility assessment, these can be implemented as soon as they are identified.

An important aspect of waste minimisation is establishing a monitoring and targeting programme to ensure the long-term success of the project. It has generally been found that insufficient metering is present in factories. As a minimum, suggested areas for metering include main incoming water, borehole water if applicable; boiler feed water; each water-consuming department / equipment; ablutions; steam, electricity and liquid petroleum gas use.

You can't manage what you can't measure

It must be stressed that waste minimisation is not a once-off activity. It is a continuous process, where targets must be set, monitored and then re-assessed on a regular basis.

Dissemination of results is very important:
Nothing breeds success like success!

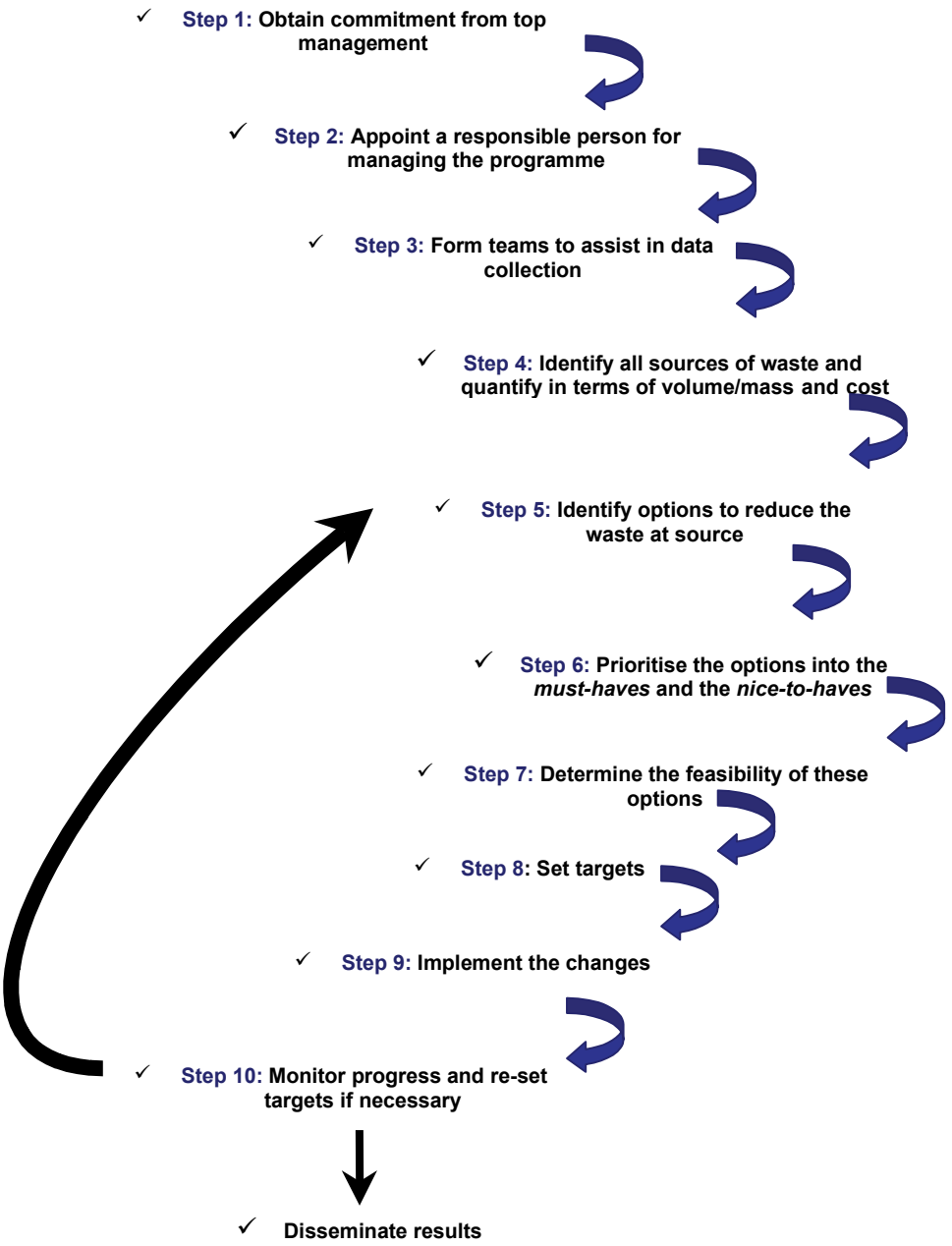


Figure 3: Step-by-step approach to implementing waste minimisation

Facilitator Checklist
Improving the Bottom Line

- ❑ Understand waste minimisation
- ❑ Understand the importance of waste minimisation
- ❑ Understand how to implement a waste minimisation programme

Recommended Readings:

Institute of Chemical Engineering Waste Minimisation Guide (1992) BD Crittenden and ST Kolaczkowski, United Kingdom.

United States Environmental Protection Agency Waste Minimisation Opportunity Assessment Manual (1988), USA.

Council for Scientific and Industrial Research Technical Guide K49 (1979). How to conduct an industrial waste audit. G Wentzel and J Funke, South Africa.

United Nations Environment Programme Technical Report Series 7 (1991), Audit and reduction manual for industrial emissions and waste, France.

Dutch Ministry of Economic Affairs, Prepare manual, The Netherlands

Section 2:
Working together in a Waste Minimisation Club

The support and information obtained from the club has been very important.

I always think it a great idea to share ideas, good and bad, what you are doing right and others are doing wrong (and visa versa).

Metal Finishing Club Members, Durban

This Section will describe the concept of a waste minimisation club, how to form a club, and your role as the facilitator. Aspects relating to calling meetings are covered in Section 3.

2.1 What is a Waste Minimisation Club?

A waste minimisation club is a group of companies working together to reduce waste and save money. Companies can be from either the same industrial sector (e.g. metal finishing) or from difference sectors (e.g. textile, food, chemical etc.) and in general, consist of between 7 and 15 companies.

The companies, or club members, meet on a regular basis (generally bi-monthly) to exchange information and ideas on waste minimisation and to receive training in waste minimisation aspects. The exchange of experiences and problems is the most important aspect of the club approach, as it allows for brainstorming of solutions by like-minded people, and a solution for one company may be a solution for another.

Peer pressure to achieve results is another aspect of a Club. Company representatives do not want to attend meetings and have no progress to report to the other companies. It motivates companies to implement a waste minimisation programme.

Clubs can be self-funded, funded by an outside organisation, or a combination of both. Section 6 deals with this in more detail. However, it is more cost effective for companies to join a waste minimisation club as the training and advice received there would cost far more if it were carried out on an individual basis.

2.2 How to Form and Manage a Waste Minimisation Club

How do you, as a prospective Club Facilitator, initiate a waste minimisation club?

There are 8 main stages in forming and managing a waste minimisation club:

- ✓ Identifying the need for a waste minimisation club;
- ✓ Awareness raising: informing industry;
- ✓ Recruitment: identifying and recruiting club members;
- ✓ Organisation for action: establishing the club structure and management roles;
- ✓ Assessment: on-site audits to determine the scope for savings;
- ✓ Implementation: undertaking waste minimisation actions; and
- ✓ Analysis: quantifying results.

Training is an important aspect of a Waste Minimisation Club. It involves educating management and shop floor personnel in waste minimisation issues. Training is carried out throughout the lifetime of a Club. Similarly, dissemination of the results of the Club is important to ensure that the benefits of the Club approach are made known to all. Dissemination of both individual company results and well as of the Club as a whole should be carried out. Dissemination activities should take place throughout the lifetime of the Club.

These stages are discussed briefly in this Section and will be covered in more detail in later sections of the Manual.

Stage 1: Identifying the Need for a Waste Minimisation Club

In Stage 1, what you, as the facilitator, are required to do at this stage, is to identify the *need* for a waste minimisation club. The following scenarios may be true for you:

- ✓ You belong to an organisation that would like to initiate a waste minimisation club within your sector or geographical area;
- ✓ You, as a consultant / researcher have been approached by companies interested in forming a club but who require some form of facilitation and guidance;
- ✓ You, as a consultant, see the need for companies to implement waste minimisation and would like to motivate them as a group to implement changes on site;
- ✓ You, as a local authority, have identified the most polluting industries discharging to sewer, and would like assist in reducing their waste at source; or
- ✓ You, as part of a research organisation, would like to investigate the effect of reducing waste at source on discharge to sewer and in-house process efficiency.

You then need to identify an area / industrial sector in which there is a significant environmental impact, either in terms of the high consumption of resources, or the type of effluent / waste produced. This area could be based either on the type of industry (i.e. a number of factories within the same industrial sector that are considered to be polluting), or geographical (i.e. different factories in close proximity to one another and discharging to the same sewage works).

Therefore, potential club members may be from the same industrial sector, or from difference sectors; they may be in close proximity to one another, or within a 10 to 20 km radius of one another; or it may be a large company that would like to form an in-house club (see **Box 3**).

Box 3:
Examples of Three South African Clubs

Metal Finishing Waste Minimisation Club – companies from the same industrial sector (and in competition with one another) situated within a 20 km radius of one another.

Hammarsdale Waste Minimisation Club - companies from different industrial sectors (and some of the same sector but not in competition with one another) in the same geographical area and discharging to the same central sewage works.

Pietermaritzburg Waste Minimisation Club – companies from different industrial sectors, within a 10 km radius of one another.

Stage 2: Awareness Raising

Once the need for a Club has been identified, the potential Club members must be made aware of the need to reduce waste at source. Awareness raising can be carried out in a number of ways. Companies can be visited on a one-to-one basis; an announcement can be printed in the local newspaper of an upcoming meeting; or invitations can be sent to the companies in the sector or geographical area of interest to inform them of a meeting.

Table 2.1 lists the ways in which awareness raising has been carried out in some of the Clubs in SA.

Table 2.1: Approaches used to raise awareness of a waste minimisation club

Approach	Examples of Club	Advantage	Disadvantage
1. Targeted invitations to attend an information meeting	• Pilot metal finishing • Metal finishing – DBN • Metal finishing – WC	• Can concentrate on an area or sector	• Limited number of companies • Cant be sure of getting the message across clearly • Person with no decision making powers attends
2. One-on-one company visits	• Hammarsdale club • Large companies - WC	• Can inform MD directly • Specific company issues can be addressed	• Time consuming • Limited number of companies can be targeted
3. Media coverage to attend a meeting (e.g. Newspaper, Chamber Digest etc.)	• Pietermaritzburg club	• Wide audience • May include other organisations (not just industry)	• No focus group • Person with no decision making powers attends
4. Video (combined with one-on-one visit)	• Clubs supported by the Cape Metro Council	• Uses success stories to get message across • Industry people convey success • Can promote a number of clubs	• Time consuming • Can be costly to produce

All companies are then invited to an awareness-raising meeting to inform them of environmental issues and the need to reduce waste at source. The concept of a waste minimisation club is discussed and interested companies invited to the follow-up, or *recruitment*, meeting.

Stage 3: Recruitment

The next stage in forming a waste minimisation club is to recruit the interested companies into the Club. It is at this meeting that Club costs, activities and aims are discussed. It is best to limit the Club size to between 7 and 15 companies.

Stage 4: Organisation for Action

This involves establishing the club structure and the management role of you as the facilitator. Project champions are nominated and teams formed within the companies.

Stage 5: Assessment

The assessment stage involves undertaking on-site waste minimisation audits to identify sources and quantity of waste and determine the scope for savings. This can be carried out by the project teams themselves, by an external consultant, or by the facilitator. Ideally, the assessments should be conducted in-house such that waste minimisation becomes incorporated into the way in which the company is managed. Options for improvement are identified and feasibility analyses carried out to determine which changes are to be implemented.

Stage 6: Implementation

In the implementation stage, club members undertake the waste minimisation actions identified during the assessment stage.

Stage 7: Analysis

An important stage of managing the clubs is to analyse the results achieved. This involves quantifying the savings achieved by the individual club members, not only in terms of financial benefits to the companies, but also the environmental benefits.

(Note that this is the final stage of managing the Club, not the final stage of the waste minimisation programme in a company, as waste minimisation is a continuous process and not an activity that ends.)

Training

Training is an important aspect of a waste minimisation club. It involves educating management and shop floor personnel in waste minimisation issues and ensures the long-term success of a waste minimisation programme. If all staff are not involved in the programme and encouraged to practice waste minimisation, it will not be a sustainable process.

Dissemination

Dissemination is another very important outcome of a Club. It is essential that the success of the Club members, as well as of the Club as a whole, are recorded and made known to other organisations. There are a number of ways of disseminating results such as through the use of the media; the preparation of videos; distribution of newsletters; case studies; and a final report on the results of the Club.

Further Details:

Section 3: Awareness Raising, Recruitment and Organisation for Action

Section 5: Assessment and Implementation

Section 6: Analysis and dissemination

Section 7: Training

2.3 Structural Organisation

Once you have identified the potential club members, the next step is to have an idea of how you see the club being formed and managed. You need to have these points in mind before calling the first meeting (**Section 3**), such that you are able to answer queries relating to structural organisation. Once companies have been recruited, this structure can be altered in consultation with them and according to their needs. The basic structure of a waste minimisation club is given in **Figure 4**. A club generally consists of the following:

- A steering group
- A facilitator
- Club members
- Project champions
- Project teams

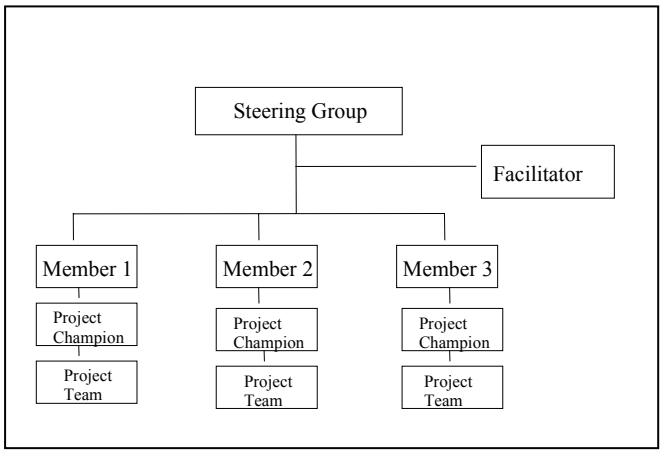


Figure 4: General structure of a WMC

Role of the Facilitator

Your role as the facilitator implies a number of responsibilities. In general, these include the following tasks:

- Defining the role of the steering group;
- Defining the role of the project champion and project teams;
- Formulating the *rules* of the club;

- Arranging and calling meetings;
- Drafting a constitution or certificate of commitment (if required);
- Arranging training and guest speakers;
- Arranging site visits and assistance with waste minimisation audits; and
- Determining the financial contributions from each company and investigating outside sources of funding.

Three of the waste minimisation clubs formed in South Africa have found it useful to form a committee, which as a group, handles the finances and organises meetings. This committee should have a representative from one of the club member sites such that their needs can be taken into account when organising meetings.

Role of the Steering Group

The Steering Group of a waste minimisation club is the name given to the group of people who meet at the club meetings to exchange information and ideas on waste minimisation. Therefore, this Steering Group consists of:

- The facilitator;
- Project champions; and
- Outside consultants (for training and assistance where applicable).

Other people who can be invited to sit on the Steering Group include:

- Company directors;
- Other company project team members;
- Suppliers;
- Local authorities; and
- Affected community groups.

The role of this Steering Group is to:

- **Act as a *driving force* for the club**. In other words, meeting on a regular basis motivates the club members to achieve results. The aims of the Club are decided as a group.
- **Provide a forum** for the exchange of information and ideas on waste minimisation.
- **Provide a forum** for the club members to receive training in waste minimisation aspects.
- **Allow for liaison with external stakeholders**. These could be the local authorities who are interested in the pollution loads from the companies, or a nearby community who is affected by emissions from the companies.
- **Assist in project tracking and progression.** This is an important aspect for the facilitator, as this is an opportunity to determine the progress at each site and at what stage the companies are with respect to implementing waste minimisation. It will also highlight where problems are being experiences and where assistance may be required.
- **Provide a forum for dissemination.** Remember that nothing breeds success like success, and if one company is making good progress and achieving results, it will motivate others to do the same. In addition, if company directors are present, they will hear first hand the progress at each site and possibly motivate them to allow the project champion more time to devote to waste minimisation.
- **Allow for social interaction.** The meetings allow the club members to talk to one another on an informal basis and become acquainted with one another.

- **Allows unification of club members.** As a group the Club may be able to lever discounts on products and services. In addition, it can act as a lobby group to negotiate with outside bodies such as the local authorities.

From experience, it is generally found that these Steering Groups are comprised only of the facilitator, a consultant and the project champions. In some cases, the local authority has been present, but often club members are suspicious of their presence and discussions are not as open when the authorities attend meetings (this subject is discussed in more details in Section 2.5).

Examples of Steering Groups for some clubs in South Africa are given in **Box 4.**

Box 4: Examples of Steering Groups

Metal Finishing Club, Durban
Facilitator (University research group); project champions; supplier

Metal Finishing Club, Cape Town
Facilitator (Consultant); project champions; suppliers

Hammarsdale Club
Facilitators (University research group; consultant); project champions; local authority

Pietermaritzburg Club
Facilitator (University); project champions; local authority; suppliers; waste contractors; community (local school)

All the possibilities for the structure of this Steering Group can be provided at the first meeting and discussed with the club members to ensure that all are comfortable with the structure. For example, the Metal Finishing Club in Durban was only comfortable inviting one supplier to sit on the Steering Group and not the others. They also voted to include the local authority by invitation to selected meetings.

Club Members

Each company that has joined the Waste Minimisation Club is known as a Club Member. Each club member then appoints a Project Champion to represent them at the Steering Group meetings.

Role of the Project Champion

The Project Champion is the person elected to represent their company at the Steering Group meeting. As the Project Champion, this person also has the following tasks:

- Facilitate waste minimisation on-site. This involves:
  - Obtaining commitment from top management;
  - Creating conditions for success of the programme;
  - Assisting teams in obtaining results; and
  - Ensuring that there is a system in place that assists in continuing improvement.
- Manage the waste minimisation programme.
- Disseminate the results.
- Record savings
- Motivate others

Note that the function of the project champion is not to go out and do waste minimisation single handily. A successful programme requires the involvement and effort of all people within the company.

The kind of person that is elected as the project champion is very important. If the wrong person is elected, the company will not make progress and people in the company will become disillusioned with the project.

The characteristics that make a good project champion include:

- ✓ Enthusiasm for the role;
- ✓ Willingness to learn;
- ✓ Credibility with both senior management and shop-floor employees;
- ✓ Ability to communicate;
- ✓ Organisational skills;
- ✓ Ability to collect, collate and analyse data;
- ✓ Good reporting skills;
- ✓ Ability to overcome barriers and push ahead.

The ultimate long-term objective of the Champion is to eliminate the need for a Champion by entrenching waste minimisation into the company culture such that the process is self-sustaining.

Role of the Project Team

The Project Champion is then responsible for forming Project Teams within the company. The role of the team is to:

- ✓ Conduct waste surveys;
- ✓ Identify problem areas;
- ✓ Brainstorm particular problems;
- ✓ Assess ideas; and
- ✓ Implement projects

There can be more than one team and they may differ in size depending on the size of the company. For example, in a small company the team may consist of the Project Champion and an assistant, whereas in a larger company there may be as many as 8 team members.

Teams may also be temporary; in other words, a task team may be formed for a specific area or process.

These teams are usually comprised of representatives from each major department / section in the company and also representatives from health and safety, and finance. If an outside consultant is assisting in the waste minimisation audit, then they should also be included in the team. The presence of a financial person is important, as it this person who will be able to give information on the budget and whether a project is financially viable. Some suggestions for inclusion in a project team are given in **Box 5.**

Box 5: Expertise for inclusion in the assessment team
(after Institute of Chemical Engineers, 1992)

The Team can consist of representatives from the following areas:

management	environmental	quality assurance & quality control
design and process	engineering	production and maintenance
legal	health and safety	research and development
operators/supervisors	transport department	accounting, finance & purchasing
external consultants		

2.4 What makes a Club a Club?

In order to ensure that you as a facilitator have a clear understanding of what a Club is, the following questions can be used to help define a Club:

- Are there a group of companies being educated in good waste management practices?
- Are each club member investigating source reduction techniques?
- Is some form of skills transfer in waste minimization taking place?
- Is information on a structured approach to waste minimization being transferred?
- Are there at least 5 active members (where active means that they are implementing waste minimization and reporting results)?
- Are there meetings at least every 8 weeks?

It is also useful to outline some rules for the Club members so that they know what is required of them. These rules can be discussed at the recruitment meeting (see **Section 3**).

- Companies must be prepared to share information (although some may take longer than others to join in this sharing. They should not be forced, but rather encouraged to take part)
- Club members must attend Club meetings and there may be a minimum attendance set (e.g. must attend 4 out of 6 meetings in one year)
- The Club members must undertake at least a pre-assessment during the lifetime of the Club so that they have identified where the main wastes are occurring
- If a membership fee is charged, all members are required to pay these in full and on time
- Club members should be prepared to report their results / savings to the facilitator for dissemination purposes (the facilitator in turn must be prepared to ensure confidentiality).

2.5 Involvement of the Local Authority

It is important to have the support of the local authority for the waste minimisation club, even if they do not attend the Club meetings. You, as the facilitator, should approach the relevant departments and explain the concept of the Club and what the Club aims to achieve. It is a good idea to invite a representative to the awareness raising or recruitment meeting where they can publicly show their support for the idea and provide information on discharge limits and regulations that are pertinent to the companies present.

Form experience it has been found that the presence of the local authority at every Club meeting limits discussions and prevents club members from sharing information and problems. A solution that has been successful, is for the club members to decide when they would like the authorities present and then invite them to a particular meeting. It is your role as the facilitator to act as the link between the Club and the authority and keep them informed of the Club progress. Similarly, if there are any changes on the part of the authority (e.g. new regulations, etc.) you will be in the position to invite them to address the Club members on these issues.

It is really the decision of the Club members as to whether or not they would like the authorities to be present and is an aspect that can be included for discussion at the inaugural meeting.

2.6 Sector-specific vs. Cross Sectional / Regional

As mentioned in Section 2.2, a Club can be formed within the same industrial sector (sector-specific) or with companies from difference sectors (cross-sectional) and which are in the same geographical area (regional). There are examples of these 2 types of Clubs, both internationally and locally (also see **Box 3**).

There are advantages and disadvantages to each of these structures, which are given in **Table 2.2** with possible suggestions for overcoming problems.

Within South Africa, it has been found that the cross-sectional / regional clubs are more effective for larger companies, whereas sector-specific clubs work better for the smaller (less than 100 employees) companies. The disadvantages listed above can be overcome through discussions with the club members, and should not discourage you from initiating either form of club.

Some examples of types of Clubs established in South Africa are given in **Box 6.**

2.7 Club Size

It has been found that the best size for a Club is between 10 and 15 companies. Larger clubs may result in limited time for discussions and may prevent some companies from reporting back at meetings. In addition, it can become very time consuming to inform all members of meetings and provide minutes; and you, or the assigned consultant, may not have enough time to undertake site visits at all companies.

Clubs with less than this number of companies have been run successfully, but it means that any costs that are incurred on the part of the Club members (e.g. club fees) will be increased. It may also not be worth your time to run a Club with only 3 or 4 members.

Some examples of sizes of clubs are given in **Box 6.**

It is however, up to you to decide the most suitable size for the Club based on the commitment of the members and the aims of the Club.

Table 2.2: Sector-specific vs cross-sectional / regional clubs

Club Type	Advantages	Disadvantages	Suggestions
Regional	• Companies under same pressure with respect to effluent limits • Usually no direct competition between members • Meetings take place locally	• Pollution problems are not generic • Individual solutions are required for each member	• Offer generic waste minimisation advice • Train project champions in undertaking waste minimisation audits • Use students to assist in undertaking audits • Provide sources of information / advice for specific problems
Sector-specific	• Pollution problems and solutions tend to be similar • Effective communication and discussions at meetings	• Can be different regulations if members are in different areas • Competition between members can limit discussions • Members may be located over a large geographical area	• Approach authorities for clarification on different limits • Emphasise the common goal of reducing waste at source • Change venue of meeting each time

The first Metal Finishing Club listed in **Box 6** was the first club to be established in SA and there were originally 29 companies signed as members to the club. However, of these 29, only half were actively involved in club activities and realised savings. The large number of companies made management of the club difficult and companies were lost because of the lack of time on the part of the facilitators to spend at each site. The Metal Finishing Club in the Western Cape is run more on the lines of an association where waste minimisation aspects are incorporated into the other functions of the association.

Box 6: Some examples of types and sizes of waste minimisation clubs in SA

Club name	Place	Type	Club Size
Metal Finishing	Durban	Sector-specific	29 (15 active)
Hammarsdale	Hammarsdale	Cross-sectional	8
Large Companies	Western Cape	Cross-sectional	7
Pietermaritzburg	Pietermaritzburg	Cross-sectional	10
Metal Finishing 2	Durban	Sector-specific	8
Metal Finishing	Western Cape	Sector-specific	17

2.8 Lifetime of a Waste Minimisation Club

How long should a waste minimisation Club operate?

Experience from both local and international clubs has shown that a Club has a lifetime of between 18 months and 3 years. During this time the club members are exposed to waste minimisation training, receive on-site assistance, implement changes and make savings. The external input from a facilitator is essential during this time to arrange meetings, motivate members and analyse the results.

It has been found that it takes between 6 and 8 months before the Club members start making progress on their sites, after which time, the benefits of waste minimisation motivate them to implement changes. It is felt that those companies that are going to implement waste minimisation will do so within these 18 months to 3 years, and those that have not, will not do so regardless of extra external input. This emphasises the importance of imbedding monitoring and targeting and the cycle of re-assessment into company culture.

At the end of this time, Club members may decide to continue meeting on a regular basis, in which case it may be more of an informal get-to-together, or they may decide to formalise it and form an association.

It is therefore suggested that when forming the Club, to work on a time-scale of at least 2 years.

Some examples of the lifetime of Clubs are given in **Box 7.**

Box 7: Lifetime of some Waste Minimisation Clubs

Club name	Place	Duration	Long-term results
Metal Finishing	Durban, SA	3 years	Formed a Metal Finishing Association
Hammarsdale	Hammarsdale, SA	2 years	Incorporated into the Industrial Conservancy
Aire and Calder	United Kingdom	3 years	Informal gatherings
Project Catalyst	United Kingdom	2.5 years	Continued savings

2.9 Drafting a Constitution

Some of the Clubs in SA have a constitution, while others do not. The advantages of having a constitution include:

- ✓ Club members are united as one body, and as such, have a mandate and voice to negotiate with local authorities etc.;
- ✓ It is an indication of the Club members commitment to the Club;
- ✓ The goals of the Club are clearly explained and set-out;

- The roles of the Chairperson, secretary and treasurer are well defined;
- It can lever public funds, e.g. from DTI; and
- It assists in administrative aspects where money is involved (e.g. opening a bank account).

In order to achieve an effective constitution, it is important to have the following components:

- An elected Chairperson, secretary and treasurer; and
- An elected committee to uphold the constitutions objectives and powers.

The Chairperson conducts the meetings and puts into action the decisions made by the committee. He / she effectively manages the Club and mediates the resolution of any conflicts. The committee ensures that the objectives and decisions remain constitutional and serves as an advisory panel to the Club.

Three of the Clubs in SA have formed committees which consist of representatives of the Club and the facilitator. Constitutions for these Clubs have been signed. These Clubs are run more on the basis of an association rather than just a Waste Minimisation Club and therefore felt the need to formalise the process. In addition, the two Clubs in the Western Cape have funding from outside sources and required an open bank account. This was only possible if the Clubs were a constituted organisation.

The first Metal Finishing Waste Minimisation Club in Durban did not have a constitution at the outset, but signed a *Certificate of Commitment*. This certificate outlined the goals of the club, and was signed by senior management. By making this declaration, the company showed commitment to:

- implementing a programme of waste minimisation;
- reducing all sources of waste (liquid, solid, energy, gaseous);
- continual improvement;
- establishing a monitoring programme;
- reducing environmental impact;
- sharing information with other club members; and
- attending regular club meetings.

Members of the Western Cape Club for Large Industries have signed similar certificates. These certificates were framed and hung in the receptions of these companies indicating their commitment to reducing waste at source to their customers.

Based on this declaration, the Metal Finishing Club drafted a constitution for the Club. However, since the Club consisted of less than a third of the metal finishers in the Durban region, it was decided to form a Metal Finishing Association which has a constitution.

In some cases, Club members may request that the amount of information they are going to share is outlined in the constitution so that the facilitator and the members are clear on what topics will / will not be discussed. This may only occur in those Clubs where members are in direct competition with one another.

Sample constitutions and declaration of commitment are given in **Appendices 1 and 2** respectively.

Facilitator Checklist
Working together in a Waste Minimisation Club

- ❑ Understand the concept of a waste minimisation club
- ❑ Identify your role
- ❑ Understand role steering group
- ❑ Understand role of Project Champion and Teams
- ❑ Understand constraints of club types, size and lifetimes
- ❑ Understand how to draft a constitution

Recommended Readings:

Environmental Technology Best Practice Programme GG122 (1998)
Waste Minimisation Clubs – Setting them up for success, United Kingdom

Environmental Technology Best Practice Programme GG27 (1996)
Saving Money through Waste Minimisation – Teams and champions,
United Kingdom

Centre for Exploitation of Science and Technology (1995)
Waste Minimisation – A Route to Profit and Cleaner Production.
Final Report on the Aire and Calder Project, United Kingdom

East of Scotland Water (2000). Less is More – Final Report for the East of Scotland Waste Minimisation Project, United Kingdom.

March Consulting Group (1998). Northumbria Waste Minimisation Club – Final Report; United Kingdom.

Section 3:
Motivating by Meeting
Raising awareness, recruitment, organisation for action

I feel bad if I go to a meeting and I can't report any improvements or savings.

Metal Finishing Club Members, Durban

This chapter will cover aspects relating to calling meetings, such as wording of the invitations, preparation requirements, presentations and so on. All supporting documents are given in the **Appendices** and referred to in the relevant sections. Budget considerations are given in Section 8. Remember that it may not be necessary to carry out all of these meetings – it depends on the situation. For example, an awareness raising meeting / recruitment meeting may not be required if companies are already wanting to form a club.

It is not always necessary to carry out all these steps. In a lot of cases, the awareness raising and recruitment meetings are combined. Take a look at your situation and decide whether it is necessary to do both. Suggestions are provided below.

A combined awareness raising and recruitment is suggested if:

- ✓ You are speaking to an industrial organisation directly where you want to recruit members of that sector
- ✓ You are speaking to a company who wants to set up an in-house club
- ✓ You are approaching each company in the proposed area / sector on a one-to-one basis

Separate meetings are suggested if:

- ✓ You are targeting a large geographical area and want to inform all companies of the opportunities, but will only need 10 of them to join. The first meeting will be an awareness raising meeting and the second a recruitment meeting
- ✓ You know you are not speaking to decision makers in the organisations you are targeting

Remember that this Manual only provides guidance and that your approach can be as flexible as needed.

3.1 Planning an Awareness Raising Meeting

Once you have identified the target area or companies, you will need to have some form of *awareness raising* meeting to introduce the concepts of waste minimisation and a waste minimisation club, and propose the formation of such a Club for their companies.

As shown in Table 2.1 in Section 2, there are a number of ways of informing industry of the intention to initiate a waste minimisation club, but in most cases, an awareness-raising meeting is held such that all parties can ask questions and identify potential fellow club members.

In order to hold an awareness-raising meeting, you will need to consider the following:

- ✓ informing the local authorities;
- ✓ an invitation;
- ✓ the contact details of all the relevant companies;
- ✓ a suitable venue;
- ✓ speakers / video presentation;
- ✓ a handout and reply form; and
- ✓ an attendance list.

Informing the Local Authorities

The support from the local authority is important when initiating a waste minimisation club. This is especially true if the companies are not complying with the regulations for effluent discharge. You should meet with the local authority to explain the concept of a waste minimisation club and ask for their backing. The authorities will most likely have no further involvement in the Club other than to provide information where required and attend meetings when invited (see earlier, Section 2.4). If companies know that it is a concept supported by local government, it is more likely to be successful - it has been found that industry responds better when there is both the *carrot* and the *stick* being applied!

More than one authority may need to be approached depending on the area in which you are planning to establish the Club. For example, you may need to speak to the local authority as well as the Department of Water Affairs and Forestry, or the local Department of Environment Affairs.

The Invitation

A sample invitation is given in **Appendix 3.** As your intention is to motivate companies to attend the meeting, it should include a statement about how much waste costs industry and that companies in SA have managed to save between 2 and 7% of their annual turnover. It is also a good idea to include an endorsement by the local authority or use their letterhead on the invitation. An indication of the types of presentations that will be given should be included. You should also try and get publicity from the local press. If there is a leading company in the sector you are targeting and they support this concept, include their endorsement as well.

Invitations should be sent out about 4 weeks prior to the meeting and be addressed to senior management – preferably the managing director or environmental manager. Details regarding the date, time, duration and venue should be provided, along with directions if necessary. A deadline for replies should be given and a contact name provided for the responses. Alternatively, a reply slip can be provided which the companies complete and fax to you.

It has been found that Monday and Friday are bad days for organising meetings, with Tuesday and Wednesday been the most preferred days. The best time is in the morning, around 9am or 10am and the meeting should not last more than 2 hours.

Company contact details

You will need the contact details of the relevant companies. You should send to as many companies as are in the area or industrial sector, as the response rate is generally low. A list of companies should be available from the local business chamber, or, if they are regularly monitored for effluent discharge, the relevant authority can provide company details.

Venue and catering

The most suitable venue is one that is sufficiently close to all the companies and large enough to accommodate the expected number of representatives. There should be facilities available for making presentations such as an overhead projector and screen. If it is a large room, it may be necessary to have a microphone as well.

Some examples of meeting places include:

- ✓ the local authority's board / training room
- ✓ the chamber of businesses offices
- ✓ one of the interested companies board / training room
- ✓ Community Hall

It is your choice as to whether you would like to provide refreshments at the meeting. If possible, this recruitment meeting should be at no cost to the companies with the refreshments sponsored either by you or another party. If this is not possible, a minimal charge to cover catering expenses can be asked of the companies.

Speakers / presentations

The awareness-raising meeting should cover aspects relating to the need for waste minimisation and why it is beneficial to companies to implement such a programme on-site. In this Manual you are provided with the basis for some presentations (discussed further in Section 3.2) on waste minimisation and the results of case studies elsewhere in SA. It would however, be beneficial if you could arrange for a company that is implementing waste minimisation to address the meeting and explain the benefits him/herself. Industry people respond better to *one of their own* than an outsider. Another approach is to use a video on waste minimisation where industry representatives are speaking on their own successes.

It has also been found that a presentation on the SA environmental laws and how they impact on industry motivates companies to investigate their environmental responsibilities. If you do not know of anyone who could give this presentation, it is more than likely that the local authority has a lawyer who will be able to assist.

Where non-compliance with the local regulations is an issue, a presentation by the local authority on the limits and the implications of non-compliance can also be presented.

Handout and reply form

It is a good idea to have some form of handout detailing the concept of a waste minimisation club and the benefits of being a member for the attendees to take with them after the meeting. Include in this handout a reply form that can be faxed back to you if they are interested in being part of the Club. The reason for this is that quite often the person that is sent to attend this meeting does not have the power to commit his/her organisation to undertaking such a project and they will need to consult with others in the company. A sample handout is given in **Appendix 4**.

Attendance list

Place an attendance list at the entrance for completion by the attendees. Details to ask for include:

- ✓ name
- ✓ company
- ✓ postal address
- ✓ phone
- ✓ fax
- ✓ email

You will need these details for future contact. It is best to print this as a table on an A4 page in landscape such that there is sufficient space for the information (see **Appendix 5**).

Facilitator Checklist:
Planning an Awareness Raising Meeting

- ❑ Meet with local authorities
- ❑ Arrange venue and catering
- ❑ Organise speakers / presentation
- ❑ Prepare invitation
- ❑ Obtain company contact details
- ❑ Send out invitations
- ❑ Publicise meeting in the local press
- ❑ Prepare handouts and reply forms
- ❑ Prepare attendance list
- ❑ Check on presentation equipment

3.2 The Awareness Raising Meeting

Print out the agenda for the meeting and hand to the attendees on the day. A sample agenda for an awareness meeting is given in **Appendix 6.**

As discussed in Section 3.1, the basis for this meeting can include:

- ✓ welcome and introductions
- ✓ presentation on local regulations
- ✓ presentation on national environmental laws and how it impacts on industry
- ✓ presentation on waste minimisation and waste minimisation clubs
- ✓ presentation on case study results
- ✓ presentation from a company practicing waste minimisation
- ✓ time for questions
- ✓ a summary of the mornings proceedings
- ✓ the next steps

Welcome and introductions

The meeting will begin with you introducing yourself and the other speakers, welcoming all present and giving an outline of the aims of the meeting and the agenda. Ask if there are any other items to be added to the agenda.

Presentations

It is useful for the first presentation to be made on the new legislation or regulations as are relevant for your situation. This highlights to industry the impact of their pollution and the consequences thereof. It will assist in promoting the idea that reducing waste at source makes *good business sense* (see **Appendix 7** for sources of information on new legislation). It is beneficial if this presentation is given by a representative of the local authority or an environmental lawyer as it appears more *official*.

As the concept of waste minimisation is not well understood by industry / business, it is suggested that an introduction to waste minimisation be presented, where the aims, benefits and the methodology are explained. Following on from this, the concept of a waste minimisation club can be introduced, together with case study results from other Clubs in SA.

Sample presentations on these topics are provided in **Appendices 8 and 9**.

If you have a speaker from industry, this would be the ideal time for them to introduce the results they have achieved and the benefits of implementing waste minimisation in their company.

The presentations for the day can then be ended with an outline of the proposed Club, suggestions on how it could be structured and managed and the discussion points for future meetings (see Section 3.3).

Sufficient time for questions should be allowed between each speaker.

After all questions have been discussed, summarise the mornings proceedings and provide each attendee with a handout summarising the aims of the proposed Club and a reply form for them to return to you if they are interested.

Questions

Box 8 lists some common questions that are asked at an awareness meeting, with some suggested answers.

Next steps

The next steps would then be to explain that all of those who return the form would be contacted with a date for the follow-up recruitment Club meeting. If there are not a large number of people present,

you can perhaps suggest that they will also be contacted by you in the next 2 weeks to follow-up on the meeting.

Handouts and reply forms can also be sent to those companies that sent apologies for the meeting, but expressed an interest in the concept.

It may be necessary to repeat awareness raising meeting if there is insufficient response or further awareness raising is required.

Facilitator Checklist:
The Awareness Raising Meeting

- ❑ Attendance list
- ❑ Pens
- ❑ Labels for name badges
- ❑ Agenda on an overhead and to hand out
- ❑ Presentations
- ❑ Handout
- ❑ Reply form
- ❑ Presentation equipment

Box 8: Common questions / comments and suggested answers	
What happens if my competitor is also a member?	• Emphasise that it is information on Waste Minimisation that is being shared, not trade secrets • Companies are only asked to share what they are happy to share – no-one is forced to give away confidential information • Make companies aware that members of all other clubs in SA had similar reservations, but that it has not caused problems
We simply do not have the money to invest in this type of programme	• Re-iterate the benefits of waste minimisation and that it does not cost money to make initial savings • Use case studies to demonstrate that most savings are made with no- or little investment
I really don't see the benefit of being in a Club	• Explain the benefits of a club approach: - the sharing of information - learning from others experiences - using joint funds to employ a consultant as a group - meeting with industry peers - realising that you are not alone in fighting waste
Can we join at a later date when we have more time?	• This may be possible depending on the other club members and how they feel about new members joining at a later date, but mention that they would lose out on some of the initial training
I don't have the authority to say "yes" to being a member	• Provide the attendees with the handout and reply forms which they can give to the relevant person in their company. • Offer to send more information to the relevant person
	• Offer to send more information to the relevant person

3.3 The Recruitment Meeting

The recruitment meeting is held soon after the awareness-raising meeting such that the interest and enthusiasm does not fade. All companies that submitted reply forms or apologies for the previous meeting are invited. If there are any further potential members that were not invited to the awareness-raising meeting, they can be included in this invitation.

The aim of the recruitment meeting is to:

- ✓ Re-iterate the concepts of waste minimisation and waste minimisation clubs;
- ✓ Discuss the costs and the benefits of the proposed Club;
- ✓ Sign companies up as Club members; and
- ✓ Plan the Inaugural Club meeting.

A sample agenda is given in **Appendix 10**.

Contacting companies

An invitation detailing the date, venue, time and agenda should be circulated to all interested companies at least 2 weeks prior to the meeting. A sample invitation is given with the agenda in **Appendix 10**. This invitation can be faxed, posted or emailed, depending on the most suitable form of contact. An RSVP date and contact number should be provided.

If you are targeting specific companies and this recruitment meeting is combined with your awareness-raising meeting, a good idea is to hold a top management breakfast seminar where you can address the decision-makers in the company. If possible, the costs of this meeting should be covered by your own budget, but if not, it is acceptable to ask for a fee to cover the cost of the meal.

Presentations

The concepts of waste minimisation and a waste minimisation club can be reiterated, firstly to act as a reminder to those who were present at the awareness raising meeting, and secondly to inform those that did not attend the meeting of the importance of waste minimisation.

If possible, the same local authority representative who presented at the awareness raising meeting should be invited to re-iterate the importance of reducing waste at source and the penalties for non-compliance with local regulations.

Discussion Points

Points that are raised at this meeting are aspects relating to:

- ✓ membership fees;
- ✓ Club operation;
- ✓ Funding for the Club;
- ✓ Club size
- ✓ How to sign up as a Club member; and
- ✓ Date of the Inaugural meeting.

Application forms are handed to all attendees and those that are interested are asked to complete them and either hand them to you, or send them by fax or email.

Membership fees:

The manner in which Club membership fees are calculated is discussed such that the companies have an understanding of what they will receive for their money.

Club operation:

The functions of the proposed club is discussed, providing the companies with an indication of how often the Club will meet, the actions undertaken at these meetings, the role of facilitator and so on.

Funding for the Club

Potential club members are informed of the possibilities for subsidies from outside organisations to assist in the running of the club.

Club size

As discussed in Section, it is best to limit the Club to 10 to 15 members. If you have more than this number of companies that are interested in forming a Club, you can either:

- ✓ run it as one Club if you have sufficient resources (manpower and time); or
- ✓ suggest forming 2 Clubs where companies are grouped according to area or industry type.

Box 9 discusses the approach used in the Pilot Metal Finishing Club.

How to sign up as a Club member

All attendees are provided with an application form that can be returned to you.

Date of the Inaugural meeting

This date of this next meeting is discussed with the attendees. It is suggested that it be held within 2 weeks of the recruitment meeting to ensure the momentum is maintained. A suitable venue is also discussed.

Box 9: Size of the Pilot Metal Finishing Club in Durban

At the recruitment meeting, 29 companies signed up to be members. It was suggested that 2 or 3 Clubs be formed based on the sewerage works to which they discharged. It was the companies' decision to have one large Club. From experience, it would have been better to insist on smaller Clubs, and perhaps to have based them on process types – for example, one for electroplaters, one for powder coaters, etc. The large size of this Club and the limited personnel resources of the PRG meant that companies could not receive individual attention.

Facilitator Checklist: Recruitment Meeting

- ❑ Attendance list
- ❑ Pens
- ❑ Labels for name badges
- ❑ Agenda
- ❑ Presentations
- ❑ Application forms

3.4 The Inaugural Meeting

Once replies from the recruitment meeting have been received, the inaugural meeting can be planned. This meeting is held for official club members only. The aims of this meeting are to:

- ✓ Finalise the organisation and management of the Club;
- ✓ Training of Club members to provide information on the first steps in undertaking a waste minimisation programme; and
- ✓ Identify the possible barriers and drivers.

All companies that returned the application forms are contacted with the details of the Inaugural meeting. An example invitation and agenda is given in **Appendix 11**.

It is strongly recommended that this invitation be followed up with a phone call one or two days before the meeting as a reminder.

Discussion Points

Items for discussion on the agenda can include:

- ✓ aims of the Club;
- ✓ structure of the club;
- ✓ payment of membership fees (and what it covers);
- ✓ drafting of a constitution;
- ✓ declaration of commitment;
- ✓ frequency of meetings and venues;

- time and duration of meetings;
- *"rules"* of the Club

It is a good idea to have some-one taking minutes such that all discussions are recorded.

Aims of the Club

The main aim of a waste minimisation Club is to provide a forum for companies to meet to exchange problems, ideas and experiences in waste minimisation, such that they encourage one another to reduce waste at source, make financial savings and reduce their environmental impact.

As a facilitator, you may already have some specific ideas of what you would like the Club to achieve. For example, in the case of the pilot Metal Finishing Club, one of the aims was to reduce the amount of metal sludge produced that was to be disposed of to landfill. These aims can be listed for discussions, as well as obtaining suggestions from the members.

Structure of the Club

This covers the manner in which the Club is managed, such as:

- Will there be a committee with a chairperson, secretary and treasurer; or will you be solely responsible for managing the Club? (Discussed in **Section 2.3**)
- Will outside stakeholders (e.g. local authorities; communities; suppliers; etc.) attend the Club meetings? (Discussed in **Section 2.4**)
- The role of project champions and project teams within the companies (**Section 2.3**)
- Can other companies join at a later date or is the Club membership closed?
- Are outside consultants / students going to be employed to assist in audits and / or training?

The manner in which the Club is structured and manage will depend on the Club members. Each Club that has been established in SA has been managed slightly differently, with different organisational structures. What is necessary however, is one person to drive the process, and this is most likely going to be you, the facilitator.

Table 3.1 provides some advantages and disadvantages of some of the aspects mentioned above. **Boxes 10 and 11** give some examples from previous clubs in SA.

Box 10: Closed or Open meeting?

In the Pilot Metal Finishing Club it was decided that companies had until a certain date to join the Club, after which, no new members would be accepted. The main reason for this is that after companies have obtained an understanding of waste minimisation and are implementing changes, they do not want to have to re-visit these issues for a new company. However, it was found that after the Club had been running for 2 years, that they were open to having new members who could benefit from their experiences.

Box 11: Using outside assistance

It has been found in the majority of the Clubs in SA, that those companies that do not receive assistance from students do not make progress. The main reason for this is that the Project Champion does not have the time to devote to undertaking mass balances and identifying sources of waste. This student assistance was complimented by site visits on a quarterly basis by the facilitator. If student assistance is not available, another approach is to suggest to the members that a person other than themselves be trained (See Section 6). A third method is to source an outside consultant to assist. By approaching a consultant as a Club, the costs for their time can be spread among the members. Training can also be undertaken by you using the Trainer's Manual.

Frequency of meetings

Meetings need to be held regularly to ensure that progress is made. The Club approach is successful because it allows for members to learn from one another and the peer pressure to achieve results motivates companies to implement changes.

It has been found that meetings held every 2 months are the most successful, as it allows companies sufficient time between meetings to undertake investigations in their companies and keeps the momentum going. Less frequently than this can cause members to lose interest; and more frequent meetings may cause them to feel pressured and prevent them from attending. However, in some cases it has been found that holding monthly meetings for the for the first 3 months, followed by bimonthly meetings after that period is a useful method of creating awareness and providing companies with the necessary tools to initiate an audit on-site.

Suggestions on choosing a venue are provided in **Section 3.1**.

Time and Duration of Meetings

As mentioned previously, the best days for meetings are Tuesdays, Wednesdays or Thursdays. The time of day depends on the members. **Box 12** lists some of the Clubs in SA together with the times and duration of meetings.

The duration of Club meetings is usually based on the time limits of the Club members. The agendas for the meetings will have to be based on this limit. Club meetings generally last between 2 and 4 hours depending on the length of feedback from the companies, whether training is being carried out, or if there is an invited speaker. The larger the Club, the longer the meetings will last to allow all to have a chance to talk.

Table 3.1: Some aspects to keep in mind when planning the Club structure

Aspect	Advantages	Disadvantages
Closed Club	• All members are at the same stage at the same time • Close relationships are formed between members	• Exchange of experiences may be limited
Open Club	• New members benefit from the experiences of the old • More companies to share experiences and ideas • Club life may be longer	• New members will miss out on any training already carried out • Mistrust of new members may limit discussions
Student assistance	• Provides an extra pair of hands to collect data • Can be employed at low cost rather than paying a company person to collect data • Student gains industry experience • Companies make quicker progress	• Programme stops when the student leaves • Waste minimisation may not be integrated into company operations but seen only as a student project
Use of outside consultants	• Provides an objective view • Have experience in waste minimisation • Costs can be divided between Club members	• Can be costly even when shared • May not have the required cross-sectional experience
Training of other team members	• Waste Minimisation aspects are covered in detail with all team members • Project Champion does not have to spend time on in-house training	• Can increase club membership fees if done on-site for each Club member

Box 12: Times and Duration of Club meetings

Club	Time	Duration
Pilot Metal Finishing Club	Tuesdays, 9h00	3 to 4 hours
Hammarsdale Club	Wednesdays, 9h00	3 hours
Pietermaritzburg Club	Wednesdays, 16h00	2 hours
Large Industries, Western Cape	Wednesdays, 13h00	4 hours
Metal Finishing, Durban	Wednesdays, 9h00	2 hours

Membership costs

If you do not have complete external funding for running the Club, you will need to charge the members an annual membership fee to cover your costs. These membership fees will have to be discussed carefully with the Club members and it must be made clear to them what they will obtain in return.

There may the possibility of subsidised membership fees through external finding schemes. These can include the Department of Water Affairs and Forestry, the Department of Trade and Industry, the Water Research Commission and local authorities.

This aspect of membership fees and how to determine the best level of financial contribution is covered in more detail in **Section 8** of the Manual (Funding a Waste Minimisation Club) together with possible sources of external funding.

To charge or not to charge?

The two Pilot waste minimisation clubs were fully funded by the Water Research Commission, which meant that the club members did not contribute financially to the management of the Clubs. In hindsight, this was a disadvantage as there was the general feeling that because the service was *free*, that it was not of much value. Members were slack at attending meetings and training sessions, and it is felt that if they had been paying a membership fee, they would have made a much greater effort to attend meetings and implement changes.

Club "Rules"

Some basic conditions for being a Club member should also be discussed. These cover aspects such as:

- ✓ Attendance at meetings and training sessions
- ✓ Reporting of results
- ✓ Sharing information
- ✓ Payment of fees

In the Pilot Metal Finishing Club, these *rules* became the basis for the certificate of commitment (see **Section 2.8**). An example of a certificate of commitment is given in **Appendix 2**.

By joining the Club, the members are agreeing to abide by these conditions and is a sign of their commitment to reducing waste at source.

Constitution

The issue of having a Club constitution was discussed in detail in **Section 2.8** and should be addressed at the meeting with the members. If it is agreed that a constitution is required, it may take a few meetings before one is signed. A draft will first have to be prepared which must be circulated to all members for comment. After this has been completed, the final version can be drawn-up and signed. Positions on the committee must then be nominated and elected.

An example of a constitution is provided in **Appendix 1**.

Barriers and drivers

An important exercise at this stage is to identify the barriers and drivers to waste minimisation amongst the Club members. This is carried out by asking the members to list what they view as the potential barriers to a successful programme in their company, and the aspects that they feel would drive them to make changes. An explanation of this exercise and the results from other Clubs is given in **Section 4**.

Training

An important aspect of a waste minimisation Club is the opportunity for the members to receive training in waste minimisation aspects. This training can be carried out as part of the Club meetings, or as a separate meeting. These issues can be discussed at the inaugural meeting to obtain an idea of the views of the club members.

At each meeting, it is important to provide the members with some task to undertake at their factories such that they have something to report back on at the next meeting.

At the Inaugural meeting it is suggested that the members be trained in the first stage of waste minimisation; namely, obtaining commitment from management.

Training aspects are discussed in more detail in **Section 7**.

Next steps

On conclusion of the inaugural meeting, the basic structure of the Club will have been decided, together with the frequency of meetings, venue and duration of meetings. Membership costs will have been discussed and a committee elected to manage these funds. All members will have an understanding of waste minimisation and the aims of the Club and the barriers and drivers of the companies understood.

Whether the Club members have decided to have training carried out separately from the meetings, or combined with the meetings, the date for this training / meeting should be set as soon as possible such that they can begin to implement waste minimisation on site.

Minutes of this meeting should be written and circulated to all members within a week after the meeting.

On completion of the Inaugural meeting you will have completed the first 2 steps in forming the club (as discussed in Section 2) – **Recruitment and Organisation for Action**.

Assessment and Implementation will be discussed in Section 5, Analysis in Section 6, and Training in Section 7.

Facilitator Checklist:
Inaugural Meeting

- ❑ Invitations sent out 10 days in advance
- ❑ Reminder call to all members
- ❑ Attendance list
- ❑ Agenda
- ❑ List of discussion points
- ❑ Handouts of any important notes
- ❑ Items for barriers and drivers exercise (see Section 4)
- ❑ Outline for draft constitution
- ❑ Draft certificate of commitment
- ❑ Minute taker
- ❑ Flip chart
- ❑ Training material on obtaining commitment and forming teams

3.5 Suggested Meeting Agendas

Once the inaugural meeting has been held and the Club formed, most Club meetings will follow a similar format (see **Box 13**).

Box 13: Sample Format for Club Meetings

Sample Agenda:

9h00	-	9h10	Feedback from the facilitator / secretariat
9h15	-	9h45	Feedback from Club members
9h45	-	10h15	Speaker (s)
10h15	-	10h30	Tea/coffee
10h30	-	11h30	Training / Speaker / Site visit
11h30			Closure

These times are guidelines only and will be longer/shorter depending on Club limitations.

Examples of agendas for other Clubs in South Africa are provided in **Appendix 12**.

Feedback from the facilitator

This aspect of the meeting allows you time to provide information that may be relevant to the Club members. For example, it could be news on Club fees; the organisation of site visits; new regulations; management issues; and so on.

Feedback from Club members

This aspect is the most important part of the meeting, where members report back on the progress and problems in implementing waste minimisation in their companies. In this way, information is exchanged between the companies and possible solutions suggested. In the beginning, you may find that this exchange is limited due to mistrust and Club members being wary of one another, but as the Club progresses, discussions will become more interactive and lively.

Speakers / training / site visits

Time should be set aside in the meeting for training, guest speakers or site visits by the members. If time allows, one or more of these aspects can be undertaken at a meeting. If meetings are being held at Club member sites, then a good method of concluding a meeting is to undertake a site visit of that company and allow all present to brainstorm ideas. Some examples of guest speakers and site visits held for other Clubs are given in **Box 14.**

Box 14: Some topics and activities of other Clubs

Pilot Metal Finishing Club
Cleaner Production options for metal finishing
New SA legislation and policies
Procedure for waste classification
Health and safety aspects
Sludge disposal options
Local regulations
Funding schemes for SME's
Selected videos on waste minimisation
Visit to the local landfill sites
Visit to a Club member site
Shop-floor training

Pietermaritzburg Club
Recycling options
Waste management systems
Incineration
Waste minimisation videos
Local regulations

Metal Finishing – Western Cape
National Qualifications Framework
Occupational Health and safety
Local regulations
Cleaner Production options

3.6 Choosing Topics for Club Meetings

As can be seen from **Box 14,** a variety of topics are covered at Club meetings. Aspects related specifically to the process of carrying out waste minimisation are covered as part of the training. Invited speakers generally address issues that are of relevance to the Club members, but which are in addition to the process of implementing waste minimisation.

It is a good idea to keep the members informed of any changes in local / national regulations which may affect them and this can be done either through yourself, or by inviting a representative to address the meeting.

If you are running a sector-specific waste minimisation Club, relevant speakers can introduce waste minimisation options which are suitable for that sector. For example, in the Metal Finishing Clubs, speakers presented topics related to new electroplating technologies; metal sludge disposal systems and filter presses. This is obviously more difficult when dealing with a cross-sectional Club, and topics need to be chosen that are more generic, such as health and safety; environmental management systems etc. The Pietermaritzburg Club for example, was addressed by one of their Club members as to the waste management system that has been introduced at their company and how it operates.

Site visits are another useful method of promoting discussion. Where possible, Club site visits to one another companies should be carried out. In this way, a member may be able to assist in finding solutions to another member's problems. Site visits to other places of interest are also encouraged. For example, the Pilot Metal Finishing Club did not have an understanding as to the operation of a landfill and a visit to the local sites assisted in this.

Videos are also an effective way of demonstrating the success of waste minimisation programmes. Unfortunately, most videos are produced in Australia, UK or USA and none as yet in SA. However, these videos show case studies of companies that have implemented changes and realised savings at little or no cost and therefore show the benefits of such a programme.

3.7 Time Requirements

Planning and running meetings can be very time consuming. The following tables outline some of the activities and the time required for various meetings (this is total time which may be spread over a period of a week or more).

Awareness Raising meeting

Table 3.2 outlines the activities for organising and running an awareness-raising meeting. The time required for meeting with local authorities will vary depending on the number of organisations you need to meet with – for example, you may need to meet with the local metro and with the local Department of Water Affairs and Forestry.

Table 3.2: Outline of time required for organising an awareness-raising meeting

Activity	Time required
Obtaining a list of companies	4 hours
Mailing of invitations	4 hours
Taking responses and answering questions	2 hours
Creating a database of attendees	8 hours
Arranging venue	2 hours
Meeting with local authorities	4 to 10 hours
Organising speakers	4 hours
Meeting	4 hours
Reporting	8 hours
Mailing of follow-up letter	4 hours
Total	**44 to 50 hours**

Subsequent meetings

The time requirements for organising and running the subsequent meetings will be similar for most meetings and are summarised in Table 3.3.

Table 3.3: Outline of time required for organising subsequent meetings

Activity	Time required
Preparation of agenda	2 hours
Sending out of invitations	4 hours
Taking responses and answering questions	2 hours
Arranging venue	2 hours
Organising speakers	4 hours
Preparation of training material	8 hours
Calling all members a day before	2 hours
Meeting	2 to 4 hours
Reporting / minutes	4 hours
Distribution of minutes	4 hours
Total	**34 to 38 hours**

3.8 Writing of Minutes

It is very important that minutes are taken of each meeting that is held. These minutes will contain the information shared by members at the meeting and also provide a record of the questions raised and discussions held. These minutes should be circulated to all members for comment and a date given by which changes must be submitted. These minutes are an important record of the activities of the Club and can be used by you to monitor the progress of the members and for preparing case studies.

Facilitator Checklist:
Follow – up meetings

- ❑ Invitations sent out 10 days in advance
- ❑ Reminder phone calls to members
- ❑ Attendance list
- ❑ Agenda
- ❑ Handouts of important notes
- ❑ Minute taker
- ❑ Training notes
- ❑ Organised guest speaker
- ❑ Organised site visit
- ❑ Guidelines on how to start a staff awareness campaign

Section 4:
Barriers and Drivers

The minute your back is turned the operators do their own thing.

The Metro keeps changing the rules - you comply with one thing and they demand another.

We joined because we wanted to save money.

Metal Finishing Club Members

This section will discuss common barriers and drivers that have been experienced in establishing waste minimisation clubs and implementing waste minimisation measures. Suggestions on how to identify these aspects, and overcome barriers while promoting drivers will be provided.

4.1 What are Barriers and Drivers?

A **barrier** is anything (action / item / process) that hinders the implementation waste minimisation. Conversely, a **driver** is something that promotes the process and generally leads to success.

It is important to identify and understand the barriers and drivers that are going to be experienced in the Club, both in the formation and running of the Club itself, and within each member company. Each of these will be looked at separately in this Section.

4.2 Barriers to Forming and Running a Waste Minimisation Club

Before the barriers to implementing waste minimisation within the companies are discussed, you must be aware that you are going to come up against barriers while forming and managing the Club itself. Barriers that have been experienced by Club facilitators are listed in **Box 15**, together with suggestions as to how they can be overcome. These are also explained in more detail in this section.

Non-attendance

Non-attendance at meetings and training sessions is a problem for most Club facilitators, and is mostly due to a lack of time of the Project Champions. This is very frustrating for the facilitator, especially when all members say they are attending and only 50% arrive. Reasons for this lack of time may be due to a number of reasons, such as:

- ✓ In a small company, the Project Champion may be the owner and cannot be absent very often from site
- ✓ A lack of commitment from senior management such that the Project Champion is not given the time to attend meetings
- ✓ The Project Champion holds a number of responsibilities in the company and cannot spend much time on waste minimisation aspects

This barrier can be addressed by making sure that meetings and training sessions are held at a convenient time and location for the Club members. Additionally, ensure that there is commitment to the Club from senior management level in the company by either making an appointment to speak to him/her or by sending a letter outlining what the Club is aiming to achieve and the results from other Clubs. As the benefits of waste minimisation become realised, companies will ensure they have sufficient time to attend meetings and receive training.

Box 15: Barriers experienced in the running of Clubs

Barrier	Suggestion to overcome
Non-attendance at meetings and training sessions	- hold meetings at convenient time and location for all members - ensure commitment from senior management - set a minimum attendance - meet at a club members site on a rotational basis
Lack of REAL commitment	- use local case studies from the same industrial sector - make one-on-one visits to management - get endorsement of the concept from another industrialist - show success from a competitor - have an early success to get management on board - identify the true cost of their waste
Lack of progress on-site	- walk-through audit - provide access to assistance - train in small stages - undertake site visits to other factories - identify quick-wins - set achievable tasks for the member - provide starting points - facilitate a brainstorming session in the company to overcome barriers - disseminate results on-site
Poor success in recruitment stage	- get commitment from management - identify the decision maker in the company - identify the correct timing for that Club - find pressure points / interest areas - realise that you cannot force a Club and recognise when to give up
Competition between Club members	- emphasise that it is information on waste minimisation that is to be shared - companies only need to share what they are comfortable with sharing
The attitude that companies are doing you a favour by being a member	- provide success stories
Lack of perception of the need for waste minimisation	- provide success stories
Obtaining data from companies	- sign a confidentiality agreement - accept limitations of what the company wants to report to you
Hijacking of meetings by a member	- try to re-direct discussions - limit time per company within reason - monitor reactions from other members to see level of interest
No *big stick*	- involve the local authority - emphasise the benefits of waste minimisation

Lack of Progress

The reasons for lack of progress on site are also mostly to do with a lack of time on the part of the Project Champion to devote to waste minimisation. Again, it is very frustrating to train people in waste minimisation and then not have them implement any changes. This barrier could be overcome by:

- ✓ Undertaking a walk-through audit and highlighting areas that should be investigated further
- ✓ Providing access to students to assist in undertaking audits
- ✓ Encouraging site visits to other Club member sites where progress has been made

- Training other employees within the company in waste minimisation (see Section 7)

Since making progress is essential to the Club concept, it may be necessary to exclude those companies that are not making an effort to implement any changes.

Competition between Members

Based on the experiences with the pilot metal finishing club, a fear of revealing trade secrets to competition is a barrier that will be overcome with time. As trust is formed between the club members, they will be more open to sharing problems, experiences and advice. As they realise that by sharing common problems they are assisting one another, this fear will reduce. They will also realise that it is experiences with *waste minimisation* that are to be shared and not detailed process information.

Poor Attitude

The last three barriers listed in **Box 15** are more or less inter-linked and relate to the motivation for companies to join a waste minimisation club. As the pilot Clubs were funded from external sources and students were involved, many members thought that they were doing the *facilitators* a favour by being Club members and participating in the project. It was only after results were achieved and companies made savings that it became clear that it was for their benefit to implement waste minimisation.

Lack of Perception of the Need to do Waste Minimisation

This barrier may prevent companies from joining a Club. Many companies think that they understood the term *waste minimisation* and feel that they are already doing all that was possible to reduce their waste. It was only after receiving training and gaining information on the concept of waste minimisation and the benefits, that companies realise that there is more to reducing waste at source than originally perceived.

Lack of a Big Stick

The lack of a big stick can also hinder the process of trying to encourage companies to join a Club as many feel that if they are complying with the regulations and there is no pressure from the authorities to reduce their waste, then why should they make any changes. In the pilot Clubs, the pressure from the local authorities was a large motivating factor for companies to join the Clubs. Without this external pressure it may be difficult to form a Club, as has been experienced in the Gauteng region. This barrier could be overcome through the use of case studies to prove financial savings and through awareness raising and training. The local authority should also be involved through asking them to speak at meetings and encourage industries to reduce waste at source by, for example, providing incentive schemes or awards.

4.3 Internal Barriers to Waste Minimisation

Barriers to implementing waste minimisation within a company can be broadly divided into 5 categories:

- Time
- Resources
- Politics
- Culture
- Fear

Time

Quite often a lack of time is not a perceived barrier at the onset of a Club, but emerges very soon to be the largest biggest barrier to waste minimisation being implemented within a company. Project Champions often do not have the time to devote to waste minimisation projects and attend meetings. They also do not have the time to train the Project teams such that they can assist in the audits.

Resources

This can refer to a lack of any company resources, such as personnel, data, finance, process, etc. It also refers to aspects such information on waste minimisation and technology. These barriers are usually easily identified by Club members at the start of the waste minimisation programme.

Politics

This can refer to both internal company politics, such as a lack of commitment from top management and a lack of communication; but can also refer to external politics like unclear regulations from the local authority.

Culture

Waste minimisation represents a new way of thinking for most people and it is very difficult for people to change the manner in which they carry out their tasks. If employees of a company are resistant to change it will hinder the process of waste minimisation.

Fear

An effective waste minimisation programme involves all employees, but quite often people are scared of making a fool of themselves and will not make suggestions to reduce waste.

Barriers that have been identified by Club members are listed in **Box 16**.

Box 16: Typical internal barriers to waste minimisation

no time	lack of finance	process constraints
lack of commitment	lack of information	technology
unclear regulations	lack of external pressure	poor communication
fear of change	lack of incentives	disbelief of benefits
perceived cost	lack of skills	

It is important to identify the barriers and work with the Project Champions to overcome them within their companies. Generally, as the companies become more aware of the benefits and start realising savings, waste minimisation becomes more of a priority.

Table 4.1 lists some internal waste minimisation barriers experienced in companies in SA.

Table 4.1 List of typical internal barriers and strategies to overcome them

Barrier	Possible Strategy
"I am too busy – maybe next week / month / year."	Time is always a constraint. Emphasise that waste minimisation results in improved process efficiency, thereby cutting down time and increasing productivity
"We'll have a go if it's not too much bother"	Overcome apathy by ensuring management commitment. Quote local success stories.
"I want to do something, but am afraid of making a fool of myself"	Increase knowledge on methodology and benefits of waste minimisation. Encourage attendance at meetings where ideas and information are exchanged.

"We'll see how its done and how others get on first"	Use case studies to demonstrate benefits of waste minimisation. Motivate to be the leaders rather than followers.
"But we don't have an effluent problem"	Stimulate a pro-active approach by pointing out stricter legislation and regulations. Minimising effluent volumes also leads to reduced treatment costs.
"It's not my responsibility"	Ensure that the right project champion is appointed who has the support of management. Encourage management to communicate commitment to all levels such that the Project Champion receives assistance.
"Environmental solutions cost money"	Quote success stories which indicate minimal investment and immediate payback periods. Stress that it's often the housekeeping issues which reduce environmental impact and save the most money.
"But we've always done it this way"	Overcome resistance to change by presenting waste minimisation as a challenge for the company's new "sustainable development" thus ensuring its survival and competitive edge in the years to come.
"We already minimise waste – we recycle paper and cardboard"	While recycling does reduce the impact on the environment, it is an end-of-pipe option. Look at methods of reducing the generation of this waste at source. Use any money obtained to finance other waste minimisation projects.
"We want to do something, but don't know where to start"	Provide information on methodology of waste minimisation and access to case studies. Undertake site visits to companies that have implemented changes.

4.4 Recognising your own Barriers

When initiating a Club it is also important for you to recognize your own barriers – in other words, what potential problems are there for you in running a Club. Some examples are:

- ✓ Other work commitments
- ✓ Lack of equipment (e.g. monitoring equipment)
- ✓ Lack of time to devote to the Club
- ✓ Potential conflict of interest with Club members

For example, the facilitators of the Pietermaritzburg Club were also lecturers at the University and found that they did not have enough time to devote to the Club due to all their other commitments in their department. The last point may be relevant if for example you are a local authority that is regulating the companies participating in the Club, in which case the members may be hesitant to share information.

If you are aware of these potential barriers from the start, then you are more likely to be able to overcome them successfully.

4.5 Drivers for Waste Minimisation

Drivers for joining a waste minimisation Club or implementing waste minimisation within a company are generally the opposite of the barriers. In other words, if a *lack of skills* is a barrier, then *training* is a driver. The most obvious driver is the savings that can be made, followed by compliance with regulations (see **Box 17** for typical Drivers).

There are also drivers that contribute to the success of the Club itself, the most important being the presence of both a *carrot and a stick*, and a *Club* champion. Generally, industry needs some form of pressure from outside to motivate them to reduce waste, whether it is pressure from regulations, or market pressure. Only after receiving training and information on waste minimisation and achieving savings, will the companies realise that it makes business sense to implement such a programme. Future clubs can build on the success of the pilot Clubs and it may be that outside pressure is not as essential as for these first clubs.

An industry person is far more effective at encouraging other industrialists to implement waste minimisation than an outside consultant. It is felt that the Pilot Metal Finishing Club may not have been as successful as it was if it were not for the enthusiasm of one or two metal finishers in the club.

Box 17: Typical Drivers for Waste Minimisation

Savings	Pressure from authorities
Reduced pollution	Training
Information	Increased process efficiency
Improved company image	Commitment
Incentives	Improved quality
Improved knowledge of process	Monitoring
Co-funding / subsidies	ISO requirements

4.6 Identifying Barriers and Drivers

This section explains a simple, but effective method of identifying the barriers and drivers within the Club.

What you will need

- ✓ Pieces of paper (about A6 size) – at least 10 per participant
- ✓ Markers – one per person
- ✓ Flip board paper
- ✓ Different coloured stickers (dots / stars etc.) – 6 per participant
- ✓ Prestick
- ✓ Spray-on glue
- ✓ List of typical barriers and drivers

Procedure

1. Stick the flip-board paper onto the wall with the Prestick – two pieces together labelled BARRIERS and two together labelled DRIVERS.
2. Spray these papers with the glue. If you do not wish to use spray-on glue, make sure that the paper you hand out has a sticky side.
3. Hand each participant the pieces of paper, markers and 6 stickers.

4. Explain the concepts of barriers and drivers, giving one or two examples.
5. Give them 5 minutes to write down all the barriers they can think of that exist within their company, one per piece of paper.
6. Collect all papers and then stick them up on the BARRIERS paper, calling each one out as you do it, and asking the participants to try and group them. Explanations and discussions on each barrier can also take place.
7. Summarise the grouped BARRIERS onto another page, leaving space at the end of each line for a "vote" (see **Appendix 13 for an example**).
8. Stick this list on the wall
9. Ask each participant to take 3 stickers and place a "vote" next to which barrier they feel is the most important. They can vote for 3 different barriers, or place all stickers on one barrier.
10. Do the same for DRIVERS.
11. Once all votes have been placed, total them up for each barriers and driver and list the top 3 for each.

Discussions

- ✓ See if the barriers can be grouped according the 5 categories listed in Section 4.3.
- ✓ Discuss the top 3 barriers and drivers and how they can be overcome or used to promote waste minimisation
- ✓ Compare the barriers and drivers to those identified in previous studies

4.7 Overcoming Barriers

As discussed in Sections 4.3 and 4.4, barriers to the Club concept and waste minimisation can be overcome in time through:

- ✓ Training and awareness
- ✓ Success stories
- ✓ Results from within the Club
- ✓ Meeting with management
- ✓ Encourage management to communicate commitment to all levels such that the Project Champion receives assistance
- ✓ Allowing time for the Club to mature and relationships to develop
- ✓ Discussions with local authorities

4.8 Monitoring Changes

It is interesting to carry out this same exercise at various intervals of the life of the Club and compare the results. You will notice a change in the barriers depending on what stage the companies are in with the implementation of their waste minimisation programme. Depending on the life of the Club this can be done at anything from 8 months to 1 year intervals.

For example, in Pilot Metal Finishing Club, one of the main barriers identified at the beginning of the Club was a lack of knowledge. A year later, this was not even considered a problem, whereas time was the main barrier. Another year on, finance emerged as a barrier because companies had now implemented the no and low cost options and were looking at more capital intensive solutions.

Facilitator Checklist: Identifying Barriers and Drivers

- ❑ Understand barriers and drivers
- ❑ A6 paper
- ❑ Markers
- ❑ Flip chart paper
- ❑ Different coloured stickers
- ❑ Prestick
- ❑ Spray-on glue / sticky paper
- ❑ List of typical barriers and drivers

Recommended Readings

Kothuis B, Janisch, C and van Beers D (1999). Barriers and drivers to cleaner production and industrial symbiosis for small and medium sized enterprises in SA. University of Cape Town 2nd workshop on Industrial Symbiosis

Section 5:
Results through Action
Audits and Implementation

The idea was to have very little end-of-pipe treatment.

What we need to do, obviously, is more monitoring.

Part of the system is customer education.

Metal Finishing Club Members

This section outlines the process of undertaking audits, implementing changes and monitoring results. The process of undertaking an audit and the various stages involved were discussed in **Section 1** and shown in **Fig 3**. Each stage is covered in detail during training when the Project Champions are trained in how to undertake audits and implement changes within their own companies.

Each stage in the process will be highlighted here together with how assistance can be provided to the Club members.

Detailed information on each stage in conducting a waste minimisation audit is provided in the Trainer's and Participant's Manuals.

5.1 The Importance of Data Collection

A waste minimisation audit basically involves the collection of data. The importance of gathering baseline data cannot be stressed enough. All the companies need to know what the situation is with regard to, for example, water, energy and chemical use, before they start making changes so that the savings can be quantified.

Data is collected throughout the waste minimisation process – it is not a once-off activity. It is crucial to the success of the programme and ensures that the changes that are made are monitored and maintained.

The data collection process can be broadly divided into 4 stages:

- ✓ Scoping audit
- ✓ Pre-assessment
- ✓ Detailed assessment
- ✓ Monitoring

Scoping audit

This involves collecting all financial (and where possible consumption data) data relating to the use of raw materials, water, energy, consumables etc. and determining the scope to save based on an accepted range of savings that can be expected (listed in **Section 1, Table 1.1**). This highlights those areas where the most savings could be made and gives an indication of where the company should focus their attention.

Pre-assessment

In the pre-assessment stage, the company collects data relating to all waste streams, and starts to identify where data is missing and where additional metering is required. At the end of this process, those areas that require more detailed investigation will be known.

Detailed assessment

In this stage, those areas that are thought to be the most problematic are investigated in further detail. This involves constructing mass and energy balances and undertaking live audits. This assessment will provide quantitative data regarding both the use and wastage of materials and / or utilities and the related production data.

Monitoring

Once waste minimisation options have been identified and implemented, the improvement must be measured such that the savings can be calculated, and monitored to ensure that the changes that have been made are providing the expected and required results. This is a very important aspect of a waste minimisation programme, as a company should strive towards *continuous improvement*.

The Project Champions will be trained in how to undertake data collection in each of these stages. The relevant information and worksheets are found in the **Trainer's and Participant's Manuals.**

5.2 Identifying Waste Minimisation Options

As discussed in **Section 1**, there are 5 main changes that can be made to a process to reduce waste; namely:

- ✓ Housekeeping
- ✓ Technology
- ✓ Input materials
- ✓ Product
- ✓ On-site reuse / recycling

All waste minimisation options can be divided into one of these 5 categories, and generally, more than 50% of the options identified and implemented within a company are housekeeping changes. Even within a cross-sectional Club, there will be similar changes that can be made to each company to reduce waste.

Through the Club, the Project Champions will receive guidance on how to identify options, which options are suitable for their particular company and process, and also be able to exchange information with other members as possible solutions.

It is useful to suggest to Club members that they keep a record of the waste minimisation options identified using *Opportunities Data Sheets* (see **Appendix 14**). These sheets record information such as:

- ✓ Waste minimisation option;
- ✓ Type of change;
- ✓ Consequences of the change (e.g. reduction in water use);
- ✓ Projected savings of inputs and outputs;
- ✓ Projected payback;
- ✓ Feasibility of the option; and
- ✓ Timing.

A set of sheets should be completed for each option identified and stored for future reference. An option that may not be feasible at that time, may become feasible later in the future.

These sheets can also be used when assessing the results of the Club (**Section 6**).

Identifying waste minimisation options is a team effort and it is important to stress that it involves all members of staff. There are a number of methods of encouraging ideas, and these are listed in **Table 5.1**. There are advantages and disadvantages to each approach and the method used depends on the company culture.

These approaches are discussed during the course of training the Project Champions and detailed information is provided in the Trainer's and Participant's Manuals.

Table 5.1: Methods of encouraging ideas

Method	Advantages	Disadvantages
Brainstorming	• Involves people from different areas • Encourages ideas	• Can get side tracked • Quieter team members may be intimidated and not speak
Suggestion boxes	• Can be placed in strategic positions in the company • Encourages ideas from all levels of employment • Ensures confidentiality so people are not intimidated	• Can result in a flood of ideas that have to be addressed • Employees may become discouraged if no feedback is provided on suggestions
Incentive schemes	• Encourages participation from all employees • Increases staff moral	• Can lead to unhealthy internal competition

A small metal finishing company in Pietermaritzburg uses the suggestion box approach successfully. Boxes are placed at various intervals around the factory and suggestion forms are provided in both English and Zulu. Management have given a commitment to implementing all feasible ideas, or providing feedback on those options that are not implemented to the person who provided the idea.

5.3 Implementing Changes

Once options for improvement have been identified, companies must determine if they are feasible technically, economically and environmentally. Aspects to be considered in each of these analyses are given in **Table 5.2**.

It is important to make Club members aware that not all options need to undergo a feasibility analysis. Those that are obviously beneficial can be implemented immediately. The Trainer's and Participant's Manuals deal with the feasibility aspect in detail.

Those options that are found to fulfil the feasibility criteria can then be implemented.

During the implementation phase, it is also important to set up a system to monitor performance. Stress again that waste minimisation is not a once-off activity. A company cannot make a change and then say that they have *done* waste minimisation. Changes need to be monitored regularly and targets reset depending on the progress.

Emphasise the phrase:

YOU CANNOT MANAGE WHAT YOU CANNOT MEASURE

And encourage all members to incorporate this statement into their working life.

Table 5.2: Aspects to consider in a feasibility assessment

Technical Feasibility	Economic Feasibility	Environmental Feasibility
• Can it be done? • Is it applicable? • Is it available? • What are the risks involved? • Does it solve the problem or fix the symptom? • Who needs to be involved? • What is the timing?	• Capital costs • Operating costs • Savings • Payback • Time value of money	• Impact of changes on the environment • Current and future regulations / legislation

5.4 Providing Assistance

The aim of the Club is not to carry out audits and implementation for the Club members, but to empower them to take ownership of the programme and be able to train project teams in-house. This is of course, is not always easy due to the barriers discussed in **Section 4**, and therefore, it may be necessary to assist in this stage to ensure that progress is made.

Assistance can be provided in the following ways:

- ✓ Training of Project Champions in each stage of a waste minimisation programme
- ✓ Undertaking, or organising, site visits on a regular basis to identify options for improvements (included in Club fees)
- ✓ Providing access to students to assist in the auditing
- ✓ Recommending consultants that will be able to assist
- ✓ Providing relevant case studies and literature
- ✓ Providing self-assessment worksheets (see Section 9 for sources of information)
- ✓ Encouraging progress
- ✓ Providing on-site training (see Section 7)
- ✓ Providing a walk-through audit (see Section 5.5)

It is important for you to build up a relationship with the Club members, rather than have them see you as some one who they only see every 8 weeks at a meeting. Some ways in which relationships can be built include:

- ✓ Contact the members between meetings (phone, fax, email, quick visits) to keep up-to-date with their progress
- ✓ Send information to the members that would be of interest to them; e.g. policy information, new technologies, literature sources etc.

Remember, you cannot do everything for the Club members – it is your role to coach them in implementing waste minimisation. It may be necessary for you to assist in a walk-through audit, but then you must hand over to either a student or to the designated responsible person in the organization.

5.5 How to conduct a Walk-through Audit

As mentioned in previous sections, one way in which you can assist a company in starting their waste minimisation programme, is to carry out a walk-through audit, or a pre-quick scan (PQS) which highlights the problem areas and provides a starting point for the company.

A PQS basically involves observing the general operating practices in the company and obtaining some background information on their utility use etc. Based on this information, some suggestions can be made for improvement. At this stage, these recommendations will most likely relate to housekeeping issues, with more technical suggestions only emerging after the assessment phase.

Box 18 lists some of the information that should be requested as part of the PQS. In most cases, it is useful to request this information from the company before entering the site as it can assist you in determining how much time will be required for a site visit.

Box 18: Some of the typical information required in a PQS

- annual utility use and cost (water, electricity, steam, oil etc.)
- information on sub-meters and any recorded data (electronic if possible)
- production data that corresponds to these meter readings
- a simple process flow diagram highlighting the main process steps
- an outline of any water / energy / waste management programme
- an observation of housekeeping practices

An outline of a generic PQS as used by BECO- Institute for Sustainable Business is provided in **Appendix 22.** A checklist for housekeeping practices is provided in **Appendix 23**.

Obviously, a PQS needs to be designed for each type of organisation that is being surveyed and information specific to that process requested.

There are a number of Guides available that can assist you in undertaking an audit in an organisation. These are listed in the Facilitator's checklist over page.

Facilitator Checklist: Results through Action

- ❑ Understand each stage of undertaking an audit
- ❑ Identify ways in which to assist club members
- ❑ Provide relevant worksheets and notes to members
- ❑ Conduct a PQS and highlight areas for improvement (if required)

Recommended Readings

Trainer's and Participant's Manuals

Water Research Commission: Waste Minimisation Guide for the Textile Industry – A Step towards Cleaner Production (2002), SA

United States Environmental Protection Agency: Waste Minimisation Opportunity Assessment Manual (1988), USA.

Environmental Technology Best Practice Programme GG38C: Cutting Costs by Reducing Waste: A self-help guide for growing business (1997)

Section 6:
Lessons Learnt
Analysing and Disseminating Club Results

Getting to meet with competitors, sharing ideas and gaining experience has been a total breath of fresh air.

If I weren't making any savings, I could not afford to make all these improvements.

Metal Finishing Club Members

As the Club facilitator, it is important to collate the results of the Club in order that it can be used as a further case study. In addition, external funding bodies like to have proof that waste minimisation clubs work, and it is therefore essential to record the successes of the Club. Aspects to report on include:

- ✓ methods of collating information
- ✓ categorisation of waste minimisation options identified and implemented
- ✓ financial savings
- ✓ environmental savings
- ✓ barriers and drivers
- ✓ social interactions
- ✓ lessons learnt

Many companies are nervous about releasing information to a third party, so it is advisable to sign a confidentiality agreement with the individual Club members to assure them that all data reported to you will remain confidential. A general confidentiality agreement can be found in **Appendix 15**.

6.1 Methods of Collating Information

One of the more difficult aspects of analysing the success of the Club is obtaining the information from Club members. Problems you are likely to encounter include:

- ✓ Lack of quantification of savings
- ✓ Conflicting reports
- ✓ Lack of response to your queries

It can be very frustrating and time consuming to collate the results and this section provides you with some tips and approaches, which may assist in making the process easier. **Table 6.1** summaries the advantages and disadvantages of each approach.

Questionnaires

A common approach to collecting results on a project is to hand out or send out questionnaires to the companies involved.

From experience with the Clubs in SA, this approach is not successful when collecting quantitative information such as financial savings or water / effluent / chemical quantities saved. Club members do not have this information to hand and often the questionnaire is placed in the in-tray and forgotten about until reminded. If quantitative information is required, a more successful approach is to send out the questionnaire and follow it up with a one-on-one interview where you can work through each question with the Club member.

Questionnaires have however, been successful when requesting qualitative information on the success of the Club and the waste minimisation activities on site.

Points to note when preparing this type of questionnaire include:

- ✓ Keep it simple and to the point
- ✓ Use the multiple choice approach such that members do not need to write answers
- ✓ Check that questions are not ambiguous such that they are understood in the right context

An example of a questionnaire prepared for the pilot Metal Finishing Club is provided in **Appendix 16**. Amongst others, this questionnaire was used to assess their understanding of the concept of waste minimisation, their views on the Club and how it was run, and their general environmental awareness. You can use this format to develop a questionnaire suitable for your Club members.

Feedback at meetings

Since the primary aim of the Club is to encourage interaction and exchange of information, this is where you will obtain a large amount of information on the activities of each club member on-site. In addition, a comment raised by one member may remind another of similar activities at their site which they may have not reported on themselves. It must be realised though that feedback at meetings may not be completely factual, as companies may not have correctly quantified results and thus provide incorrect information.

It must also be noted that this type of forum can also inhibit sharing of results due to, for example, competition between members, or embarrassment on the part of a project champion to report on small savings when all other members have large savings.

However, the information gained from meetings can be used as a basis for a follow-up visit from you to verify the details. It is therefore important to have a person to take minutes such that all feedback is recorded.

Phone calls

Phone calls are not an effective means of obtaining information as it is difficult to know when its convenient for you to call and the Project Champion may be busy or off-site. It is also difficult to explain questions clearly over the phone and also difficult to record as the person is speaking. Results are also often not close to hand.

It may be effective if it is well planned and the Club member is aware of the date and time you are to call and have been provided with the questions before hand.

One-on-one interviews

This is the most effective method of obtaining and verifying information as interviews require that a date and time are set aside where you and the Club member are not going to be disturbed. You will have a basic idea of the results from feedback at meetings and previous conversations with the member and these can form the basis of your interview. Any misunderstandings can be clarified immediately such that the questions and answers are clearly understood. Members may also feel more comfortable speaking in private where they don't have to worry about competition or fear of embarrassment in front of their peers.

Verifying results

Once you have collected the information and prepared a report, it is important to send the report or case study to the Project Champion to check on the accuracy of the information. This is again best followed up on by a one-on-one visit to ensure that there are no misunderstandings.

Table 6.1: Approaches used to collate Club results

Approach	Advantages	Disadvantages
Questionnaires	• Suitable for qualitative information • Allows collation of Club member's views on certain issues	• not suitable for quantitative information • response rate is low • different interpretations of questions may occur
Feedback at meetings	• convenient for member and facilitator • may jog memories	• accuracy may be poor • not all members will report on results at meetings • members may not attend all meetings
Phone calls	• convenient for the facilitator • allows for questions to be made clear	• accuracy may be poor • may not be convenient for the member
One-on-one interviews	• planned at a convenient time • misunderstandings can be cleared • may jog memory • accuracy of information can be verified	• can be time consuming

6.2 Categorisation of Waste Minimisation Options

The five main changes that can be made to a process to effect waste minimisation were discussed in **Section 1**; namely housekeeping, technology, input materials, product and on-site recycling. These are the categories into which waste minimisation options identified by the Club members should be divided.

The simplest method of recording and reporting the options per member is by means of a database or spreadsheet. As shown in **Table 6.2**, list the option, the type of saving and change, and the status of the option (implemented, investigating, not feasible, not known). This should be done for each Club member, and can be updated as the Club progresses.

Table 6.2: Summary reporting of waste minimisation options for each Club member

Option	Type of Saving	Type of Change	Status
Option 1	Water, energy	Housekeeping	Implemented
Option 2	Chemicals, energy, water	Technology	Investigating
Option 3	Raw material	Input material	Not feasible
Option 4	Water	Reuse	Not known (Dec 2000)

It is important to be clear on what options constitute, for example, a housekeeping or technology change. This is to ensure that you are consistent in your reporting and that others are clear on what options have been identified / implemented.

General rules to use when categorising the options are listed below.

Housekeeping

Improved housekeeping involves changes to way in which the process / operation is carried out. These include:

- ✓ generally no- or low-cost investments
- ✓ metering and monitoring
- ✓ improved control of process
- ✓ improved maintenance
- ✓ education and training

Technology

Technology changes involve changes to the process itself, and may require capital investment. These can include:

- ✓ replacing old equipment with new
- ✓ process optimisation
- ✓ automation
- ✓ redesign of equipment

Raw materials

Changes to raw (or input) materials, includes:

- ✓ replacing materials with non-toxic alternatives
- ✓ using renewable raw materials
- ✓ using materials that can be recycled in-process

Product

Product changes are more difficult to implement and generally involve undertaking a life cycle assessment such that an informed decision can be made. Changes may include:

- ✓ increasing product life
- ✓ reformulating products to have a different shape and / or shade
- ✓ alterations in packaging

On-site reuse / recycling

On-site reuse or recycling involves:

- ✓ using a waste material / stream within the same process (reuse)
- ✓ using a waste material / stream as an input for another process on-site (recycle)

These options can then be analysed by means of a pie chart to give an indication of the extent to which the changes are housekeeping, technology etc. and also the status of the options.

Table 6.3 indicates how the types of changes can be summarised for a Club. The status of each option can be summarised in a similar manner under the headings; **implemented, investigating, not feasible,** and **not known.**

Table 6.3: Summary reporting of waste minimisation options for a Club as a whole

Club member	Housekeeping	Technology	Raw material	Product	Reuse	TOTAL
Options Identified						
Member 1	10	3	0	0	1	**14**
Member 2	3	5	1	0	3	**12**
Member 3						
etc.						
TOTAL						**412**
% of Total	**47**	**35**	**10**	**2**	**6**	**100**
Options Implemented						
Member 1	4	1	0	0	0	**5**
Member 2	3	2	0	0	1	**6**
Member 3						
etc.						
TOTAL						**158**
% of Total	**73**	**13**	**10**	**0**	**4**	**100**

Examples of the type of changes implemented and the status of the identified options for the Pilot Metal Finishing Club are given in **Figure 5** and **Figure 6** respectively.

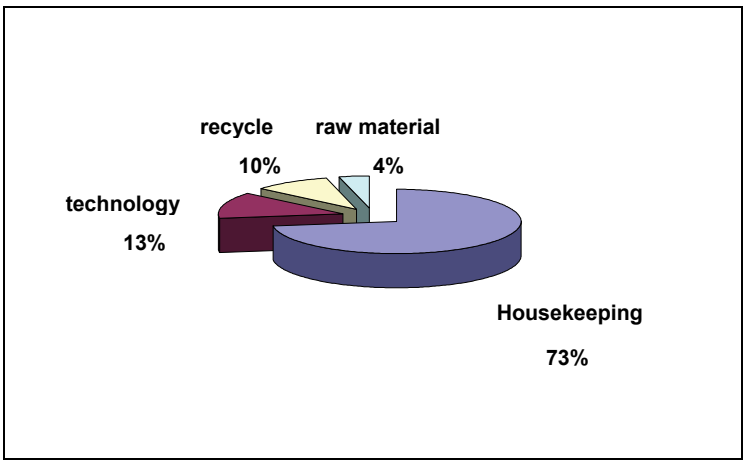
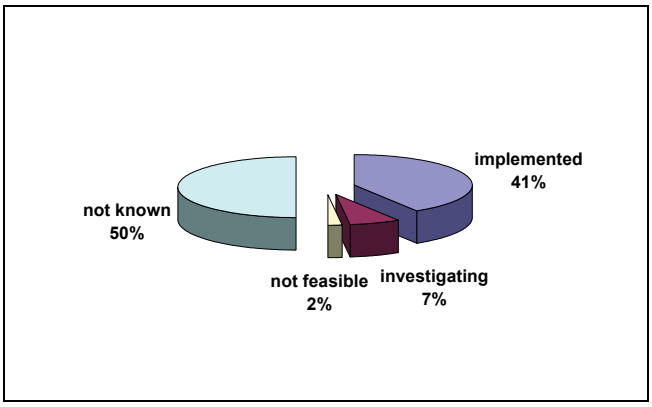


Figure 5: Categorisation of waste minimisation options implemented in the Pilot Metal Finishing Club in Durban (shown as a percent of total implemented)

(December 2000)

Figure 6: Status of waste minimisation options identified for the Pilot Metal Finishing Club (shown as a percent of total identified)

(December 2000)



6.3 Financial Savings

Financial savings to the Club members are a good measure of the success of the Club. In addition, it is generally these types of figures that Club members will have calculated to determine their own progress and will be more easily available than volume or mass savings.

Financial savings can be reported in a number of ways:

- ✓ as annual savings per company
- ✓ as savings per employee
- ✓ as savings as a percent of company turnover

It is best to report savings per company member in terms of type of saving (water, energy, chemicals etc) and then use the totals to determine savings per employee or as a percent of turnover. Table 6.4 provides an example of reporting financial savings.

Table 6.4: Summary reporting of financial savings for a Club

Club member	Water (R/y)	Effluent (R/y)	Energy (R/y)	Raw materials (R/y)	Chemicals (R/y)	TOTAL (R/y)
Member 1	777 600	168 630	78 870	99 880	30 910	1 155 890
Member 2	5 560	110 000	0	88 000	1 515	205 075
Member 3						
etc.						
TOTAL	**915 000**	**820 000**	**250 000**	**378 000**	**164 000**	**2 527 000**
% of Total	**36**	**32**	**10**	**15**	**7**	

As shown in **Table 6.4**, these savings give an indication of the type of savings made as a percent of the total. This can be represented in a pie chart to show in which area the most savings were made. **Figure 7** gives a pie chart for the Pilot Metal Finishing Club.

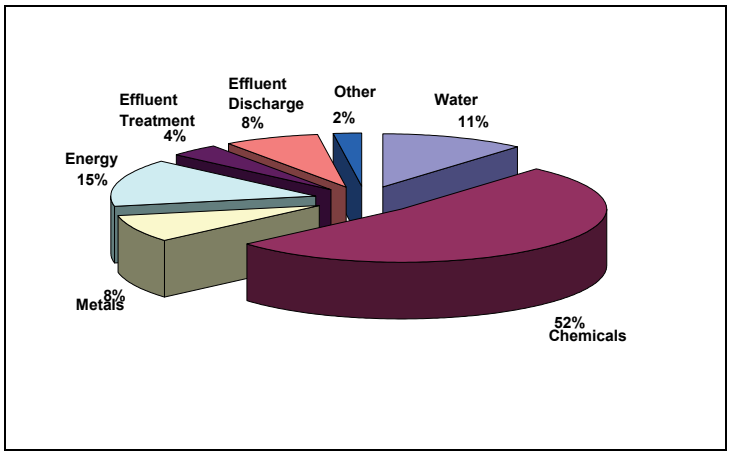


Figure 7: Summary of types of savings made for the Pilot Metal Finishing Club in Durban.

(December 2000)

Savings per employee and as a percent of company turnover gives a better indication of the impact of the savings on company operation. It is also useful to quote these figures when recruiting new members, as it also provides proof that savings can be made regardless of the size or profitability of a company.

A Metal Finishing Club member employing 50 staff members, made an annual saving in the region of R195 000. This represented 20% of his annual turnover and R3 900 per employee.

A second Metal Finishing Club member employing 180 staff members, achieved an annual saving of approximately R1 156 000, which represented 3.9% of the annual turnover of the company. Savings per employee where in the region of R6 400.

6.4 Environmental Savings

Environmental savings are more difficult to quantify as most companies look at financial savings rather than mass / volume of savings made. It is important however to try to determine the volume of water and effluent saved, the decrease in energy usage and the reduction in chemicals discharged to drain. It is these figures that the local authorities are interested in obtaining, as they are responsible for monitoring emissions from site.

Savings should be related to production, as variations in production leads to variations in utility use. For example, a company may record that the water use was less in one week than another and report this as a saving. On investigation it may be found that the production for that particular week was half the amount than usual and, in fact, they may have used more water per unit production in that week than previously!

When you are reporting savings made by the Club and individual club members on an annual basis, these variations will generally average out and you can obtain a good idea of the average savings made per year through the implementation of waste minimisation measures. This is another reason why reporting financial savings as a percent of the annual turnover gives a better indication of the degree of savings achieved.

This section will describe some simple methods of determining the environmental savings achieved by a Waste Minimisation Club. Suggestions on quantifying these savings are given in Table 6.5.

Water and effluent savings

Savings in water use also leads to savings in effluent discharge. This then results in savings in treatment chemicals as there is less volume of effluent requiring treatment. Less sludge will also be produced.

Table 6.5: Some suggestions for quantifying environmental savings

Saving	Method of Quantifying
Water	• divide total annual financial savings by average cost of water per kl • use monthly water bills to determine average reduction in water consumption and relate this to average annual production • use weekly water meter readings to determine average reduction in water use and relate to average production
Effluent	• take 90% of water savings as savings in effluent • use meter readings to determine average savings
Electricity **(air emissions)**	• divide total annual financial savings by average cost of energy to determine savings • use meter readings or monthly bills to determine average savings • use these figures to determine reductions in emissions to air
Chemicals	• use stock figures to determine reductions in issues to factory floor or treatment plant • if chemical use is related to water use (i.e. solutions prepared based on water volume), savings can be determined from water reductions in those areas
Solid waste	• report the reduction in the number of skips disposed of to landfill • report amount of waste that is recycled or reused and will no longer be sent to landfill

Energy savings (air emissions)

Savings in energy leads to savings in the emission of greenhouse gasses such as carbon dioxide, sulphur dioxide and nitrous oxides.

Electricity is generated by Eskom through the burning of coal. Decreasing electricity use thus leads to less coal being burnt at source. Figures available from the 1999 Eskom Environmental Report show that 0.8 kg of CO_2, 0.008 kg SO_2 and 0.004 kg NO_x is formed per kWh of electricity produced. If the quantity of electricity saved in kWh can be calculated, savings to the environment in terms of air emissions can also be determined.

If a company uses steam generated by the burning of coal on site, similar savings can be quantified. If other fuels are used, the same types of figures can be obtained from literature.

Chemical savings

It is important to report the reduction in chemicals discharged to drain, especially those that are toxic, or contribute to the chemical oxygen demand, suspended solids or total dissolved solids of the effluent.

Solid Waste

Recycling, reuse, segregation and the returning of packaging to the supplier all contribute to reducing the mass of solid waste disposed of to landfill. Encourage club members to record the mass of solid waste recycled or reused and to report the reduction in the number of skips disposed of off-site. Reductions in toxic waste such as sludges that required special handling are important to report as this represents a substantial environmental saving.

6.5 Barriers and Drivers

Reporting on the barriers and drivers is important in the understanding of the success and failures of the Club. Both internal (company) barriers and barriers experienced in the running of the Club should be identified and the manner in which they were overcome explained. In this way, other Club facilitators can learn from your experiences.

Aspects to report on include:

- ✓ Problem areas within the individual companies
- ✓ Problem areas in running the Club
- ✓ Techniques used to overcome these problems both within the companies and by you
- ✓ Factors that made the Club a success
- ✓ Factors that drove the waste minimisation process within the Club members sites

The easiest method of obtaining information from Club members is through a qualitative questionnaire as discussed in Section or by visiting companies and asking their opinions. An example of a questionnaire is given in Appendix.

6.6 Social Interactions

The main success of the Club approach is that the Club members are able to interact with other industrialists and learn from one another. You will find that as the Club matures, good relationships develop within the Club and also with outside organisations such as the local authorities, customers and suppliers.

Information on these aspects can be obtained from your own observations, feedback at meetings, questionnaires and interviews. Aspects to report on are provided in Table 6.6.

Table 6.6: Reporting on social interactions within a Club

Interaction	Aspects to consider
Relationships between Club members	• Change in attitude to exchange of experiences and information • Have any one-on-one relationships emerged? • Benefits of club approach
Relationship with local authority	• Change in attitude of the Club members to the local authority and visa versa • Movement to co-regulation • Support of club approach by authority
Relationships with suppliers	• Involvement of suppliers in the Club • Are suppliers assisting in waste minimisation activities?
Interaction	**Aspects to consider**
Relationship with customers	• Communications with customers to make product changes • Using waste minimisation as a marketing tool

Exchange of Information:

Within the Pietermaritzburg Waste Minimisation Club, an operator from one metal finishing company visited a fellow club member's metal finishing site to observe the changes made to a certain operation to improve the process. The operator returned to his site and implemented the same changes there, resulting in improved process efficiency

6.7 Dissemination of Results and Lessons Learnt

Reporting on the success factors and problem areas within the Club you are running is important for the development of future waste minimisation clubs in South Africa. The best method of reporting the results is through a final report, case Studies, newsletters, videos and the publication of articles.

Final report

Aspects to include in the final report are:

- ✓ Reasons for forming the Waste Minimisation Club
- ✓ Date of formation
- ✓ Objectives of the Club
- ✓ Funding organisations
- ✓ Profile and background info on club members
- ✓ Structure of the club
- ✓ Training
- ✓ Methodology
- ✓ Club meetings
- ✓ Waste minimisation options identified and implemented
- ✓ Financial savings
- ✓ Environmental savings
- ✓ Barriers and Drivers
- ✓ Social interactions
- ✓ Feedback from Club members on Club approach
- ✓ Other outcomes of the Club
- ✓ Conclusions
- ✓ The way forward

An outline of the format for a final report is provided **in Appendices 17.**

Case Studies

It is important to prepare case studies on the successes achieved by the Club members. Remember to ensure that permission is granted by the company before the case study is disseminated to other parties. In some cases, the company may be happy for the information to be released, but do not want to be named, in which case it can be prepared anonymously. Information that should be included in a case study are:

- ✓ Background information on the company
- ✓ How the company initiated their waste minimization programme
- ✓ What the options where that were identified
- ✓ The financial savings

- The environmental savings
- Comments from the club member
- Pictures (if possible)

The case study should not be more than 2 or 3 pages long. An example of a case study is provided in **Appendix 18.**

Newsletters

Newsletters are a good way of disseminating the activities of the Club and providing information on waste minimization. Newsletters are generally prepared for each Club that you are running, and in this you can include an update on other Club's activities. An example of a Newsletter for the Metal Finishing Waste Minimisation Club in the Western Cape is provided in **Appendix 24**. The cost of preparing the newsletter should be included in membership fees and the frequency of production can be discussed with the Club members. There should however, be at least one newsletter a year, and two if possible.

Videos

Another method of disseminating the success of the Club approach is through the use of videos where existing Club members speak about their experiences and results. BECO-Institute for Sustainable Business, and the Western Cape Department of Environment and Planning, have both prepared such videos. They are also a useful tool when raising awareness or recruiting companies to a new Club.

Media coverage, presentations, and publications

Making use of the media such as newspapers is another good way of keeping people informed about the Clubs and their progress. Preparing articles for journals and making presentations at conferences also assist in the dissemination process and make people from varying organizations and business aware of the benefits.

6.8 Assessing the Success of the Club

How will you know if the Club has been a success? If you can answer yes to the questions provided below, then you can take it that you have been successful in managing your Club.

- Has there been on-going commitment from the Club members?
- Has there been at least a 75% attendance by the members?
- Have the companies reported savings?
- Can you list the waste minimisation options identified, implemented and investigating?
- Can you compare progress from the first walk-through audit?
- Do the Club members want to continue meeting on a regular basis?

Facilitator Checklist: Lessons Learnt

- ❑ Determine strategy for collecting information
- ❑ Prepare questionnaires
- ❑ Make appointments for interviews
- ❑ Collate financial savings
- ❑ Collate environmental savings
- ❑ Categorise waste minimisation options
- ❑ Identify social benefits
- ❑ Report on barriers and drivers
- ❑ Prepare Final report
- ❑ Prepare Case studies
- ❑ Send out newsletters
- ❑ Prepare a video / use existing videos to spread the concept
- ❑ Present results at conferences/workshops/in-house seminars

Recommended Readings

Water Research Commission (2002) Applicability of Waste Minimisation Clubs in South Africa: Results from Pilot Studies, Synthesis Document.

Centre for Exploitation of Science and Technology (1995) Waste Minimisation – A Route to Profit and Cleaner Production. Final Report on the Aire and Calder Project, United Kingdom

Centre for Exploitation of Science and Technology (1995). Waste Minimisation – an Assessment of Motivation, United Kingdom

East of Scotland Water (2000). Less is More – Final Report for the East of Scotland Waste Minimisation Project, United Kingdom.

March Consulting Group (1998). Northumbria Waste Minimisation Club Final Report; United Kingdom.

Industrial Research and Technology Unit (1998). Waste Elimination from Textiles – WEFT Project, United Kingdom

Section 7:
Creating Momentum through Training

I actually learned a lot. Things just get reinforced in your head - it just gets clearer.

Everyone gets uniform information and common knowledge.

Metal Finishing Club Members

This Section deals with a very important aspect of promoting waste minimisation in industry, namely, the training of the Club members. Details on the training material are found in the Trainer's and Participant's Manual and will only be discussed briefly here.

7.1 The Importance of Training

Many industrialists do not understand the concept of waste minimisation, let alone the steps required to implement a waste minimisation programme within their own company. Club members need to be informed of the benefits of reducing waste at source and trained in the methodology of implementing the necessary changes. If people do not understand what they are doing and why they are doing it, waste minimisation will not be successful.

The best method of training is to introduce each stage of undertaking waste minimisation at a Club meeting. It is important to use exercises and examples such that the concepts are enforced. Club members are then asked to complete similar exercises on-site, and in this way, learn by doing.

7.2 Who should be Trained?

All levels of staff within an organisation need to be trained in waste minimisation practices. It is no good only having the Project Champion trained – this information needs to be transferred to everyone within the organisation.

This is obviously a difficult task, as training is generally carried out at the Club meetings where only the Project Champion is present. The Project Champion is then expected to train his/her Project Team and inform senior management of the importance of waste minimisation. The main disadvantage to this approach is that the Project Champion often does not have the time / ability to train the team members, with the result that there is minimum involvement from other members and progress is slow.

Some suggestions for overcoming these problems include:

- ✓ Hold training sessions separately from Club meetings and invite other team members to attend
- ✓ Invite team members to Club meetings where training is taking place
- ✓ Undertake training at individual sites with the team members
- ✓ Ensure that Project Champions are provided with the necessary information and tools to train his/her team members
- ✓ Meet with senior management to ensure that commitment exists

Remember: if you are going to do extra training, then make sure that the members understand these costs are over and above the Club fees.

Training at shop-floor level has been identified as an important aspect to ensuring the success of a waste minimisation programme. It is the operators that have control over the efficiency of a process, the reduction of spillages, the wastage of water and energy, and so on. It is not feasible for the Project Champion to monitor all production processes and the operators need to understand the importance of reducing waste at source.

7.3 The Type of Training Required

The type of training required depends on the profile of the Club members. In general, generic training in waste minimisation and waste minimisation practices needs to be undertaken to ensure basic understanding of the concept and the steps involved. This can then be supplemented by industry specific examples and exercises depending on the Club member's requirements.

More technical training can also be undertaken on aspects such as energy (compressed air, steam generation etc.) depending on the needs of the Club members.

Training for Project Champions

Generic topics that can be covered are listed in Table 7.1. Data gathering and analysis are important aspects of implementing a waste minimisation programme, and you should spend more time on these topics than the others. It is in these training sessions where you can introduce industry-specific examples and exercises to ensure that the Project Champions understand the relevance to their company.

The Trainer's Manual provides generic training material for all these topics, with reference to sources of information on industry specific examples. The topics are broken into smaller training modules such that each module will take about an hour to complete.

Training for Management

It is important for the management of a company to be aware of the need for waste minimisation and the legislation and regulations related to environmental issues. Training for management it therefore more of an awareness raising exercise. This may take place during the awareness raising stage in a one-on-one visit, or the Project Champion of a Club member may request that you speak with management to inform them of the benefits of implementing waste minimisation.

In the Hammarsdale Pilot Club, senior management of the Club members were provided with environmental awareness information sessions. Topics that were covered included:

- ✓ General environmental awareness
- ✓ Identification of potential savings
- ✓ Sustainability – environmental and financial
- ✓ Health & safety issues
- ✓ Legal & policy issues
- ✓ Labour issues
- ✓ Communication structures
- ✓ Environmental company policies

Those companies that participated in this form of training benefited greatly, as many of the management were not aware of new environmental legislation and the impact this had on their business. Examples of the questions asked and handouts provided in the Hammarsdale Club are given in **Appendix 19**.

Table 7.1: Generic waste minimisation training topics

Topic	Aspects covered
Introduction to waste minimisation	• Definition of waste minimisation • The need for waste minimisation • Legislation and regulations • Steps in undertaking a waste minimisation programme • Benefits of waste minimisation • Identifying the potential to make savings
Planning and organisation	• Role of project champion and teams • Getting commitment • Barriers and drivers
Data gathering	• Process flows • Identifying sources of waste • Fitting data to process flow diagrams • Identifying the true cost of waste
Data analysis	• Mass balancing • Monitoring and Targeting
Identifying waste minimisation options	• Root cause analysis • Generating ideas • Getting staff involved
Feasibility analysis	• Technical • Economic • environmental
Implementation	• Project management • Role of teams
Maintaining the programme	• Motivational techniques • Keeping the momentum

Shop floor training

Training of the shop-floor staff has emerged time and again as an important aspect of implementing and maintaining a waste minimisation programme. It is the operators that have control over the manner in which a piece of equipment is used and they should be made aware of issues related to reducing waste at source.

Training of the shop-floor staff needs to be undertaken by some one who can speak their language and understand the cultural differences that exist within a mixed society. The aims of this training can include:

- ✓ Informing, motivating and involving shop-floor staff by broadly presenting the waste minimisation club concept and environmental issues
- ✓ Identifying potential waste minimisation initiatives for their specific working environment
- ✓ Involvement of trainers/supervisors among shop-floor staff to ensure ongoing training, motivation and involvement

- ✓ Helping to maintain the needed communication between management and shop-floor level on waste minimisation initiatives and savings in the future.

The subject material should be developed in consultation with the project champions and training staff of the club member companies. To assist in future training initiatives of a similar nature and to continue environmental training in general, the subject material should also be developed into manuals with the participation of the trainers from the club member sites.

This is the approach that was used in the Hammarsdale Waste Minimisation Club. An example of the type of questions posed to the shop floor and the responses are provided in **Appendix 20.**

7.4 Helping Project Champions help themselves

You can assist the project champions in raising the awareness of the staff at the member companies through providing information on how to implement an awareness raising campaign. A good source of information is a Guide developed by the UK Environment Agency entitled *Waste Minimisation – Getting staff involved*. You can include tips and hints from this guide in your generic training for the Champions to assist them in increasing staff involvement.

7.5 Funding for Training

It is important for you to make it clear at the start of the Waste Minimisation Club what type of training is included in the Club fees, and that if extra training is required (e.g. management awareness, shop-floor etc.) that this is over and above the membership fees. This type or training may also be outside your area of expertise and it may require the Club approaching an organisation that specialises in developing this type of training material. In general, generic waste minimisation training for Project Champions is included in the Club fees.

This aspect of funding is discussed in **Section 8**.

Facilitator Checklist: The Importance of Training

- ❑ Understand the need for training
- ❑ Identify the target audience
- ❑ Develop training for project champions
- ❑ Develop an awareness course for Management
- ❑ Identify need for shop-floor training
- ❑ Identify organisations that can assist in training

Recommended Readings

Water Research Commission (2002) Applicability of Waste Minimisation Clubs in South Africa: Results from Pilot Studies, Synthesis Document.

Enviros March (1998). Waste Minimisation Training Modules 1 to 6 United Kingdom

Water Research Commission (2002). Waste Minimisation Clubs – Training Manual.

UK Environment Agency. Waste Minimisation – Getting Staff Involved

Section 8:
Funding a Waste Minimisation Club

Those who benefit should give something back to the club - it's only fair.

Metal Finishing Club Member

This section will highlight those aspects that need to be taken into account when determining the costs of establishing and managing a waste minimisation club, and the level of membership fees that are to be charged.

Examples from other Clubs, both locally and internationally, will be provided as guidelines.

8.1 Financial Considerations

There are a number of aspects to take into consideration when determining the costs involved in managing a waste minimisation club. These are listed in **Table 8.1** and discussed further in this section. These costs can be covered totally by membership fees, or be subsidised by external funding organisations (see **Section 8.3**).

An example of how the costs for a Club were determined is provided in **Appendix 21**.

It is also important to ensure that the Club members understand that these costs are based on an annual basis and will be revised after one year.

Fixed and variable costs

The costs involved can be broadly divided into two areas: fixed and variable costs. Fixed costs are those items that will cost the same regardless of the number of Club members, whereas, variable costs are those that depend on the number of companies involved.

Fixed costs can include:

- ✓ Time for organising speakers, preparing agendas, preparing invitations etc.
- ✓ Venue hire
- ✓ Running the meeting
- ✓ Preparing minutes, newsletters etc.

Variable costs can include:

- ✓ Postage, paper, phone calls
- ✓ Collating results
- ✓ Catering
- ✓ Site work
- ✓ Outside assistance

When determining costs it is important to differentiate between these costs such that you are aware of which will increase, or decrease, with the number of members.

Table 8.1 List of financial considerations

Item	Considerations
Facilitator's time	• Preparing agendas • Emailing / faxing / phoning companies • Organising the venue • Organising speakers • Facilitating the Club meeting • Site work • Preparing newsletters • Writing of minutes • Preparing training material • Collating results • Dissemination of results
Phone calls, postage and faxes	• cost of calls • paper costs • postage costs
Other assistance	• cost of students • cost of other consultants (e.g. for site work or training) • additional training • additional site work
Lecture / training aids	• photocopying of any notes • cost of overhead transparencies • sourcing training material
News letters	• paper • postage
Venue and catering	• hiring costs • cost of refreshments per club member
Funding	• method of determining club fees (see **Section 8.2**) • proportion of external funding available (see **Section 8.3**)

In the Pilot Metal Finishing Club, a venue had to be hired and catering provided. The costs amounted to approximately R500 per meeting. Over 3 years, this totalled R9 000. Since the Club was run free of charge to the Club members, these costs were covered by the external funding organisation.

In the Waste Minimisation Club for Large Industries in the Western Cape, the Club members take turns to host the meetings and provide refreshments. Therefore, no costs are involved for this aspect.

Facilitator's Time

You need to consider the amount of time that you (or your organisation) is going to spend on preparing for meetings, running the meetings, visiting sites and administering the Club, and cost this in accordingly (see **Table 8.1**).

Generally, a certain number of hours site work per club member is included in the Club costs. For example, each member may be entitled to 4 hours of site assistance every quarter. Anything more than this is then charged separately to the respective Club member. Where applicable, student

assistance can be costed in for the Club as a whole as they can be charged out at a lower rate and spend more time on-site. These are aspects that need to be discussed with the Club members at the Inaugural meeting.

General administrative costs include items such as contacting companies, preparing notes and training material, contacting speakers, organising venue and catering, preparation of minutes and so on, must also be included. This aspects are often very time consuming and should not be underestimated.

As discussed in Section 6, analysis of the results of the Club is very important to ensure sustainability of the Club concept. This can be a time consuming activity and should also be included when considering the costs involved in running a Club.

Remember that you cannot learn on company money and can therefore not include costs for research time.

Venue and Catering

It may be necessary to hire a venue for each Club meeting. If this is the case, these costs must also be included. Similarly for the catering needs. If meetings are held at different Club member's sites on a rotational basis and that member undertakes to provide refreshments, then these costs will fall away.

Other Aspects

As listed in Table 8.1, other aspects that need to be considered include costs of placing calls, sending faxes, paper for copying of notes and newsletters, overhead transparencies, and so on. These may seem like minor details, but can become large costs over a period of 2 years, especially if the Club grows.

8.2 Determining Company Contributions

There are a number of ways in which the contributions from the companies can be determined. They can be based on:

- ✓ sliding scale based on company turnover (as a percent)
- ✓ sliding scale based on company size (per number of employees)
- ✓ standard rate per company based on overall club costs
- ✓ totally externally funded

The size of the contribution from the Club members obviously also depends on the degree of subsidisation by external sources. It is unlikely that any other Clubs will be funded totally by external sources as were the two Pilot Clubs.

There are advantages and disadvantages to each of these, which are given in **Table 8.2**, together with examples of Clubs where this system has been used.

Table 8.2: Approaches used in determining Member contributions

Approach	Advantages	Disadvantages	Example
Company turnover	• companies pay according to their abilities • Smaller companies are subsidised by larger companies	• Larger companies may feel they are being penalised as they are not getting more information • Companies do not like giving out this information	• Some Clubs in the UK. None in SA as yet
Company size **Per employee** **Per m^2 floor space**	• Companies pay according to their needs	• Larger companies may feel as if they are being penalised unless more time is spent on their sites	• Proposed Club for the Plastics industry in Cape Town • Shopping mall Club in Cape Town
Standard rate	• Members contribute the same amount for the same benefits	• May discourage smaller industries • May seems as if the larger companies are benefiting	• Pietermaritzburg Club
None	• companies more likely to join club	• can hinder progress due to a lack of motivation to obtain a payback • feeling of "free information is bad information"	• Pilot Metal Finishing Club, Durban • Pilot Hammarsdale Club

Steps to determining company contributions

1. calculate fixed annual costs
2. calculate variable annual costs per club member
3. total costs based on a theoretical Club size (e.g. 7 members)
4. identify increase / decrease in costs based on a lower / higher number of club members
5. determine contributions based on the first three cases listed in **Table 8.2**

Examples of Member contributions:

As a percent of turnover
Some of the Clubs established in the UK used the annual turnover as a basis for determining company contributions. It was a system that was quite successful where there was a difference in the size of the participating companies.

Based on number of employees
It has been proposed that members of the Clubs sponsored by the Cape Metropolitan Council be charged per employee. In the case where members are stored in a shopping mall, it is proposed that they be charged according to the floor space occupied (i.e. per m^2)

Standard rate
The Pietermaritzburg Club members each pay a set rate towards the operating costs of the Clubs. Students are used for site work and their costs are covered by external funding sources.

8.3 Keeping Records of the Costs

It is important to keep track of the expenditure at various stages of managing the Club. Simple accounts will generally suffice. **Table 8.3** provides a guideline for keeping track of the budget and **contains fictional data as an example.**

Table 8.3: Keeping track of expenditure

Budget for (Name) Waste Minimisation Club	
Budget used to date compared with total budget	**Date:**

Item	Original budget (R)	Updated budget (R)	% of total	Budget used (R)	% Budget used
1. Recruitment meeting	3 000		7	2 800	93
2. Preliminary site visits	5 000		11	1 500	30
3. Company reviews	15 000		34	3 000	20
4. Training	12 000		27	7 000	58
5. Project management	2 000		5	6000	30
6. Dissemination	4 000		9	0	0
7. Other	2 000		5	0	0
TOTAL	**43 000**			**14 900**	**34**

Table 8.4 gives an indication of the income to the Club, and **Table 8.5**, expenditure of the Club.

Table 8.4 Club Income to (Date)

Date	Description	Amount
05/01/98	Local Metro	R15 000
01/02/98	DWAF	R30 000
01/03/98	DTI	R60 000
01/02/98	Company contr.	R10 000
Total		**R115 000**
Balance		**R100 100**

Table 8.5: Club expenditure to (Date)

Date	Description	Amount
01/01/98	Recruitment	R2 800
03/03/98	Prelim visits	R1 500
01/04/98	Project management	R600
06/04/98	Company reviews	R3 000
06/07/98	Training	R7 000
Total		**R14 900**

8.4 Sources of External Funding

There are a number of organisations in South Africa that have offered funding schemes for waste minimisation initiatives in business. These include:

- ✓ The Department of Trade and Industry (DTI)
- ✓ The Department of Water Affairs and Forestry (DWAF)
- ✓ The Water Research Commission (WRC)
- ✓ Local municipalities
- ✓ External funding organisations

It may also be possible to obtain funding from international funding organisations such as DANCED (Danish Co-operation for Environment and Development, now DANIDA). DANCED is providing co-funding for Metal Finishing Waste Minimisation Clubs in the KwaZulu Natal and Western Cape regions (2001 and 2002).

These sources are discussed in more detail in this section. Contact details are given in **Section 9**. Please be aware that while these organisations may have funded Clubs in the past, that this funding may not continue into the future.

The Department of Trade and Industry

The DTI have a funding scheme called the **Sector Partnership Fund** whereby a group of 5 or more companies can apply for a subsidy of 65% of costs for an activity which improves competitiveness and productivity of the companies involved. The majority of the Clubs established in the Western Cape are subsidised by this scheme.

The Department of Water Affairs and Forestry

A business plan was drafted by DWAF in 2001 (DWAF, 2001), on how to establish and manage waste minimisation clubs in the metal finishing sector in South Africa. As part of the Danced Metal Finishing project, DWAF will make available R50 000 / year from its budget to over three years (2001 to 2003) to sponsor waste minimisation clubs and their activities. The sponsorship is subject to the condition that the funds are not used for the administrative costs of running a club, or that the funds directly benefit any private institution or business.

Currently, the Metal Finishing waste minimisation club in Durban is co-funded through this programme.

The Water Research Commission

The WRC provided funding for the two Pilot Waste Minimisation Clubs and is co-funding the second waste minimisation club for Metal Finishers in the Durban region.

Local Municipalities

The Cape Metropolitan Council is providing funding for the establishment of waste minimisation clubs in the Western Cape through the Mess Action Campaign (MAC). This is a strategic framework to clean up the City of Cape Town and keep it clean, and was launched in 2001 by the Mayor of Cape Town. Under this project, 9 Clubs have been initiated.

The KZN provincial Department of Agriculture and Environment Affairs (DAEA) has also established a budget for waste minimisation activities. There is the possibility of further waste minimisation clubs being established under this programme.

Facilitator's Checklist

Funding a Waste Minimisation Club

- ❑ Determine your fixed and variable costs
- ❑ Determine the best method of calculating company contributions
- ❑ Set up a system to keep track of costs
- ❑ Determine sources of external funding

Recommended Reading

Environmental Technology Best Practice Programme GG122 (1998) Waste Minimisation Clubs – Setting them up for success, United Kingdom

Section 9:
Where to Now?

What happens when the Club you are facilitating has reached maturity? You have trained and assisted the Club members in implementing waste minimisation, and the Club has been running for 18 months to 2 years. Where to now?

There are a number of possibilities that can be investigated once the Club has run its *waste minimisation* course. These can include:

- ✓ Extending the lifetime of the Club to cover more waste minimisation aspects
- ✓ Changing the make-up of the partnership
- ✓ Change the focus of the Club
- ✓ Increasing the number of companies supported by encouraging the self-help approach
- ✓ Widen the focus
- ✓ Merge two or more Clubs to make one larger one
- ✓ Expand and split a Club into smaller Clubs
- ✓ Establishing a centre of information to continue long-term delivery of waste minimisation to local companies
- ✓ Close the Club completely

9.1 Extending the Lifetime

Once the Club has concluded its official lifetime based on your original plans, funding etc., there is no reason why the Club has to end if all members are willing to continue with Club activities and provide the funding themselves for your time and assistance. The costs would of course be greater than when the Club was subsidised, but meetings need not be held as frequently and less training and site assistance would be required.

9.2 Changing the Membership

Another option to consider is to change the membership of the Club and invite other organisations from the same area or sector to join. In this way, further income is generated from these new members and the older members can assist in transferring knowledge that they have learnt. It may emerge that the old Club members will phase themselves out and a completely *new* Club is formed.

9.3 Changing the Focus

There is no reason why you cannot change the focus of the Waste Minimisation Club to other areas once waste minimisation issues have been covered in detail. Options could include looking at ISO 14000; benchmarking etc. Alternatively, the Club could become a topic-specific such as an energy Club.

9.4 Encouraging Self-help

You can also encourage the existing Club members to assist other companies in implementing waste minimisation. In other words, these Club members could become mentors to these new members. This works particularly well where you have large companies mentoring smaller companies such that costs are reduced for this new member. The old member companies could also, for example, volunteer to assist the smaller company in their audits and data collection.

9.5 Widen the Focus

Another option is to widen the focus of the Club and encourage, for example:

- ✓ The formation of an industrial association
- ✓ The establishment of an eco-industrial park in the area
- ✓ The development of a community improvement area

The members of the Pilot Metal Finishing Club initiated the formation of the KZN Metal Finishing Association, which now has more than 70 members. This association encourages the implementation of waste minimisation and a second waste minimisation club has been established through the MFA.

9.6 Merge two or more Clubs

If there are two or more Clubs in the same geographical area, there is the possibility of merging these Clubs to have a larger membership and therefore more interaction between members. In addition, if some members leave, this would ensure that the Club remains large enough to warrant the time spent on facilitating the meetings.

Two Clubs were established in Pietermaritzburg within a few months of one another – a metal finishing Club, and a cross-sectional Club. Membership at each of these was low, and therefore it was proposed that the Clubs be merged after the first few meetings to enable the Club to continue to operate.

9.7 Expand and Split

The opposite of Section 9.6 may also take place if the Club has a large enough membership and two distinct groups form. The Club may then be split into two or more smaller Clubs where they are easier to manage and may become more focussed on specific issues.

9.8 Establishing an Information Centre

In one example in the UK, the members of a waste minimisation club formed an information centre where they were willing to provide assistance to other companies in their area based on what they had learnt during the lifetime of their Club.

9.9 Close the Club

After considering all options, it may be the best solution to simply close the Club. This should not be seen as a failure if the Club has achieved its aims of transferring waste minimisation to the companies involved. You can provide guidance to the Club members in how they can incorporate waste minimisation into their existing business structure. Another suggestion is to hold an award / presentation evening to officially close the Club and congratulate the members on their progress. Encourage the companies to stay in contact on a social level.

Facilitator's Checklist

Where to Now?

- ❑ Ask the members what they would like to see happen to the Club
- ❑ Provide some ideas of how the Club could evolve
- ❑ Provide guidance in the closing of the Club if required

Recommended Reading

Environmental Technology Best Practice Programme GG122 (1998) Waste Minimisation Clubs – Setting them up for success, United Kingdom

Section 10:
Legislative Support for Waste Minimisation

This Chapter provides a brief overview of the structure of the South African Government and highlights the various functions of each level of government. The various departments responsible for environmental management are also described, together with a summary of some of the more relevant legislation, white papers and strategies that promote waste minimisation. (Source: www.gov.za).

10.1. Overview of the structure of the South African Government

On the National (Central) level, the Government consists of the Legislative Authority (Parliament), the Executive Authority (The Cabinet) and the Judicial Authority. The second level is the Provincial Government, and under this level are the Municipalities / Municipal Councils, or the Metropolitan / Local Council.

Parliament

Parliament is the legislative authority of South Africa and has the power to make laws for the country in accordance with the Constitution. It consists of the National Assembly and the National Council of Provinces (NCOP). Parliamentary sittings are open to the public.

Any Bill may be introduced in the National Assembly. A Bill passed by the National Assembly must be referred to the NCOP for consideration. A Bill affecting the provinces may be introduced in the NCOP. After it has been passed by the Council, it must be referred to the Assembly.

Provincial Government

South Africa has nine provinces. They are Eastern Cape, Gauteng, KwaZulu-Natal, Mpumalanga, Northern Cape, Limpopo, North West, Free State and Western Cape.

Decisions are taken by consensus, as in the national Cabinet. Besides being able to make provincial laws, a provincial legislature may adopt a constitution for its province if two thirds of its members agree. However, a provincial constitution must correspond with the national Constitution as confirmed by the Constitutional Court.

According to the Constitution, provinces may have legislative and executive powers concurrently with the national sphere over, among other things:

- ✓ environment
- ✓ health services
- ✓ nature conservation
- ✓ trade and industrial promotion
- ✓ urban and rural development
- ✓ regional planning and development

Local Government

The recognition of local government in the Constitution as a sphere of government has enhanced the status of local government as a whole and of municipalities in particular, and has given them a new dynamic role as instruments of delivery.

There are 3 categories of Municipalities:

- Category A Municipalities (Metropolitan Municipalities)
- Category B (local municipalities)
- Category C (district areas or municipalities)

Pretoria, Johannesburg, East Rand, Durban, Cape Town, and Port Elizabeth fall under metropolitan areas with the corresponding metropolitan municipalities, namely Tshwane, Johannesburg, Ekurhuleni, eThekwini, Cape Town and Nelson Mandela. There are 231 local municipalities and 47 district municipalities.

Government Departments

There are 23 Government Departments. Environmental management in South Africa is the responsibility of various government institutions.

At central government level, the Department of Environmental Affairs and Tourism (DEAT) is the central policy-formulating and co-ordinating body. Other departments involved include Agriculture, Water Affairs and Forestry (DWAF), Minerals and Energy (DME), and Health.

10.2 Relevant Legislation (Acts), White Papers and Strategies for Waste Minimisation

This section highlights some of the aspects within legislature that support the implementation of waste minimization, and some of the actions that have been implemented to promote waste minimization within South African business.

Note that these are only very brief summaries and more information can be obtained by downloading the respective Acts / White Papers / Strategies off the websites (see Section 11 or Appendix 7 for more information).

The National Environmental Management Act, 1998 (NEMA)

NEMA requires government and provincial departments to compile Environmental Implementation Plans (EIPs) and Environmental Management Plans, providing a legal framework for environmental development. The Department's EIP was completed in 2001. A number of other departments and provincial governments are either completing or have completed their implementation and management plans

NEMA covers the protection of all environmental media. It places an obligation on owners of land on which any activity is, or was, performed which is, or has caused pollution to take place, to take all reasonable measures to prevent the pollution from occurring, continuing or re-occurring. It, therefore, imposes liability for historical activities which caused pollution as well as historical pollution itself. NEMA also allows for local authorities to direct the offender to take clean up and rehabilitation measures. If this directive is ignored, the authorities can undertake the necessary steps and recover all costs from the offender.

Penalties that can be incurred in terms of the NEMA include:

- payment of damages, whereby any third party that was harmed / damaged due to pollution can fine the offender;
- pollution advantage; i.e. it can be shown that the company has gained financially by not disposing of waste in the correct manner, they can be forced to pay this amount;
- investigation and prosecution costs incurred by the investigation.

Some other important aspects of the NEMA are outlined below. These highlight the importance responsible waste management within business.

Private Prosecution

Under the NEMA, private citizens have the right to enforce pollution control by being able to prosecute any company or individual if it is felt that there is a breach of any law relating to the protection of the environment. In the event of the prosecution being unsuccessful, the accused may be required to pay the private prosecutors legal costs.

Access to Information

In terms of the NEMA, any person is allowed access to information held by the government pertaining to all emissions to the environment. In other words, the public is entitled to access the production process of a company that utilises a substance that is potentially harmful to the environment.

Director Liability

Any person who is, or was, a director of a company at the time at which the company committed an act of pollution, and it is found that the director did not take all reasonable steps to prevent the pollution from occurring, can be held liable in a personal capacity. In this case, the director can be convicted on all penalties described in the previous section, including imprisonment. There is, therefore, an obligation on the part of a director of a company to be aware of all aspects relating to the production of waste on site.

Protection of Workers

Under the NEMA, there are two clauses, which aim to protect the workers. In the first instance, a worker is entitled to refuse to perform any task if they reasonably believe that it poses a threat to the environment. In this case, the employer may not take action against the worker. In the second instance, workers are encouraged to disclose any information on company activities that poses an environmental risk to the authorities. Again, no action may be taken against them by their employer.

The National Water Act, 1998 (NWA)

The NWA enables DWAF to manage water quality through both source-directed and resource-directed measures. Source-directed measures include the issuing of licences to water users with a potential impact on the resource.

The Department has adopted a hierarchy of decision-taking with regard to source-directed water quality management:

- ✓ pollution prevention: prevent waste production and pollution or degradation of the water resource wherever possible.
- ✓ waste minimisation and remediation: if waste production and pollution or degradation of the water resource cannot be avoided, waste production, pollution or degradation of the water resource must be minimised and remedied.
- ✓ precautionary principle: if there is no alternative to the disposal of waste and/or the discharge of water containing waste, the precautionary principle applies. In applying this principle, the disposal of waste and/or discharge of water containing waste will only be allowed if the receiving environment has the capacity to assimilate the additional waste load.
- ✓ differentiated approach: if the receiving water resource has the capacity to assimilate an additional waste load, i.e. when the requirements of the reserve and the other waste users are not threatened, relaxation from prescribed standards or requirements may be considered. This approach is followed for all potential sources of pollution (as defined by the Act) and not only for hazardous substances

The NWA also makes provision for the prosecution of offenders who do not comply with its regulations. The maximum penalty for a first time offender is R50 000 and/or one-year imprisonment. This is increased to R100 000 and one-year imprisonment for second offenders. Additional penalties may be applied if deemed necessary. It has been DWAF policy not to prosecute offenders immediately. DWAF, however, due to continual deterioration in the quality of the RSA water resources, considers pollution to be a serious offence and have recently begun prosecuting offenders immediately.

Water Services Act

The Water Services Act was passed in 1997 and is related to the use of water and discharge of effluent. Its main aim is to fulfil everyone's right of access to basic water supply and basic sanitation. Effluent discharge is either controlled by the local authority (if discharged to sewer), or by DWAF (if discharged to river / sea / dam). The Act gives these bodies the right to issue permits and licenses for the discharge of effluents provided that the company companies with certain discharge standards. These standards are set by the relevant authority in such as way as to promote cleaner production /

waste minimisation activities – in other words, to encourage industry to reduce pollution on-site. If a company violates this act, they are liable for a fine and / or imprisonment

White Paper on Integrated Pollution and Waste Management

DWAF and DEAT together completed the IP&WM policy, which is a subsidiary policy of the overarching environmental management policy, as set out in the White Paper on Environmental Management Policy for South Africa, and further supported by the National Environmental Management Act (No. 107 of 1998).

This IP&WM policy applies to all government institutions, society at large, and to all activities that impact on pollution and waste management. One of the fundamental approaches of this policy is to prevent pollution, minimise waste, and to control and remediate impacts. The management of waste will be implemented in a holistic and integrated manner, and will extend over the entire waste cycle, from "cradle to grave", including the generation, storage, collection, transportation, treatment, and final disposal of waste.

The government aims to:

- encourage the prevention and minimisation of waste generation, and thus pollution at source
- encourage the management and minimisation of the impact of unavoidable waste from its generation to its final disposal
- ensure the integrity and sustained "fitness for use" of all environmental media, i.e. air, water and land
- ensure that any pollution of the environment is remediated by holding the responsible parties accountable
- ensure environmental justice by integrating environmental considerations with the social, political and development needs and rights of all sectors, communities and individuals, and
- prosecute non-compliance with authorisations and legislation.

The White Paper on Integrated Pollution and Waste Management for South Africa represents a paradigm shift from dealing with waste only after it is generated (i.e. "end of pipe") towards:

- pollution prevention
- waste minimisation
- cross-media integration
- institutional integration, both horizontal and vertical, of departments and spheres of government, and
- involvement of all sectors of society in pollution and waste management

The National Waste Management Strategy (NWMS), which is the basis for translating the goals and objectives of the policy into practice, has since been developed, together with short-term (five-year) priority Action Plans for the following key elements of the strategy:

- Integrated Waste Management Planning
- Waste Information Systems
- General Waste Collection
- Waste Minimisation and Recycling
- Waste Treatment and Disposal.
- Capacity Building, Education, Awareness and Communication

A summary of some of the points in the waste minimisation action plan is given in the next section.

National Waste Management Strategy

The National Waste Management Strategy of South Africa presents a long-term plan (up to the year 2010) for addressing key issues, needs and problems experienced with waste management in South Africa. The NWMS strategy follows the waste hierarchy approach, which is internationally accepted as a rigorous approach to integrated waste management. The waste hierarchy prioritises waste management options, in descending order as follows:

- Cleaner production (Waste Prevention, Waste Minimisation);
- Recycling (Re-use, Recovery, Composting);
- Treatment (Physical, thermal and chemical destruction);
- Disposal (Land filling).

The Department of Environment Affairs and Tourism (DEAT), as the governmental lead agent for the National Waste Management Strategy, will be responsible for developing and implementing a National Programme for Waste Minimisation.

The aim of this waste minimisation strategy is to ensure that waste minimisation procedures and practices are adopted by all sectors of society, with a special initial focus on the principal generators of waste particularly those producers who generate a high volume of waste and low volume of waste with a high environmental impact.

While the actual implementation of most waste minimisation practices will be carried out primarily by the private sector (as the principal generator of waste), it is the duty of the public sector to take a leading role in providing the right structure, incentives and information to facilitate the implementation of these waste minimisation practices. In so doing, the public sector will ensure that there is an appropriate balance between the use of directive-based ("command-and-control") measures and co-regulatory initiatives (NWMS, version D, section 9, 1999).

The proposed Waste Minimisation priority initiatives have been divided into the following subject areas/themes:

- Programme development and administration
- Legislative and policy initiatives
- Information and awareness initiatives
- Demonstration projects
- Public/private partnerships initiatives

These subject areas aim to promote the implementation of waste minimisation through ensuring:

- these initiatives are undertaken in a structured and co-ordinated manner
- there is integration with other national, provincial and local governmental activities
- there are appropriate control and incentive-based mechanisms
- the development of a database of locally relevant case studies and sector specific waste minimization guidelines
- the implementation of demonstration projects
- continued support to the private sector in implementing waste minimization initiatives

10.3 Provincial support

Within each province there is a provincial department that is responsible for promoting environmental improvements (see Table 10.1). Waste minimisation and cleaner production activities form an integral part of these improvement plans, and each province has to prepare a business plan of how they will promote and support waste minimization activities.

Two examples of how waste minimisation is supported are:

- Within the Department of Environmental Affairs and Development Planning in the Western Cape, under the Pollution and Waste Management Directive, a programme is in place to promote the formation of waste minimisation clubs. A CD video presentation has been prepared on behalf of this directorate to highlight the benefits of waste minimisation and to becoming a member of a Club.
- The Department of Agriculture and Environmental Affairs in KwaZulu Natal have a programme in place to support the establishment of waste minimisation clubs in the province.

These Provincial departments are responsible for regulating the industry in the province to support their objectives. This is carried out by the development and implementation of policies, legislation, strategies, action plans, norms, standards, and guidelines on pollution and waste management.

Contact details of each of these departments are provided in Section 11. It would be useful to contact these departments to see if there is any support available to you as a facilitator of a waste minimisation club.

Table 10.1: List of Provincial environmental departments

(source: http://www.environment.gov.za/)

Province	Department
Eastern Cape Province	Department of Economic Affairs, Environment and Tourism
Gauteng Province	Department of Agriculture, Conservation, Environment and Land Affairs
KwaZulu Natal Province	Department of Agriculture and Environmental Affairs
Limpopo Province	Department of Finance, Economic Affairs, Tourism and Environment
Mpumalanga Province	Department of Agriculture, Conservation and Environment
Northern Cape Province	Department of Agriculture, Land Reform, Conservation and Environment
North West Province	Department of Agriculture, Conservation and Environment
Western Cape Province	Department of Environmental Affairs and Development Planning

10.4 Local support

Within each metropolitan area, the local authority is given the responsibility of developing bylaws which regulate the industry in their area. These bylaws set certain requirements for discharge of emissions to water, air and land, and industry must apply for a permit to be able to operate.

Local authorities have become aware of the need to encourage waste minimisation and best practice within industry, and some initiatives have been undertaken in this regard. Some examples are provided below:

- Within eThekwini, a new permitting system has been developed which places an emphasis on the implementation of waste minimization / cleaner production practices within industry to reduce waste at source. In other words, a company wishing to apply for a permit must show, amongst other criteria, that it is following a system of continuous improvement.
- The City of Cape Town supported the establishment of 9 waste minimization clubs in the Western Cape region under their Mess Action Campaign (MAC) in 2002/2003.

10.5 Other Support Structures for Waste Minimisation

Within South Africa there are already some initiatives in place to promote the implementation of waste minimisation / cleaner production to South African industry. Two of these initiatives are the National Cleaner Production Centre, and the Clothing and Textile Environmental Linkage Centre.

National Cleaner Production Centre (NCPC)

The South African National Cleaner Production Centre officially inaugurated on 24th of February 2003. The Centre is a collaborative venture between the United Nations Development Organisation (UNIDO), the Swiss and Austrian technical institutions, the DTI and the CSIR. The development objective of the NCPC is to enhance the competitiveness and productive capacity of national industries, primarily SMMEs, through the increased application of cleaner production techniques and the transfer of environmentally sound technologies. In doing so, the NCPC will promote dialogue between industry and government. This will in turn enhance market access for South African products by assisting the development of environmentally acceptable manufacturing processes that meet the international market needs.

The DTI will provide R3 million, while the Swiss and Austrian governments will contribute USD950,000 and USD750,000, respectively over a 3-year period. After the first three years, the programme will be evaluated to analyse its progress and possible extension for funding. In order to work towards becoming self-sufficient over the next 3 years, the NCPC will charge a fee based on direct costing for the basic services, taking into account the size and financial position of the client. Full costs will be charged for services over and above the basic.

The NCPC is based at the CSIR's Process Technology Centre in Pretoria. Regional offices will be formed in Durban and Cape Town to co-ordinate the activities in these areas.

A director, assisted by a deputy director manages the NCPC. Other NCPC staff members include an administrative assistant, an economist or costing engineer (part-time) and three regional coordinators (part-time). The work of the NCPC will be overseen by an Executive Board which is governed by a Constitution An Advisory Board will support the work of the NCPC Director and the Executive Board. The regional coordinators will form sector specific steering committees.

The NCPC programme has a sectoral approach, focusing initially on the textile, food and chemical sectors in the three most industrialized regions of the country, Gauteng, Western Cape and KwaZulu-Natal. The NCPC will provide in-plant assessments and training programmes, promote investment in cleaner technology and provide policy advice and information. It will focus initially in the food, chemical and textile industries and subcontractors in the supply chain. The NCPC will work closely together with existing cleaner production programmes such as the DANCED initiatives as well as initiatives from universities and other institutions.

Clothing and Textile Environmental Linkage Centre

A joint initiative by the Department of Environmental Affairs and Tourism (DEAT) and the Department of Trade and Industry (the DTI) prompted the Danish government into formulating a programme of assistance to South Africa in Cleaner Production in 1996. Five major industrial sectors were targeted, one of which was the textile industry. The Cleaner Textile Production Project (CTPP) was initiated in June 2000 and ended in June 2003

The Clothing and Textile Environmental Linkage Centre was initiated in May 2003 as an extension of the Danida CTPP and aims to continue disseminating the lessons learnt during the CTPP as well as to promote CP further up and down the supply-chain.

CTELC is funded by the DTI (DKK495 000) and Danida (DKK2.2 Million) for 3 years. At the end of this time, it is envisaged that the centre will be incorporated into the NCPC under the regional centre in Cape Town which is focused on the textile sector. The NCPC textile component and CTELC will fall under the same project steering committee.

The centre aims to promote CP along the textile pipeline, including designers, clothing manufacturers, retailers and textile manufacturers. This is achieved through awareness-raising seminars and workshops, newsletters, web page, site visits and providing sources of further assistance to clients

Facilitator's Checklist

Legislative Support for Waste Minimisation

- ❑ Familiarise yourself with the relevant National legislation
- ❑ Contact the relevant Provincial Department for information on any waste minimization programmes they have in place
- ❑ Contac the local authority for information on how they can support waste minimization – either through regulation, or with financial support
- ❑ Make Contact with the National Cleaner Production Centre / CTELC

Recommended Reading

National Environmental Management Act

White paper on Integrated Pollution Control and Waste Management

National Waste Management Strategy

National Water Act

Water Services Act

Section 11:
Where to go for Help

This section lists organisations, web pages and sources of literature that may be of assistance to you in setting up and running a waste minimisation club.

11.1 Local Organisations

General Information

Pollution Research Group	School of Chemical Engineering University of KwaZulu- Natal, Durban, 4014 South Africa	**Chris Buckley** + 27(0)31 260 3375 buckley@nu.ac.za
Susan Barclay CC	PO Box 1310, Forest Hills, 3624 South Africa	**Susan Barclay** + 27 (0)31 763 5219 suebar@iafrica.com
BECO **Institute for Sustainable Business**	PO Box 12485, Mill Street, 8010 South Africa	**Bas Kothuis** +27 (0)21 689 7117 bkothuis@beco.com
Enviros	PO Box 1310, Forest Hills, 3624 South Africa	**David Mercer** + 27(0)72 218 0854 mercer@mweb.co.za

Funding

Department of Trade of Industry	Private Bag X84, Pretoria, 0001 South Africa	Customer Care 0861 843 384 (local) +27 (0)11 254 9405 contactus@thedti.gov.za
Department of Water Affairs and Forestry	Private Bag X313, Pretoria, 0001, South Africa	+27 (0)12 336 7500 www.dwaf.gov.za (online)
Water Research Commission	Private Bag X03, Gezina, 0031 South Africa	**Greg Steenveld** + 27 (0) 12 330 0340 gregs@wrc.org.za

11.2 Internet Resources

This section lists some Internet pages that may be of use to you. Many of those listed under the *general waste minimisation information* have links to other useful pages, and also allow you to download guides, pamphlets, presentations etc. These sources are listed alphabetically.

General waste minimisation information and Guides

Canadian Center for Pollution Prevention	www.c2p2online.com/
East of Scotland Waste Minimisation Club	www.esw.co.uk
Envirowise, UK	www.envirowise.gov.uk
Green Networks	www.greennetwork.dk/
Greenprofit	www.greenprofit.net
Leicestershire Waste Minimisation Association	www.lwma.sageweb.co.uk
National Cleaner Production Centre	www.ncpcsa.co.za/
Project Cleaver	www.projectclever.com
Sabina (Sustainable Business in Action)	www.sabina.co.uk
Scottish Environmental Protection Agency	www.sepa.org.uk
Target Zero, New Zealand	www.ccc.govt.nz/targetsero
The Clean Technology Centre (CTC)	www.ctc-cork.ie
UK Environmental Protection Agency	www.environment-agency.gov.uk
United Nations Environment Programme	www.unep.org
United Nations Industrial Development Organisation	www.unido.org/
United States Environment Protection Agency	www.epa.org/
Waste Minimisation Clubs – SA	www.nu.ac.za/wasteminclubs

National Government

South African Government	www.gov.za
Department of Environment Affairs and Tourism	www.environment.gov.za/
Department of Water Affairs and Forestry	www.dwaf.gov.za

Department of Trade and Industry	www.dti.gov.za
Department of Mineral and Energy Affairs	www.dme.gov.za

Provincial Government (Environment)

Eastern Cape Province: Department of Economic Affairs, Environment and Tourism	http://www.ecprov.gov.za/ department_overview.asp? departmentID=3
Gauteng Province: Department of Agriculture, Conservation, Environment and Land Affairs	http://www.dacel.gpg.gov.za/
KwaZulu Natal Province: Department of Agriculture and Environmental Affairs	http://agriculture.kzntl.gov.za/
Limpopo Province: Department of Finance, Economic Affairs, Tourism and Environment	http://www.limpopo.gov.za/depts/
Northern Cape Province: Department of Agriculture, Land Reform, Conservation and Environment	http://www.northern-cape.gov.za/departments/
North West Province: Department of Agriculture, Conservation and Environment	http://www.nwpg.org.za/Agriculture/
Western Cape Province: Department of Environmental Affairs and Development Planning	http://www.westerncape.gov.za/ environmental_cultural_affairs/ default.asp

Local Government

Local Government Home Page	www.local.govt.za
Durban (eThekwini)	www.durban.gov.za
Cape Town	www.capetown.gov.za/
Johannesburg	www.joburg.org.za/
Pretoria (Tshwane)	www.Tshwane.gov.za
Port Elizabeth (Nelson Mandela)	www.pecc.gov.za
East Rand (Ekurhuleni)	www.ekurhuleni.com

11.3 Literature and Videos

This section highlights some of the literature and video / CD presentations that you might useful as reference documents. It is by no means exhaustive as there is a vast quantity of information on waste minimisation / cleaner production available. The documents are listed here alphabetically. Further sources of information are provided in the Training Manual.

Literature

Centre for Exploitation of Science and Technology (1995) Waste Minimisation – A Route to Profit and Cleaner Production. Final Report on the Aire and Calder Project, United Kingdom

Centre for Exploitation of Science and Technology (1995). Waste Minimisation – an Assessment of Motivation, United Kingdom

Council for Scientific and Industrial Research Technical Guide K49 (1979). How to conduct an industrial waste audit. G Wentzel and J Funke, South Africa.

Dutch Ministry of Economic Affairs, Prepare manual, The Netherlands

East of Scotland Water (2000). Less is More – Final Report for the East of Scotland Waste Minimisation Project, United Kingdom.

Environmental Technology Best Practice Programme GG122 (1998) Waste Minimisation Clubs – Setting them up for success, United Kingdom

Environmental Technology Best Practice Programme GG27 (1996) Saving Money through Waste Minimisation – Teams and champions, United Kingdom

Environmental Technology Best Practice Programme ET30 (1996). Finding Hidden Profit – 200 Tips for Reducing Waste

Environmental Technology Best Practice Programme GG106 (1998), Cutting Costs by Reducing Waste: Running a workshop to stimulate action

Environmental Technology Best Practice Programme GG26 (1996) Saving Money through Waste Minimisation: Reducing water use

Environmental Technology Best Practice Programme GG25 (1996) Saving Money through Waste Minimisation: Raw material Use

Environmental Technology Best Practice Programme GG38C (1997) Cutting Costs by Reducing Waste: A self-help guide for growing business

Enviros March (1998). Waste Minimisation Training Modules 1 to 6 United Kingdom

Industrial Research and Technology Unit (1998). Waste Elimination from Textiles – WEFT Project, United Kingdom

Institute of Chemical Engineering Waste Minimisation Guide (1992), BD Crittenden and ST Kolaczkowski, United Kingdom.

March Consulting Group (1998). Northumbria Waste Minimisation Club – Final Report; United Kingdom.

National Productivity Council, New Deli, Training Package for Waste Minimisation Circle Facilitators

United Nations Environment Programme Technical Report Series 7(1991), Audit and reduction manual for industrial emissions and waste, France.

United States Environmental Protection Agency Waste Minimisation Opportunity Assessment Manual (1988), USA.

University of Hertfordshire (2000), The East Anglican Waste Minimisation in the Food and Drink Project

United Kingdom Environment Agency (1998), Waste Minimisation – A Good Practise Guide

United Kingdom Environment Agency (),Waste Minimisation – Getting Staff Involved

Water Research Commission (2002) Applicability of Waste Minimisation Clubs in South Africa: Results from Pilot Studies, Synthesis Document.

Water Research Commission: Waste Minimisation Guide for the Textile Industry – A Step towards Cleaner Production (2002), SA

Water Research Commission (2002). Waste Minimisation Clubs – Trainer's and Participant's Manuals.

Video presentations

UK Environment Agency (1994). Waste Minimisation – The results of the world's two largest waste minimisation initiatives: Project Catalyst and the Aire and Calder Project.

UK Environment Agency (1997). Money for Nothing and your Waste Tips for Free

Environment Australia (1997). The EcoReDesign Program

City of Cape Town (2002). Join the Club

Environment Australia. Environment and Business Profiting from Cleaner Production

Scottish Environmental Protection Agency. No Time to Waste

CD Presentations / Tools

CSIR: South Africa – Sustainable Development 2002, a CSIR Perspective

Danida Cleaner Textile Production Project: Cleaner Cotton and Cleaner Textile Production (2002)

Department of Environmental Affairs and Development Planning – Western Cape: Waste Minimisation Clubs (2003)

Environmental Technology Best Practice Programme and the UK Environment Programme: Waste Minimisation Interactive Tool (WMIT)

US EPA: Waste Minimisation / Pollution Prevention Technical Conference, Philadelphia, Pennsylvania, 3rd to 5th August 1998.

WASTE MINIMISATION CLUBS

FACILITATOR'S MANUAL

APPENDICES

List of Appendices

Appendix 1:
Club Constitution

This appendix contains an example of a Waste Minimisation Club constitution. It is based on one that was developed for the KwaZulu-Natal Metal Finishing Association and the Waste Minimisation Club for Large Companies in the Western Cape.

Use this as a guideline for developing a constitution that is applicable for your particular Club.

CONSTITUTION OF THE (NAME OF WASTE MINIMISATION CLUB) IN (REGION)

1. NAME

The name of the club shall be the (Name of the Waste Minimisation Club) in the (Region) hereinafter referred to as “the Club”.

2. NON-PROFIT ASSOCIATION

2.1 The Club is a non-profit organisation supported by the (name of subsidising organisations).
2.2 The Club is not formed and does not exist for the purpose of carrying on any business that has for its object the acquisition of gain by the Club or its individual members.
2.3 No part of the income or assets of the Club shall be paid directly or indirectly, by way of dividend, donation or otherwise, to any person.
2.4 The Club shall not be entitled to carry on any trading or other profit-making activities or participate in any business, profession or occupation carried on by any of its members or provide to any of its members financial assistance in respect of the member's business, or any premises or continuous services or facilities for the purpose of carrying on any business, profession or occupation.
2.5 The income and expenditure of the Club shall be audited by an independent auditor as required in the conditions for claiming from (name of Subsidising organisations).

3. OBJECTIVES AND POWERS

The Club is constituted to achieve the following:

3.1 To promote the interest and active participation of the members in a programme of waste minimisation with a view to the reduction of all sources of waste including, but not limited to liquid, solid, energy and gaseous waste;

3.2 To improve environmental management within the industrial area by reducing the company’s environmental impact together with establishing monitoring programmes;

3.3 To facilitate the exchange of ideas and experiences in waste minimisation as a mechanism for improved awareness and understanding of the concept;

3.4 To provide forums for open discussion and debate to gain an understanding of the potential impacts of industrial development on the social and natural environment;

3.5 To establish and build relationships between project champions and companies to solve environmental problems and resolve conflicts related to Industry

3.6 To provide on-going education of the members through the dissemination of information related to waste minimisation, cleaner production and pollution prevention,

3.7 To ensure that the information is available, ensure clarity and recognize the value of both expert scientific and local knowledge in environmental problem solving

3.8 To achieve those objectives, the Club shall have the following powers:

(i) To arrange and hold training sessions on waste minimisation at bimonthly meetings;

(ii) To publish bulletins and newsletters for the Club's purpose;

(iii) To purchase, hire or acquire in any other manner any moveable property or person which may be deemed necessary or convenient for any of the purposes of the Club;

(iv) To open and operate any account with any financial institution in the name of the Club, including a cheque account, and all funds shall be invested in a registered financial institution;

(v) All such powers as are necessary and / or ancillary to carry out the aims and objectives of the Club, and to carry out all its powers hereunder on such terms and conditions as it deems fit.

4. MEMBERSHIP

4.1 The Club shall have the following classes of members:

(i) Ordinary membership is open to (define club members and region)

(ii) Other organisations cannot become a member of the Club, but can attend meetings with observer status, e.g. Concerned members (Local Government), Interested members (suppliers), Expert consultants

4.2 The Club shall consist of a minimum of (x) members

4.3 A company can have only one membership.

4.4 Application for membership shall be in writing on the prescribed forms

4.5 Membership shall lapse or be terminated in the event that:

(i) a member no longer wishes to be a member of the Club or adhere to any of its objectives, as stated in section 2 of the constitution and has resigned in writing by giving notice to that effect to the secretary;

(ii) despite due demand the membership fees still remain unpaid after 2 (two) months of the due date for payment;

4.6 The members of the club shall be the subscribers to the constitution whose names and signatures appear below

4.7 Anyone else who seeks admission as a member, shall apply in writing to the secretariat of the Club: (name of facilitators)

4.8 As the founding organization, (name of facilitators) shall fulfil the roles of Chairman and Secretary. The treasurer will be a representative from one of the member companies, as voted and approved by the majority of members at a general or special meeting.

5. SUBSCRIPTION FEES

5.1 The subscription fees for the Club will consist of an upon-once admission fee and a membership fee

5.2 The admission and membership fees will be equal for all members (or as decided for your particular club)

5.3 Where a member is applying for membership an admission fee shall be lodged together with the application

5.4 The membership fee is an annual payment that has to be paid in advance, in the first year of membership within one month after the due date or date of application.

5.5 The secretariat will suggest the height of the admission and membership fees annually. On the annual general meeting the members will give their vote for the suggested admission and membership fees.

5.6 If a company fails to pay the membership fee, the committee will remind that company by writing after one month of expiring of the date the membership fee has to be paid.

6. MEETING

6.1 A general meeting shall mean an annual general or a special meeting;
6.2 The members of the Club may at any time convene a special general meeting and shall, on the requisition of not less than 50% of members, convene a special general meeting.
6.3 Members shall be given 7 Days notice of any meeting, together with the notice of the agenda and proposals for consideration thereafter

7. AMENDMENTS TO THE CONSTITUTION

The constitution of the Club or any part thereof, may only be amended by a resolution adopted by a majority of two-thirds of the ordinary members of the Club present at an annual or special general meeting of members of which due and proper notice has been given as provided for above.

8. NOTICES

Every member shall ensure that their address and any change thereof is recorded with the Club

9. GENERAL

A copy of the constitution may be inspected by the members upon application to the secretary. Every person upon becoming a member of the Club shall receive a copy of the constitution.

10. INDEMNITY

Every member, officer, servant and / or committee member shall be indemnified by the Club against all costs, losses and expenses which he may incur or become liable for by reason of any act or thing done by him as such in the discharge of their duties, unless the loss in question is caused by the gross negligence, dishonesty or breach of trust by the person.

11. WINDING-UP

11.1 The Club may be dissolved by a resolution passed at a general or special general meeting provided that such resolution is passed by a majority of two thirds of the members present and entitled to vote at such meeting.

11.2 In the event of such resolution being passed and the dissolution of the Club, no assets shall be distributed to the members, but shall be transferred to an organisation of similar aims and objectives provided that such organisation is exempt from tax under the laws relating to income tax and donations tax.

12. ADOPTION

The names of member companies subscribing to this constitution and signatures of company representatives are given below. The above constitution is adopted by the club members on the date shown next to signatures below.

Member Company	Name Of Representative	Signature Of Representative	Date

Appendix 2:
Certificate of Commitment

This appendix contains a copy of a certificate of commitment which was signed by members of the Pilot Metal Finishing Waste Minimisation Club and also the members of the Waste Minimisation Club for Large Industries in the Western Cape.

The certificates were signed by a suitable representative and then framed and hung in the reception of the company to indicate their commitment to reducing waste at source.

(Name of Waste Minimisation Club)

Declaration of Commitment

I, _____ ,

on behalf of

_____

commit myself and my company to the
(Name of Waste Minimisation Club)
established in (Region))

By making this declaration, the company shows commitment to:

- *implementing a programme of waste minimisation*
- *reducing all sources of waste (liquid, solid, energy, gaseous)*
- *continual improvement*
- *establishing a monitoring programme*
- *reducing environmental impact*
- *sharing information with other club members*
- *attending regular club meetings*

*Signed this*_____*day of* _____, *2002 in* _____

*Signature:*_____

Appendix 3:
Invitation to an Awareness Raising Meeting

This appendix contains an example of a letter that was sent to companies in the Pietermaritzburg area to attend an awareness raising meeting for waste minimisation.

It was sent by the local authority (Umgeni Water) and therefore had the advantage of their endorsement.

This invitation was also placed in the local newspaper and the Business Chamber of Commerce newsletter.

Dear (Managing Director)

SEE HOW YOU CAN ADD R15 000/MONTH TO YOUR PROFITS

Waste costs more than you think - it can cost as much as 10% of turnover. One metal plater in Durban managed to save R15 000/month mainly in water, chemical and effluent treatment costs using relatively simple techniques with very short payback times.

You are invited to attend a morning seminar about how you can cut costs by reducing waste. Come and find out how your company can benefit by joining other companies in a waste minimisation club. Three such clubs already exist in the Durban, Pietermaritzburg and Hammarsdale areas where substantial savings are being achieved through reducing waste at source.

Ian Sampson (Environmental Lawyer), John Danks (Industrialist who has saved R15 000/month), Sue Barclay (University of Natal - Durban), amongst others, will be giving presentations.

Date: 27 October 2000

Time: 10:00

Venue: Chamber House, Royal Showgrounds

Cost: R25-00

DON'T THROW MONEY DOWN THE DRAIN!

REPLY SLIP:

ADD TO YOUR PROFITS - 27 OCTOBER 2000

TO CONFIRM BOOKING, PLEASE FAX OR E-MAIL REPLY SLIP

FAX: (033) 394 4151 E-MAIL: pcci@futurenet.co.za

NAME/S:

COMPANY:

CONTACT PERSON:

TELEPHONE NUMBER:

METHOD OF PAYMENT: CHEQUE CREDIT CARD CASH

CREDIT CARD:

EXPIRY DATE:

BANK:

SIGNATURE:

For further information contact Marié on (033) 345 2747 by 20 October 2000.

PCCI - PO BOX 11734, DORPSPRUIT, 3206, PIETERMARITZBURG.

TEL: (033) 345 2747 FAX: (033) 394 4151 E-MAIL: function@futurenet.co.za

Appendix 4:
Examples of Handouts and Reply Forms

This appendix contains two examples of Handouts that have been provided at awareness raising meetings to provide companies with further information on waste minimisation and waste minimisation clubs.

Example 1, is a handout that was prepared for the Pilot Metal Finishing Waste Minimisation Club.

Example 2 is a handout prepared for the Waste Minimisation Club for Large Industries in the Western Cape.

These handouts can be used as a Guideline for the preparation of information brochures suitable for your proposed Club.

Example 1

Waste Minimisation Club for the Metal Finishing Industry

What are Waste Minimisation Clubs ?

A waste minimisation club is a group of companies, either within the same industrial sector or from different industries, that are taking action to reduce waste and save money. While some of these clubs may be managed by the companies themselves, the majority are run by a partnership of organisations, coordinated by a lead organisation or a *steering group*. This steering group comprises the funding bodies, organisations that support industrial development and any other interested parties such as the local authorities. The leading organisation or steering group then sets goals for the club and organises the meetings. An external consultant may be contracted to aid in undertaking the waste minimisation audits.

Within each club member (i.e. company), a *project champion* must be appointed who has the responsibility of driving the project in their company; establishing *project teams* and training them in waste minimisation; setting goals for the programme; and disseminating the results, both internally and to the other club members. These teams are comprised of representatives from each department in the company who have access to the process information.

Club meetings are held on a regular basis, generally bimonthly, where the project champions report-back on the progress in their companies. These meetings may also be used by the steering group as training sessions for the champions, or to invite guest speakers to give presentations on relevant topics

How will it be done ?

Once the interested companies have expressed their commitment, a meeting will be held to explain the concept in more detail and set a time frame for action.

It is proposed that initially meetings will be held at monthly intervals to enable training in waste minimisation aspects. Thereafter they will be held bimonthly to monitor the progress and to keep the club together.

How can I benefit ?

As a member of the club, you will benefit from waste minimisation by :

- ® obtaining a better understanding of your processes and waste;
- ® improving productivity;
- ® saving money on water, chemicals and effluent charges;
- ® complying with effluent standards as set by the authorities;
- ® having easy access to information and assistance from consultants;
- ® sharing experiences with other club members; and
- ® working together with the local authorities.

What do I have to do ?

In order to be a club member, there are a few requirements, such as :

- ® commitment to the club;
- ® commitment to reducing waste;
- ® attending all meetings;
- ® making all relevant information available to the Pollution Research Group;
- ® working with the Steering Group to set goals and time frames; and
- ® making progress.

Cost ?

A number of options for funding of the club are being investigated and will be discussed with interested companies.

How do I join ?

If you are interested in forming a waste minimisation club, please complete the attached form and / or contact the facilitator.

Waste Minimisation Club Reply Form

Yes ! I am interested in joining the

Waste Minimisation Club for the Metal Finishing Industry

Company Name :.....

Contact Person :.....

Phone : ..... Fax :.....

Email: .....

Contact Details of Facilitator:

Pollution Research Group
University of Natal, Durban

Fax: (031) 260 1118
Phone: (031) 260 3375
Email: Barclay@nu.ac.za

Example 2

Waste Minimisation Club

for larger companies established in the Western Cape

Institute for Sustainable Business

What is Waste Minimisation?

The basic concept of waste minimisation (WM) is simple: reduce or eliminate pollution at the source rather than after it has been generated: ***prevention is better than the cure***. A focus on prevention results in a hierarchy in your treatment of waste within the company (see figure 1). The concept of WM could be applied to the products, processes and services of your company.

Why Waste Minimisation?

In numerous initiatives for WM around the world, implementation of the concept has shown that it could result in a number of benefits:

- Economical benefits by increased efficiency and quality:
  - Reduced water, raw materials, energy etc. use and costs,
  - Reduced utility (waste treatment & disposal) costs,
- Environmental benefits, in sense of:
  - Reduced hazardous waste,
- Social benefits in sense of:
  - Improved company moral and communication,
  - Reduced health and labour risks.

It has been proven in projects in South Africa and abroad that a majority of the cost savings and improved environmental performance by implementing waste minimisation, can be achieved without major investments.

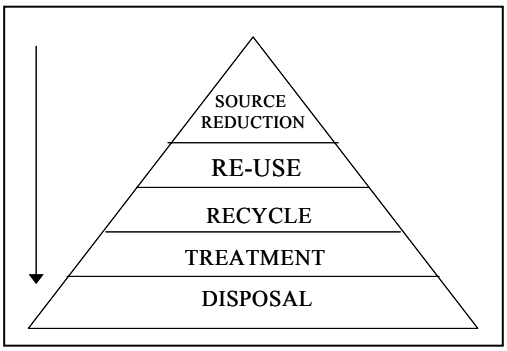


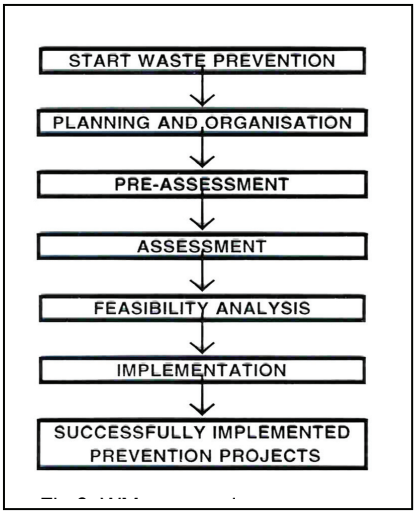
Fig. 1: Waste Minimisation Hierarchy

Governmental organizations have a significant role to play in implementing waste minimisation by regulatory and financial incentives. Local and national government have integrated the concept of WM into policy (e.g. see White Paper on Integrated Pollution and Management, issue 20978, year 2000).

How Waste Minimisation?

Options for waste minimisation can be identified by means of a Waste Minimisation Opportunity Assessment (WMOA; see figure 2). Such an assessment is:

- An analytical tool designed to assure that the organization is operating in an environmentally safe and economically efficient manner,
- Used to document the types and quantities of wastes generated by the company,
- A systematic approach for the identification and evaluation of different cleaner production options.



Waste Minimisation and Environmental Management Systems

The WMOA is a very good start to learn about the environmental aspects and impacts of your company, and provides a first step on the way to an integrated Environmental Management System. Waste Minimisation contributes substantially to a continuous improvement of the products, processes and services within your company. This continuous improvement of the activities of your company provides you competitive advantages in a broad sense.

What are Waste Minimisation Clubs?

In general a Waste Minimisation Club (WMC) has the following characteristics:

- a small number of cooperating companies,
- cross-sectional and sector specific industries,
- involved companies meet on a regular basis,

- exchange ideas and information and encourage each other on waste minimisation,
- established as voluntary industry initiatives.

Case: Hammersdale WMC in KwaZulu-Natal

This regional WMC involves 8 companies that are active in respectively the textile, food and chemical sector. This WMC has been established in cooperation with the sewage works of Hammersdale. The driving force is to improve quality of discharges to common sewage works. Each company has to participate in Waste Minimisation Assessments and reports its results and savings. Latest results claim that savings of more than R4 million / year have been achieved and a further R14

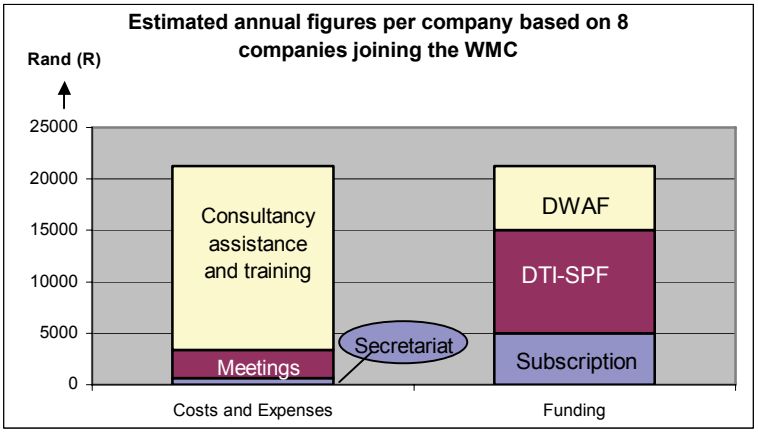
Waste Minimisation Club for larger companies established in the Western Cape

This WMC initiative aims to assist larger companies in the Western Cape in implementing waste minimisation. To do so, each company:

- Participates in a Waste Minimisation Assessment,
- Is willing to implement a programme of waste minimisation and to establish a monitoring programme,
- Is willing to share information and experiences with other club members,
- Attends bi-monthly club meetings.

Costs and Funding

Running a club and arranging regular meetings involve costs and expenses for the WMC. This is covered partly by the subscription fees from the participating companies, and partly by government subsidies (see figure).



The current policy of national and local government provides funding of the majority of the costs and expenses. The Sector Partnership Fund of the Department of Trade and Industry could cover part of the costs and expenses of the project until March 2002. The Department of Water Affairs and Forestry has sectoral funding possibilities as well, that could cover the remaining costs and expenses. A draft budget (see figure) highlights the expenses, costs and funding.

In conclusion

The concept of waste minimisation has proven to be most valuable for products, processes and services within companies, independent of industrial sectors. By means of a Waste Minimisation Club your company has the possibility to benefit from this concept in three ways:

- y having the opportunity to attract external experts for training and consulting, to have access to up-to-date databank and to benefit from a secretary (BECO-ISB) that runs the WMC for only 1/4 of the actual costs,
- By being able to benefit from an increased learning curve for the implementation of waste minimisation, as a result of the possibilities to share experiences and knowledge with other companies,
- By improving the economic and environmental impact of your company in the same time, with most likely minor or no investments (mostly time-investments).

Appendix 5:
Attendance List

This appendix contains an example of the details required on the attendance list at an Awareness Raising, Recruitment and Inaugural meeting.

Email	
Fax	
Phone	
Postal address	
Organisation	
Name	

Appendix 6:
Agenda for an Awareness Raising Meeting

This appendix contains two examples of agendas for an awareness-raising meeting. The first is for the Pietermaritzburg Waste Minimisation Club, and the second for a proposed Club in the Breede Valley, Western Cape.

In both cases, information is provided on waste minimisation, waste minimisation clubs, regulations and industry case studies.

Example 1

IBEE

Industry and Business Environmental Education Forum

(Working Group of the PCCI Environmental Committee)

AGENDA

27 October 2000

10h00	**Introduction to Waste Minimisation Clubs** **Chris Fennemore – Umgeni Water**
10h10	**Environmental Legislation** **Ian Sampson – Deloitte & Touche**
11h00	**Experience with Waste Minimisation Clubs** **Susan Barclay – University of Natal, Durban**
11h30	**Savings from Waste Minimisation** **John Danks – Saayman Danks Electroplating** **Chairman of the Natal Metal Finishing Association**
12h00	**Summary and Closure**
	Refreshments

Example 2

BECO

Institute for Sustainable

Fax Message

To:

Company:

Fax number:

From:

Date: 12 December 2006

Reference:

Subject: WMC Meeting 7th December 2001

Number of pages: 2 (including this page)

Draft Agenda

10.00 - 10.15 am	Welcome, Introduction and Purpose of Meeting	Ann Taylor *Consultant for BECO*
10.15 - 10.45 am	Waste Minimisation and Waste Minimisation Clubs	Bas Kothuis *Managing Director BECO*
10.45 - 11.00 am	Provincial Government perspective on Waste Minimisation	Gottlieb Arendse *Director Pollution and Waste Management, Western Cape Provincial Government*
11.00 - 11.15 am	Department of Water Affairs policy on Water Demand Management	Mr Reinholdt Loots *Deputy Director: Water Conservation Department of Water Affairs and Forestry*
11.15 - 11.30 am	Support from Municipal Government	Mr Cor Van Wageningen *Town Engineer, Robertson*
11.30 - 11.45 am	Break for Refreshments	
11.45 - 12.00	Proposal for the Breede River wineries	Bas Kothuis *Managing Director BECO*
12.00 - 12.20 pm	General Discussion	All
12.20 - 12.30 pm	Closure	Ann Taylor *Consultant for BECO*

Kind regards,

BECO Institute for Sustainable Business

Appendix 7:
SA Environmental Legislation

This appendix contains some selected Internet references for SA environmental legislation that you can use to add to your presentations to encourage companies to reduce waste and reduce their impact on the environment. A number of these new Bills / Acts have clauses in them which encourage waste minimisation and indicate the penalties for a company that refuses to take responsibility for its waste.

See also Section 11 in the Facilitator's Manual.

www.gov.za

A home page that gives an overview of South African government – a good place to start with lots of relevant links.

www.dwaf.gov.za

The Department of Water Affairs and Forestry home page. Look for references to the Water Act.

www.environment.gov.za

The Department of Environment Affairs and Tourism

Look for links to the National Environmental Management Act (NEMA); the Integrated Pollution Control and Waste Management Strategy, and the National Waste Management Strategy.

www.polity.org.za

A useful site that lists all the bills/ acts that have been passed in the last few years in SA. You can search by year or by type.

www.cmc.gov.za

The Cape Metropolitan Council home page. Look for the Internet based waste exchange initiative.

Appendix 8:
Introductory Presentation on Waste Minimisation

The following presentation can be used at both the Awareness Raising meeting and the Recruitment meeting to introduce the concept of waste minimisation and waste minimisation clubs.

Each slide is given with a brief explanation that you can use to expand on the content of the slide.

Examples of previous waste minimisation clubs and their results can be inserted between Slides 12 and 13. A sample presentation of these results is given in **Appendix 9.**

If there is no speaker at this meeting that will present on environmental legislation, then you should also include these aspects in your presentation. Sources of information are given in **Appendix 7**, together with a brief presentation that can be used to highlight some important points.

Title Slide

Waste Minimisation Makes Good Business Sense

Your Name
Your Company

Phone:

Email:

Use this slide to provide prospective members with your contact details. While this slide is up, introduce yourself and your organisation and what you intend to cover during this presentation.

Slide 2

What is Waste Minimisation?

- A systematic approach to reducing the generation of waste at source
- prevent waste from occurring in the first place rather than installing end-of-pipe treatment options

Emphasise the words “at source”. That is the essence of waste minimisation. It does not include off-site recycling or treatment

Slide 3

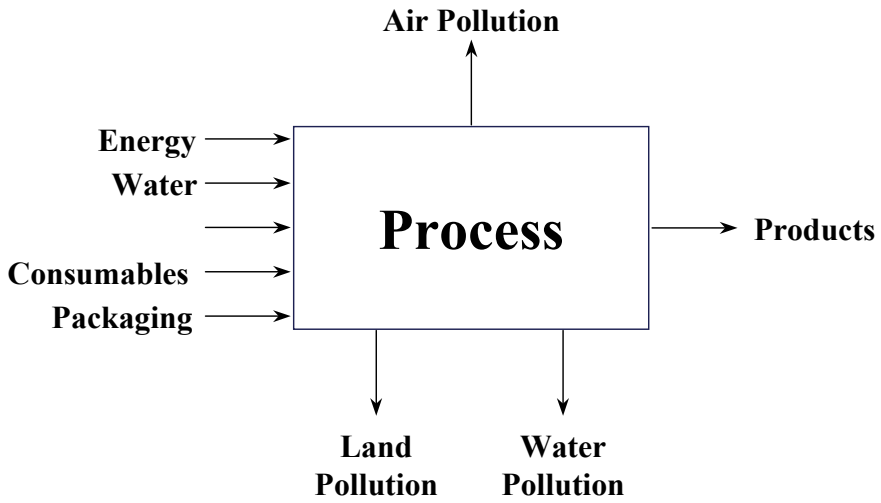
The Scope of Waste Minimisation

- All emissions to land, water or air
- Utilities consumption
- Direct materials used in products or services (raw materials)
- Indirect materials used in operations (packaging, consumables)

Waste Minimisation applies to all inputs and outputs to a process. It is applicable to hazardous and non-hazardous materials, effluent, solid waste and gaseous emissions; water and energy use; raw materials, chemicals and so on. It applies across a company's entire operation and is not only applicable to industry. It is a technique that can be used in offices and at home to reduce costs and wastes.

Slide 4

The Process Model



If one looks at this process model, where the Process is the company's operation / factory. All the inputs come in on the left-hand side – anything that does not come out as a product is waste. This waste can be in the form of waste to land, water or air. The aim of waste minimisation is therefore to maximise the conversion of the inputs to the product by minimising the formation of waste.

Slide 5

What's in it for me?

- Fundamental environmental improvement
- Reduced raw material costs & Reduced (or avoided) cost of waste treatment
- Compliance with legislation / Reduced risk of environmental incidents
- Improved process performance
- Commercial and strategic advantage

Waste Minimisation results in a number of benefits. Not only will the environment improve, but companies will save money due to improved process efficiency. Because processes are being carried out correctly with the minimum of inputs and outputs, savings will be realised in raw materials, utilities and waste. Waste Minimisation also has the added advantage of providing a marketing tool for the emerging *green* market.

Slide 6

Scope to Save

Raw Materials	**1 to 5 %**
Packaging	**10 to 90%**
Consumables	**10 to 30%**
Ancillary materials	**5 to 20%**
Electricity	**5 to 20%**
Water	**20 to 80%**
Effluent	**20 to 80%**
Solid Waste	**10 to 50%**

These figures represent the savings that are possible in a company that is not implementing any source reduction programme. They are applicable to both local and international organisations and are typical of savings realised by other South African companies who are members of waste minimisation clubs.

Slide 7

Approaches to Environmental Improvement

Waste Abatement	Waste Minimisation
• "End of Pipe" based	Process based
• Conversion of waste	Reduce resource inputs
• Dilution of waste	Recycle waste in process
• Adding cost	Reducing cost

Traditional end-of-pipe treatment (or abatement) methods are no longer the manner in which companies wish to deal with their waste. These methods do not reduce waste, they merely convert it from form to another, and involves the costly process of installing and running some form of treatment system. Waste minimisation on the other hand, involves looking at the processes and identifying where waste can be reduced, by reducing resource inputs. On-site reuse and recycling is encouraged to ensure that waste does not leave the site. All of these result in cost savings.

Slide 8

Waste Minimisation Techniques

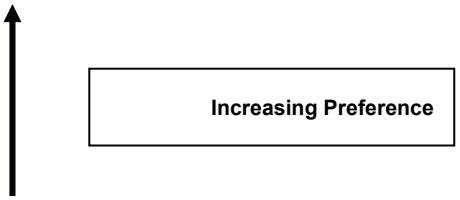
- Source Reduction
  - Good operating practices
  - Technology changes
  - Input material changes
  - Product changes
- Recycling
  - On-site
  - Off-site

Waste Minimisation is achieved through source reduction. These are 5 main areas in which changes can be made to achieve this reduction. Good operating practices (or good housekeeping) is the area where most changes can be made with little or no investment. In previous cases, over 80% of savings came from these types of changes with immediate payback. These include aspects such as metering and monitoring, improved control of process, improved maintenance, and education and training. Technology changes include replacing old equipment with new, process optimisation, automation, and redesign of equipment. Input material changes can include replacing materials with non-toxic alternatives, using renewable raw materials, and using materials that can be recycled in-process. Product changes are more difficult to implement and generally involve undertaking a life cycle assessment such that an informed decision can be made. Changes may include increasing product life, reformulating products to have a different shape and / or shade, and alterations in packaging. Only on-site reuse or recycling is seen as waste minimisation, and involves using the output from one process as either an input to the same process, or as an input to another process.

Slide 9

Hierarchy of Waste Management Practices

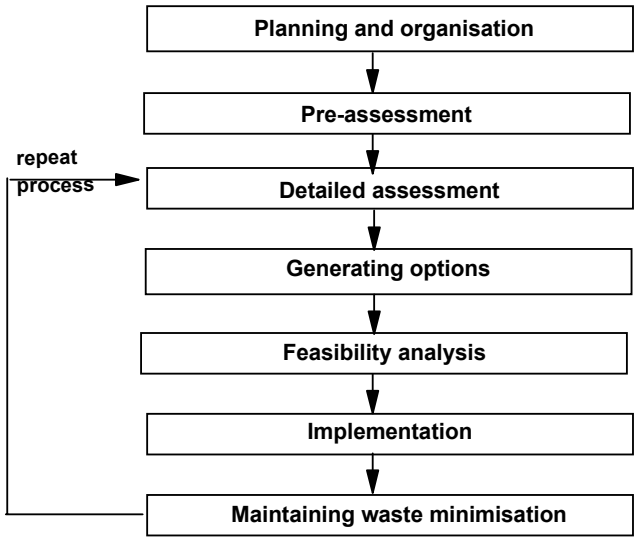
- Elimination
- Reduction
- **Recycle**
- **Treatment**
- Disposal



At the top of the waste management hierarchy is elimination of waste. It is what all companies should strive towards. If the waste cannot be eliminated, then a company must aim to reduce the waste as far as possible. Once this has been achieved, recycle options should be investigated. Treatment and disposal should only be considered after all efforts to minimise the waste produced on-site have been implemented.

Slide 10

How it fits together:



As mentioned, waste minimisation is a systematic approach to reducing waste at source. There is a set procedure for implementing a waste minimisation programme within an organisation, and the main steps are outline above. It is important to remember that waste minimisation is not a once-off activity. It is a continuous process, whereby changes are implemented, results monitored and targets reset. A company should be moving towards continuous improvement. Planning and organisation involves obtaining commitment, setting up teams and identifying the goals of waste minimisation. The assessment phase can be broken into two – the preassessment where data on the overall processes are obtained and the sources of waste identified. Those areas that are the most problematic are then investigated in more detail. Options are then identified for improvement, and the most feasible ones chosen for implementation. A system for monitoring and reviewing the waste minimisation programme must also be sent in place.

Slide 11

What is a Waste Minimisation Club?

- **A group of industries working together to reduce waste and save money**
- Promotes the exchange of experiences in implementing waste minimisation between industries
- Cross sectional / sector specific
- Meet on a regular basis

A waste minimisation club is a group of companies that meet on a regular basis to discuss issues relating to waste minimisation. It provides a forum for the exchange of information, experiences and ideas. These clubs generally consist of between 10 and 15 companies and these members can be either from the same industrial sector (e.g. all metal finishers) or from different sectors (e.g. food, textile etc.), but all within the same geographical area. Regular meetings are held (normally every 2 months) and the members are exposed to one another's progress and problems, and also receive training in waste minimisation techniques.

Slide 12

How is a Club Run?

- Steering Group
  - facilitator; industry; stakeholders
- Project Champions
  - appointed within each company
- Project teams
  - selected by Project Champions
- Outside consultants
  - assist in audits; training

A waste minimisation club generally consists of these basic elements. The steering group refers to the group that meets at the club meetings. This group therefore consists of the facilitator, a representative of each the club members, and any other interested and affected parties that are permitted to attend (e.g. company management, local authority etc.).

The project champion is the person elected by a club member to represent them at the meeting. This champion is responsible for driving the waste minimisation efforts on –site. The champion also forms project teams within the company to assist in data collection and identifying options for improvement.

Outside consultants may be called upon by the Club from time to time to assist in undertaking waste minimisation audits and training.

Slide 13

This Proposed Waste Minimisation Club

Objectives:

- to make industry more profitable
- to reduce pollution from industry
- to encourage communication between the local authority and industry
- to encourage exchange of information and experiences
- to work towards a co-operative agreement with the regulator

Use this slide as a guideline for the objectives of the Club you are proposing to form. Indicate if there is support from the local authorities for this initiative.

Slide 14

Rules of the Club

- commitment to the club
- commitment to reducing waste
- attending all meetings and training sessions
- set targets and making progress
- provide cost of changes and savings
- provide input reduction data

You can use this opportunity to highlight what is expected of the companies who wish to become members. It is important that they understand that this is a two-way commitment. You can also raise the point about constitutions and confidentiality agreements.

Slide 15

Role of the Facilitator

- Arrange meetings
- Notify members
- Arrange venue
- Organise guest speakers
- Assist in site work
- Duplicate notes
- Disseminate results
-

It is also a good idea to discuss what your role is going to be and the services you are going offer – in other words, what are the Club members going to get for their time and money.

Slide 16

Discussion Points for Next Meeting

- Funding
- Management
- Frequency of meetings
- Membership

These are just some of the points that can be raised for discussion at the next meeting (Recruitment) meeting. It provides the potential Club members with some ideas to think about for the next meeting.

Appendix 9:
Presentation on Pilot Waste Minimisation Club Results

This appendix contains slides on the results of previous waste minimisation clubs that can be used at the Awareness Raising and Recruitment meetings to demonstrate the benefits of becoming a club member.

This also highlights the need for Club results to be quantified and recorded such that other Clubs can be built on these success stories.

Title Slide

Benefits of joining a Waste Minimisation Club

Results of other Clubs in South Africa

Your name

Your contact details

Slide 2

Background to Waste Minimisation Clubs in South Africa

- Waste minimisation clubs a successful concept in The Netherlands and United Kingdom
- Could be a possible solution to promoting sustainable industrial development in South Africa
- 3 year project, sponsored by Water Research Commission and European Union Directorate for Energy (Thermie)- 1998 to 2000
- 3 year project, sponsored by Water Research Commission to develop a methodology for initiating and managing waste minimisation clubs (2000 to 2002)

Waste Minimisation Clubs proved to be a successful approach to reducing the environmental impact of industrial activity in the UK and the Netherlands and resulted in substantial financial savings for the companies that participated. It was a concept that was first introduced in the early 1990's and since then, more that 130 clubs have been established in the UK. It was felt that this approach could be a successful one to promote sustainable industrial development in South Africa, resulting in a reduction in the use of natural resources and the pollution of the environment. The Water Research Commission therefore sponsored a 3-year project to establish 2 pilot waste minimisation clubs in the KwaZulu Natal area to determine the successfulness of this approach. This project was run from 1998 to 2000 and was co-funded by the European Union Directorate for Energy (Thermie). A number of new Clubs have since been established in South Africa, and it was recognised that there was a need for some form of Guidelines for those organisations who wished to facilitate new Clubs to assist them in setting up and running Clubs. For this reason, the WRC is sponsoring a project to develop these guidelines and training material and this will run to the end of 2002.

Slide 3

Some Waste Minimisation Clubs in South Africa

Name	Place	Facilitators
KZN Metal Finishing Waste Minimisation Club (closed, but now Association)	Durban	Pollution Research Group, University of Natal
Hammersdale Waste Minimisation Club (closed)	Durban	Pollution Research Group, University of Natal
2nd KZN Metal Finishing Waste Minimisation Club	Durban	KZN Metal Finishing Association
Gauteng Metal Finishing Waste Minimisation Club	Gauteng	Gauteng Metal Finishing Association
Cape Metal Finishing Waste Minimisation Club	Cape Town	Cape Metal Finishing Association (CMFA) + BECO – Institute for Sustainable Business
Waste Minimisation Club for Large Companies in Western Cape	Cape Town	BECO – Institute for Sustainable Business
The Pietermaritzburg Waste Minimisation Club	Pietermaritzburg	University of Natal, Chemical Technology
Nelson Mandela Metropole Metal Finishers Waste Minimisation Club (*)	Port Elizabeth	University of Port Elizabeth, Inst. of Environmental and Coastal management.
Eco-club in Franschhoek (*)	Franschhoek	Enviroservices, University of Stellenbosch
City of Cape Town Waste Minimisation Club for the Plastics Industry	Cape Town	BECO – Institute for Sustainable Business
Gauteng Waste Minimisation Club for the Plastics Industry	Gauteng	BECO – Institute for Sustainable Business
City of Cape Town Waste Minimisation Club for the Convention Centre	Cape Town	BECO – Institute for Sustainable Business
City of Cape Town Waste Minimisation Club for Blue Route Shopping Centre	Cape Town	BECO – Institute for Sustainable Business

Slide 4:

Some Waste Minimisation Clubs in South Africa (cont)

Name	Place	Facilitators
City of Cape Town Waste Minimisation Club for the Meat processing industry	Cape Town	BECO – Institute for Sustainable Business
City of Cape Town Waste Minimisation Club for the Car Repair industry	Cape Town	BECO – Institute for Sustainable Business
City of Cape Town Waste Minimisation Club for Office buildings	Cape Town	BECO – Institute for Sustainable Business
City of Cape Town Waste Minimisation Club for the Atlantis industrial area	Cape Town	BECO – Institute for Sustainable Business
Waste Minimisation Club for Wine farms in the Breede river valley	Robertson	BECO – Institute for Sustainable Business
Waste Minimisation Club for the food industry Cape Metropolitan Area	Cape Town	BECO – Institute for Sustainable Business
City of Cape Town Waste Minimisation Club for the plastic industry	Cape Town	BECO – Institute for Sustainable Business
Waste Minimisation Club for the Gauteng plastic industry	Gauteng	BECO – Institute for Sustainable Business
Waste Minimisation Club for the Food and beverage Industry in the Boland area	Boland	BECO – Institute for Sustainable Business
Waste Minimisation Club for medium and large companies in Paarl	Paarl	BECO – Institute for Sustainable Business
Waste Minimisation Club for suppliers to a large automotive manufacturer	National	BECO – Institute for Sustainable Business
In house Waste Minimisation Club at the Red Cross Children's hospital	Cape Town	Fairest Cape
Sasol in-house	National	Sasol

Slides 3 and 4 list the Waste Minimisation Clubs that are either closed, running or planned for South Africa as of January 2002. You should update this list depending on when you are planning to use this presentation. The facilitators of the club are also provided.

Slide 5:

Summary of Results from some Waste Minimisation Clubs

Club	No. of members	Water & Effluent savings kl / y	Energy savings MWh / y	Financial Savings R / y
Pilot Metal Finishing – Durban	16	169 500	16 000	2 200 000
Pilot Hammarsdale – KZN	8	1 840 000	49 700	10 800 000
Large Companies – W. Cape	10	Not calculated	Not calculated	7 000 000
[1]Project Catalyst - UK	11	3 700 000	Not known	13 800 000

[1] **Based on the exchange in 1994 of R6 to one pound sterling.**

This slide summarises the environmental and financial savings made by 3 of the Clubs in South Africa and one of the Clubs in the UK. The next few slides will provide more detail on the results from the Pilot Clubs.

Slide 6

Pilot Minimisation Clubs

- Metal Finishing Club
  - established in June 1998
  - 29 members, 16 active
  - savings in excess of R2 million / year
  - closed December 2000
  - now an association

- Hammarsdale Club
  - established November 1998
  - 6 textile companies, a chemical manufacturer and a chicken abattoir
  - savings in excess of R10 million / year
  - closed December 2000
  - waste minimisation activities continue under an industrial conservancy

The Metal Finishing Club was established in June 1998 in response to new discharge regulations being set by the Durban Metro for metals to sewer. The companies were encouraged to investigate reduction at source. 29 companies joined, but only 16 were actively involved and achieved results. Over half of these companies had less than 50 employees and in total, over R2 million / y was saved.

The recruitment for the Hammarsdale Club started in November 1998, with the first Club meeting held in March 1999. It was initially meant to focus on the textile companies in the area, but the existing industrial conservancy asked that it be opened to all companies. In total, over R10 million /y savings were made.

Slide 7

Metal Finishing Club Savings

Company	Type	Employ No.	Water R/y	Chem R/y	Metals R/y	Energy R/y	Effluent R/y	Treatment R/y	Other R/y	Total
MF9	man	300	25	970			6			1001
MF1	job	10	5720			5060	1560			12340
MF2	man	800	127160			110000	34695			271855
MF4	job	10	5560	110000		88000	1515			205075
MF5	man	80	5180	0		5500	1410	24750		36840
MF6	man	26	11000	55000			3000			69000
MF8	man	180		777600	168630	78870		99880	30910	1155890
MF10	man	350	10970				4050	10260		25280
MF12	job	30	17490	30800	12100		480	33000	16860	110730
MF16	job	18	955	88000			260			89215
MF17	job	7	760				210			970
MF22	job	50	60400	68400		33000	33830			195630
MF24	job	9	550	220			150			920
MF26	job	6		550						550
MF27	job	37	4770							4770
MF28	job	14	640	13200			170			14010
	Totals		**251180**	**1144740**	**180730**	**320430**	**81336**	**167890**	**47770**	**2194076**
	% of total		11	52	8	15	4	8	2	

This table summarises the financial savings made by the Metal Finishing Club members. As you can see, they vary from a few hundred to over a million rand per year. In most cases these savings reflect between 2 and 5% of the companies annual turnover. Most of these savings were achieved with little of no investment.

Job = job shop where the company accepts any items for finishing

Man = manufacturer, where the company manufactures a product and the finishing process is one part of the production line.

Slide 8

Hammarsdale Club Savings

Company	Water R/y	Energy R/y	Consumables R/y	Raw Material R/y	Effluent R/y	Other R/y	*T*
COMP1	5 460	1 151 700		109 620	171 300	39 600	1 477 680
COMP4	212 400	89 700	272 000	113 500	212 400		900 000
COMP6	468 100			1 000 000	431 400	1 200 000	3 099 500
COMP3	1 655 800	1 648 000			1 879 000		5 182 800
COMP2		143 000					143 000
Totals	**2 341 760**	**3 032 400**	**272 000**	**1 223 120**	**2 694 100**	**1 239 600**	**10 802 980**
% of Total	22	28	3	11	25	11	

Note: Other covers those areas where combined savings in water, chemicals and energy have been made and cannot be quantified individually

This slide summarises the financial savings made by the Hammarsdale Club members. These savings reflect between 1 and 2% of the company's annual turnover.

Slide 9

Barriers and Drivers

Barriers	Drivers
• Lack of Time	Savings
• Lack of Resources	New regulations
• Lack of Finance	

These are the typical barriers and drivers experienced in the Clubs. The biggest barrier is a lack of time on the part of the project champion to get the programme going in the company. There is a lack of personal resources as well as a lack of data to enable audits to be carried out successfully. These barriers can be overcome if there is commitment from management and from all team members.

A lack of finance is more of a perceived barrier as most companies think that waste minimisation is going to cost them money. The initial savings are however achieved at little or no cost, and these savings could be used to offset the costs of future investments. Finance may become a barrier at a later stage when the low cost actions have been completed.

The main drivers for the companies to implement waste minimisation were the savings that could be made and the pressure from the local authorities to reduce waste at source, or be penalised for their discharge.

Slide 10

Social Interactions

- Forum for exchange of information and ideas
- support and commiseration
- motivation and inspiration

These are some of the other benefits to being a club member. By being part of a club, companies get to meet on a regular basis, share ideas, experiences and success, and get support from one another. Often, one idea that works in one company, may be suitable for another.

Slide 11

Summary and Conclusions

- **Waste Minimisation Clubs assist in reducing waste at source**
- **Allows for interaction and exchange of ideas**
- **Substantial financial savings can be achieved**

Finish off the presentation by summarising the important benefits of being part of a waste minimisation club. Supply your contact details and inform prospective members of the handouts and reply forms that can take with them at the end of the meeting.

Appendix 10:
Recruitment Invitation and Agenda

This appendix contains some examples of invitations and agendas for various Waste Minimisation Clubs in South Africa.

Example 1 is an invitation and agenda that was used for the Hammarsdale Waste Minimisation Club.

Example 2 is an agenda that was used for the Pilot Metal Finishing Waste Minimisation Club.

Both these can be altered to suit your particular needs when recruiting companies.

Example 1

Date:

Dear (Managing Director)

INVITATION TO RECRUITMENT MEETING AND TRAINING IN WASTE MINIMISATION

The Pollution Research Group (PRG), together with March Consulting from the United Kingdom and COWI from Denmark, are involved in a project to promote the establishment of three waste minimisation clubs within South Africa. Funding for this project comes from the South African Water Research Commission and the European Union.

Waste minimisation is defined as a systematic approach to reduce waste at source. This results in not only a reduction in environmental impact, but also substantial financial savings for industry. Waste minimisation clubs are a group of industries, from either the same sector or the same locality (or both), who meet on a regular basis to exchange experiences and ideas in waste minimisation. A number of these clubs have been established in the United Kingdom with all industries involved benefiting both environmentally and financially.

The first club in South Africa was established in June 1998 in the metal finishing sector in the Durban Metropolitan Region. There are 29 members in this club, most of which have less than 50 employees. Savings reported to date are encouraging, with one industry reducing their water use by 75% and another achieving savings of R200 000 per year with a payback period of approximately a month. A second waste minimisation club is currently being established in the Hammarsdale region, within the existing Hammarsdale Industrial Conservancy. An introductory meeting was held with many of the textile companies in November last year and a similar meeting on Wednesday 3rd March at the HIC meeting to invite other companies in the area to join. Unfortunately, many companies were not present at this meeting and as a result, the structure and management of the club could not be finalised.

In order to initiate the Hammarsdale Club, the PRG and March Consulting will be visiting a number of factories in the region and running practical courses on Waste Minimisation (9 March), and Compressed Air and Steam utilisation (10 March), to train club members in reducing waste and operating more efficiently. A wrap-up meeting will be held on Friday 12 March, to summarise the findings of the visits and to finalise the club members and management.

You are all invited and encouraged to become club members and attend these courses and especially the wrap-up meeting. Details are given on the following page.

Venue : Buckman Laboratories Training Room

COURSE TIMETABLE

Tuesday, 9 March

9h00 - 12h00 - Cleaner Production Course covering :

- Sustainable development
- What is Cleaner Production and how is it achieved
- Tools of Cleaner Production (waste minimisaiton; life cycle assessment etc.)

12h30 - 4h00 - Fun Factory Waste Minimisation Exercise

- aimed more at non-industrialists
- hands-on exercise using play-dough
- teaches production and process constraints in waste minimisation
- shows importance of waste minimisation

Wednesday, 10 March

9h00 - 12h00 - Compressed Air Course

- basic principles
- compressor types and controls
- air treatment and distribution

12h30 - 4h00 - Steam Distribution and Use

- Basic principles
- heat balance and steam components
- steam distribution
- steam utilisation
- steam trapping
- condensate and flash steam recovery

Please note that the courses on the Wednesday will require the use of a calculator

WRAP - UP MEETING

Friday 12 March at 9h00

- Will summarise the results of the visits to date and set the programme for the Hammarsdale Club.
- Include a waste minimisaiton training module to encourage discussion between club members

RSVP : Meena (031 - 260 3375) or Namo (031 - 260 3241).

We look forward to seeing you there.

Best regards,

Susan Barclay

Example 2

Waste Minimisation Club for the Metal Finishing Industry

Recruitment Meeting

Aim : *To describe in further detail the concept of waste minimisation clubs, the advantages to the metal finishing industry and the procedure for establishing a club in the Durban Metro region; and to have discussions with, and obtain feedback from, the interested companies.*

Date : ***Monday, 29 June 1998***
Time : ***8.30 for 9.00 am***
Venue : ***City Health Auditorium, Old Fort Place, Durban***
RSVP : ***Kim Tifflin, Durban Metro; Phone : (031) 302 4685; Fax : (031) 302 4747***

If you require further information please contact Susan Barclay at the Pollution Research Group, University of Natal; Phone : (031) 260 1490, or Fax : (031) 260 1118

AGENDA

8h30 - 9h00 **Tea**

9h00 - 9h10 **Welcome**

9h10 - 9h20 **Introduction to Waste Minimisation**

9h20 - 9h45 **Background to the Waste Minimisation Club Concept**

9h45 - 10h15 **How is this club going to work ?**

10h15 - 10h45 **Discussions and Comments**

10h45 - 11h15 **Tea**

11h15 - 11h30 **Summary and procedure for follow-up meetings**

11h30 - 12h00 **Questions and Closing**

Thanks to Durban Metro for distributing this announcement and facilitating the meeting.

Appendix 11:
Inaugural Meeting Invitation and Agenda

This appendix contains an example of an invitation to an Inaugural meeting of a waste minimisation Club and the associated agenda.

The invitation gives some background on waste minimisation and waste minimisation and outlines the capabilities of the facilitators. The agenda highlights success stories and allows for discussions on the manner in which this particular club is to be run.

Waste Minimisation Clubs
Working Together

20th January 2001

Dear Club Member,

INVITATION TO THE INAUGURAL MEETING OF THE PIETERMARITZBURG WASTE MINIMISATION CLUB

Date: 7th February 2001

Time: 16h00

Venue: Chemistry Building, University of Natal, Pietermaritzburg

Waste minimisation is a relatively new concept in South Africa and is defined as the application of a systematic approach to reducing the generation of wastes (gaseous, solid and liquid) at source. A waste minimisation club consists of a group of companies working together to reduce waste. This club enables companies top receive training and to exchange ideas, information and experiences in waste minimisation.

The club will offer and opportunity to address many financial and environmental issues facing local industry. For example, the National government is in the process of tightening the environmental legislation, which deals with the costing of waste discharge systems. This means that waste is going to start costing more – only one of the reasons to start minimising it.

Waste minimisation provides further benefits to the company: improved occupational health and safety performance, and financial savings which include raw material costs and effluent treatment costs. Two waste minimisation clubs have already been established by the Pollution Research Group on the Durban campus – one in the Metal Finishing Industry (Durban) and one largely based on the Textile Industry (Hammarsdale). Both these clubs have helped companies involved to make large financial and environmental savings.

The Pietermaritzburg Waste Minimisation Club will be run y the Chemical Technology Section here in Pietermaritzburg. The department has a qualified occupational hygienist, analytical chemist, environmental chemist and a chemical engineer. Students will be available to assist companies with gathering information to help with the audits. The club will be run at cost.

It is our pleasure to invite you to join this Waste Minimisation Club. If you have any further questions, please do not hesitate to contact us.

We look forward to seeing you at our inaugural meeting on the 7th February 2001.

Yours sincerely

Club Facilitator.

INAUGURAL MEETING OF THE PIETERMARITZBURG WASTE MINIMISATION CLUB

7 FEBRUARY 2001

Agenda

16h00	Welcome
16h10	Financial and Environmental Savings Achieved through Waste Minimisation Clubs Chris Buckley – Pollution Research Group
16h30	Short video on Waste Minimisation
16h50	Administrative arrangements: - future meetings - training - Club costs - Support from the Chemical Technology Group
17h30	Braai and Refreshments

Appendix 12:
Agendas for Other Club Meetings

This appendix contains some examples of agendas for Club meetings in South Africa.

Example 1: Fourth club meeting for the Pilot Metal Finishing Waste Minimisation Club

Example 2: Third meeting of the Durban Metal Finishing Waste Minimisation Club

Example 3: Meeting of the Waste Minimisation Club for Large Industries in the Western Cape

Example 4: Meeting of the Pietermaritzburg Waste Minimisation Club

As can be seen, in some cases training was provided on an aspect of waste minimisation and in others, a guest speaker was asked to address the meeting on a subject of interest the to the Club members.

Where meetings were held at a Club member's site, the meeting was concluded with a tour of the factory.

Example 1

Waste Minimisation Club for the Metal Finishing Industry
Agenda for the Fourth Club Meeting

Date : Tuesday, 2 March 1999
Time : 8.30 for 9.00 am
Venue : Innovation Center, University of Natal, Durban, Room 214
RSVP : Meena (260 3375) or Susan (260 1490) by Monday 1 March 1999

Agenda

8.30 - 9.00	Tea
9.00 - 9.10	Welcome and matters arising from the minutes Feedback from the Pollution Research Group
9.10 - 9.30	Monitoring and Targeting - UK Experience David Mercer - March Consulting
9.30 - 10.30	Environmental Legislation and Liability Ian Sampson - Van Onselen O'Connell
10.30 - 10.45	Tea
10.45 – 12.15	Feedback from Industry
12.15 - 12.30	Summary and closure

Example 2

Waste Minimisation Clubs

Working Together

METAL FINISHING WASTE MINIMISATION CLUB

Third Meeting

Wednesday 1st November

AGENDA

09:00	**Welcome & Review**	Dave Mercer
09:05	**Industry Feedback Session**	All
09:30	**The True Cost of Waste**	Dave Mercer
09:40	**Exercise*: Calculating True CoW***	All
10:00	Coffee	
10:10	**Data Analysis Techniques 1: Mass Balancing**	Dave Mercer
10:20	**Exercise: *Identification of Opportunities***	All
10:55	**Next steps**	Dave Mercer
11:00	**Arrangements for next meeting & Close**	

NB: Please bring pen/pencil, paper, CALCULATOR & your feedback presentation.

Example 3

AGENDA

General Meeting
13h00-17h00
SANS Fibres, Sacks Circle, Bellville

Wednesday 23 May 2001

13:00 – 13:15	Opening & Welcome: Brad Page of SANS Fibres
13:15 – 13:30	Announcements and information from the secretariat regarding state of membership, budget and funding of the Waste Minimisation Club
13:30 – 14:30	Exchange of experiences: Brief update from each member regarding progress with Pre-assessment phase of waste minimization program (and/or other waste minimization or environmental management experiences)
14:30 – 15:15	*Guest Speaker:*

Peter Willis, Executive Director of The Natural Step South Africa

15:15 – 15:55 *Training Presentation* by Bas Kothuis

"The Assessment Phase of a Waste Minimisation Assessment"

15:55 – 16:00	Subjects for next meeting, and closure.
16:00 – 17:00	Tea and coffee, followed by a tour of SANS Fibres plant.

Example 4

AGENDA

31 OCTOBER 2001

16:00 WELCOME

16:05 REVIEW OF THE WASTE MINIMISATION PROCESS

16:10 Using Monitoring and Targeting to Identify Waste Minimisation Opportunities

16:35 WORKSHOP 2: Target Setting

17:10 TEA

17:25 Using Statistical Process Control to Identify Waste Minimisation Opportunities

17:50 ARRANGEMENTS FOR NEXT MEETING

18:00 CLOSURE OF MEETING

Appendix 13:
Barriers and Drivers

This appendix contains tables listing the barriers to (**Table 1**), and drivers for (**Table 2**), waste minimisation as identified at the Recruitment meeting for the Pilot Metal Finishing Waste Minimisation Club.

As can be seen, this meeting was attended by industry, service providers (e.g. chemical suppliers), regulators (local authorities) and other organisations such as research bodies. In order to differentiate between these different groups, they were provided with different coloured stickers. In this way, the barriers and drivers for each group could be compared.

Each delegate was given three votes for both barriers and drivers. Some delegates did not use all their votes, which accounts for the discrepancies between total votes.

As can be seen from **Table 1**, the greatest barriers to waste minimisation for the companies present were a lack of finance, information, and technical knowledge; unclear legislation and operational constraints. It was interesting to note that while the industry as a whole did not feel that they were resistant to change, the regulators saw this as the main reason for waste minimisation not being implemented. In addition, lack of time was not considered a barrier, although later it became evident that this is one of the greatest problems facing companies in implementing a waste minimisation programme.

The main drivers identified by the companies were the savings that could be made, an improved environmental performance and more stringent legislation. The ISO 14000 environmental management requirements also received a fairly high vote. It must be noted that there are twice as many barriers listed to drivers, which accounts for the different intensity of the votes.

Table 1: Barriers to Waste Minimisation

BARRIER	NUMBER OF VOTES				
	INDUSTRY (GREEN)	SERVICE PROVIDER (ORANGE)	REGULATOR (YELLOW)	OTHER (BLUE)	TOTAL
Lack of Technical Knowledge	17	3	6	0	**26**
Lack of Finance	21	0	0	0	**21**
Unclear Legislation	11	1	3	0	**15**
Lack of Information	14	0	0	0	**14**
Operational Constraints	12	0	0	0	**12**
Resistance to change	1	0	9	1	**11**
Lack of Human Resources	4	1	4	1	**10**
Production Pressure	9	1	0	0	**10**
Low Business Profitability	6	1	0	0	**7**
Lack of Enforcement of Legislation	1	2	1	0	**4**
Lack of Outside Pressure	0	0	3	0	**3**
Low Business Confidence	0	1	1	0	**2**
Perceived as high risk	1	0	1	0	**2**
Disbelief of Payback Periods	1	0	0	0	**1**
Lack of Time	1	0	0	0	**1**
Lack of Awareness of CP	0	0	0	0	**0**

Table 2: Drivers for Waste Minimisation

DRIVER	*NUMBER OF VOTES*				
	INDUSTRY (GREEN)	SERVICE PROVIDER (ORANGE)	REGULATOR (YELLOW)	OTHER (BLUE)	TOTAL
Improved Environmental Performance	24	5	17	1	**47**
Savings	23	1	8	1	**32**
More Stringent Legislation	20	6	2	0	**28**
ISO 14000	12	1	1	0	**14**
Pressure from Customers	7	1	2	0	**10**
Improved Image	4	0	4	1	**9**
Improved Plant Utilisation	1	2	0	0	**3**

Appendix 14:
Opportunity Data Sheets

It is important for the Club members to keep track of the waste minimisation options identified within their companies. This can be done through the use of Opportunity Data Worksheets. One set of worksheets should be completed per option that is identified. These can then be filed for future reference. If an option is not feasible at present, it may become feasible at a later date and these worksheets can be used to assist in prioritising action.

Alternatively, a club member may use the structure of these worksheets to develop their own database on computer where they can store all ideas.

These worksheets have been taken from the following publication:

Environmental Technology Best Practice Programme (1998) Waste Minimisation Clubs: Setting them up for Success. Good Practice Guide **GG122**, Envirowise, UK.

Items have been entered in these tables under the column **materials** for guidance only. The company can change these to reflect their own input and output details.

Waste Minimisation Opportunity Data Worksheet

By:	Date:	Revision:
Site:	Option No:	Page No:
Title:		
Description:		

Assessment of Savings:

Current annual consumption	
Per site/dept/plant/line?	
Unit of measure	
Unit cost	
Annual saving	
Saving as % of current use	
Gross Annual cost saving (A)	
Capital Cost (B)	
Annual operating Cost (C)	
Net annual cost saving D = (A - C)	
Payback (B / D)	

Is Saving:	**Yes / no / don't know**
Measured?	
Estimated?	
Price related?	
Capacity increase?	
Does savings give:	**Yes / no / don't know**
Improved service?	
Improved quality?	
Environmental benefits?	
Other criteria (list):	

Quantify Input Savings

Materials	Current usage	Saving	Units	Saving Value (Rands)
Consumables				
Paper and Packaging				
Raw materials				
Ancillary materials				

Operating Costs	Current usage	Saving	Units	Saving value (Rands)
Fossil Fuel				
Water				
Electricity				
Gas				

Quantifying Output Savings

Materials	Current usage	Saving	Units	Saving Value (Rands)
Off site disposal				
Liquid effluent				
Air emissions				
Degraded product				

Operating Costs	Current usage	Saving	Units	Saving value (Rands)

Timing	X
Implemented	
0 to 6 months	
7 to 12 months	
1 to 2 years	
2 to 3 years	
Never	

Status Now	X
Implemented	
Feasible	
Not feasible	
Study underway	
Study not started	

Category	X
Product modification	
Input change	
Technology change	
Procedural change	
Good housekeeping	
On-site reuse / recycle	

Notes / comments / other benefits

Appendix 15:
Confidentiality Agreement

This appendix contains an example of a confidentiality agreement that can be signed with those member companies who are nervous of providing information to you that they consider to be of a confidential nature.

CONFIDENTIALITY AGREEMENT

This Agreement dated and effective **(Date)** is entered into by and between:

*(**Company Name**)*

having its principal place of business at (company address)

(hereinafter the "Disclosing Party")

and

Your name

acting on behalf of (your company)

having its principal place of business at (company address)

(hereinafter the "Receiving Party").

WHEREAS

The Parties intend to enter into discussions for the purpose of pursuing waste minimisation (the "Subject"). In the course of such discussions it may be necessary for the Disclosing Party to provide the Receiving Party with confidential business and technical information relating to the Disclosing Party's business. The Disclosing Party is willing, in accordance with the terms and conditions of this Agreement, to disclose to the Receiving Party such information on a non-exclusive basis and in confidence, either directly or indirectly.

IT IS HEREBY AGREED as follows:

1 **Definitions** For the purposes of this Agreement:

1.1 "Confidential Information" shall mean any of the Disclosing Party's information of a confidential nature embodied in data, technical knowledge, specifications, chemical make-up, materials and/or other communications, in tangible or non-tangible form, relating to or useful in connection with the design, construction or operation of the facilities and/or feedstock and/or products and/or business of the Disclosing Party (a) disclosed or provided by the Disclosing Party to the Receiving Party; or, (b) that may be learned, acquired or derived by the Receiving Party during any examination of the said information or during any negotiation or discussions concerning the Subject;

1.2 "Representatives" shall mean employees, officers and directors.

2 **Disclosure and Confidentiality Arrangements**

2.1 Disclosure The Disclosing Party shall disclose so much of its Confidential Information to the Receiving Party as the Disclosing Party deems appropriate in the circumstances.

2.2 **Undertakings** In consideration of any Confidential Information received, learned, acquired or derived pursuant to this Agreement, the Receiving Party undertakes to treat the Confidential Information as strictly confidential, not to divulge to any third party or sell, trade, publish, reproduce or reverse engineer any of the Confidential Information and, not to put in use for any purpose unrelated to the Subject, in any manner, any Confidential Information without the Disclosing Party's prior written consent, except as provided by the exclusions specified in Clause 2.3 below.

2.3 **Exclusions** Confidential Information shall not include information that the Receiving Party can conclusively establish:

2.3.1 at the time of disclosure, is, or, after disclosure, becomes generally known or available to the public through no act or failure to act by the Receiving Party;

2.3.2 was known to it or was possessed by it without restriction prior to the disclosure by the Disclosing Party;

2.3.3 was rightfully acquired and free from restrictions from a third party having an unrestricted right to disclose the same.

Specific Confidential Information shall not be deemed to be within any of these exclusions merely because it is embraced by more general published or available information. In addition, any combination of features shall not be deemed to be within the exclusions merely because individual features are within the exclusions, but only if the combination itself and its principle of operation are within the exclusions.

2.4 **Access** The Receiving Party shall restrict access to the Confidential Information only to a limited number of its Representatives (a) who are directly concerned in the Receiving Party's appraisal of the Subject or in any associated negotiations, (b) whose knowledge of the Confidential Information is essential for such appraisal or negotiations, and (c) who are under written obligation of sufficient scope to obligate them to maintain the confidentiality of confidential information of third parties in the Receiving Party's possession. The Receiving Party shall be responsible for any non-compliance by any Representative with the terms and conditions of this Agreement.

3 **Rights and Procedural Arrangements**

3.1 **Rights** Neither this Agreement nor any Confidential Information transmitted in accordance herewith shall be construed to grant any rights in or licenses to the Confidential Information, to the Receiving Party.

3.2 **Return** All rights to the Confidential Information shall remain vested in the Disclosing Party and the Disclosing Party may demand the return thereof at any time upon giving written notice to the Receiving Party. Within 30 days of receipt of such notice, the Receiving Party shall return all of the original Confidential Information and shall destroy all copies and reproductions (including in electronic form) in its possession and in the possession of its Representatives to whom it was disclosed pursuant to this Agreement. The Receiving Party may however retain one (1) copy of the Confidential Information in its confidential legal files for the sole purpose of identifying and maintaining its obligations under this Agreement.

3.3 **Duration** The term of this Agreement during which the disclosure of Confidential Information is covered by the terms hereof shall commence on the date set forth above and remain in force for three (3) years. The Receiving Party shall continue to be bound by the obligations of confidentiality and non-use set forth herein for a period of ten (10) years from the date of termination of this Agreement.

3.4 **Consequences** The Parties agree that any use of Confidential Information shall be solely at the Receiving Party's own cost, risk and expense.

4 **Miscellaneous**

4.1 **Law** This Agreement shall be governed by and interpreted in accordance with the laws of South Africa.

4.2 **Disputes** In the event of any dispute arising out of or relating to this Agreement, the Parties will attempt to reach an amicable settlement of their differences. Failing such settlement the dispute shall be referred to arbitration and settled by arbitration according to the rules then in effect of the Arbitration Foundation of Southern Africa. Such arbitration shall be held in Johannesburg, and conducted in the English language before one arbitrator appointed in accordance with the said rules. The arbitration will be governed by the substantive law chosen by the Parties elsewhere in this Agreement and any award will be final and not subject to appeal. This agreement to arbitrate shall be enforceable in, and judgement upon any award may be entered in any court of any country having appropriate jurisdiction. A dispute shall be deemed to have arisen when either Party notifies the other Party in writing to that effect. These provisions shall not prevent either Party to approach any court or other judicial forum in any country having appropriate jurisdiction to obtain timely injunctive or other relief in cases of urgency.

4.3 Entire Agreement This Agreement comprises the entire agreement between the Parties concerning the Subject and no representations, warranties or negotiations between the Parties concerning the Subject shall have any legal effect whatsoever unless contained in this Agreement.

4.4 Variations No amendments, changes or modifications to this Agreement shall be valid except if the same are in writing and signed by a duly authorised representative of each of the Parties.

IN WITNESS WHEREOF, the undersigned have executed this Agreement as of the date first written above.

SIGNED at _____ on this _____.

For and on behalf of ***(Company Name)***

Signature: _____

Name: _____

Designation: _____

SIGNED at _____ on this _____.

on behalf of (***your name / company***)

Signature: _____

Name: _____

Designation: _____

Appendix 16:
Questionnaire for obtaining Qualitative Information

The questionnaire included in the Appendix was used to assess the success of the Pilot Metal Finishing Waste Minimisation Club in Durban.

The first 5 questions aimed at determining whether the Club members had grasped the concepts of waste minimisation or if they still failed to differentiate between source reduction and end-of-pipe treatment.

The remaining questions covered aspects such as:

- Motives and reasons for joining the club
- First impressions of the club idea
- Views on the club today
- Relationship to the other platers
- Views on the usefulness of the material they have received and the presentations given at the meetings
- Reasons for not attending meetings
- Benefits from attending the club
- Barriers experienced in implementing waste minimisation
- Relationship with the Durban Metro
- General environmental attitude
- Relationship with their workers, and
- Views on the usefulness of the students assistance and report

This type of questionnaire is useful for obtaining feedback on various issues related to the operation of the Club.

As can be seen, the questions were kept simple and the members were not required to write answers – they were obtained through a scoring system.

Which of the following actions can be considered to be waste minimisation?	**1 – yes; 2 – no 3 – debatable**		
	1	2	3
1. A company installs an extra tank after the plating bath. Plated articles are dipped into this, prior to rinsing. The solution in this tank is then used to top up the plating bath. Is this 'waste minimisation'?	□	□	□
2. A company invests in a state-of-the-art effluent treatment plant. This reduces the amount of metals discharged to drain below regulatory requirements. Is this 'waste minimisation'?	□	□	□
3. A company modifies the jigs to enable better orientation of the articles. This improves the drip-off. Is this 'waste minimisation'?	□	□	□
4. A company installs a large capacity effluent holding tank. High metal content baths are discharged to this tank together with discarded rinse baths. This results in dilution of the metals before discharge to sewer. Is this 'waste minimisation'?	□	□	□
5. A company trains two employees to monitor and record the water use in their sections on a daily basis. They must report and explain variations in the water usage. Is this 'waste minimisation'?	□	□	□

A number of short statements are presented below. They are based on interviews and other sources. Read each statement and decide if you: agree or mostly agree; mostly disagree or disagree with that statement. A "don't know" option is also provided.	1 -agree 2- mostly agree 3- mostly disagree 4- disagree 5 -don't know				
	1	2	3	4	5
Motives for joining the Waste Minimisation Club					
6. The closure of the land fill site (as a consequence of the land slide) was the primary reason for me to join the club	□	□	□	□	□
7. The Durban Metro's new proposed limits for effluent discharge was the primary reason for me to join the club	□	□	□	□	□
8. Reducing my company's pollution was the primary reason for me to join the club	□	□	□	□	□
The other platers					
9. Before the joining the club: I had a fairly good idea of who the other platers were, but I never spoke to them	□	□	□	□	□
10. The metal finishers must unite in order to stand as a unified body	□	□	□	□	□
11. The metal finishers should form some type of forum	□	□	□	□	□
12. I am willing to share my experiences in waste minimisation	□	□	□	□	□
13. I don't like the idea of all club members coming to my site	□	□	□	□	□
14. I am willing to let non-competitors visit my site	□	□	□	□	□

A number of short statements are presented below. They are based on interviews and other sources. Read each statement and decide if you: agree or mostly agree; mostly disagree or disagree with that statement. A "don't know" option is also provided..	1 -agree 2- mostly agree 3- mostly disagree 4- disagree 5 -don't know				
	1	2	3	4	5
When you first heard of the club idea, what did you think?					
15. It would probably be a complete waste of time	□	□	□	□	□
16. I might learn a few new plating techniques	□	□	□	□	□
17. Others platers would scavenge my professional knowledge	□	□	□	□	□
18. Academics cannot provide much useful knowledge for a practical plater like me	□	□	□	□	□
19. I was already running an efficient business, there would not be any major savings for me to gain	□	□	□	□	□
20. I had to be careful so that sensitive commercial info would not be disclosed to competitors	□	□	□	□	□
Why did you join the Waste Minimisation Club?					
21. The Metro was promoting it – what did I have to lose?	□	□	□	□	□
22. I joined the club mainly because I was curious	□	□	□	□	□
23. I joined the club to win time and delay the new proposal from the Metro	□	□	□	□	□
24. I joined the club to stand in a better (Metro) light compared to companies that did not enter	□	□	□	□	□
25. I joined because I saw an opportunity to negotiate relaxed conditions with the Metro	□	□	□	□	□
26. I was not too busy at that time, if business suddenly caught up I would just drop the club	□	□	□	□	□
27. I joined the club because I didn't know what waste minimisation was and wanted to learn about it.	□	□	□	□	□
28. I joined the club because I thought it would help save me money	□	□	□	□	□
What do you think of the Waste Minimisation Club today?					
29. Some of it has been really interesting	□	□	□	□	□
30. Some of it has been a complete waste of time for me	□	□	□	□	□
31. I got some very practical and useful specific advice (I saw a really good idea and went back to my company and copied it)	□	□	□	□	□
32. It has mostly served as a source of inspiration - the improvements I have made are my own ideas	□	□	□	□	□
33. I am now giving more thought of the pollution that my firm is causing	□	□	□	□	□
34. The major role of the club has been as a means (facilitator) of communication with the Metro	□	□	□	□	□
35. I would like to see it continue, and would contribute towards someone managing and running the club	□	□	□	□	□
36. I have made some changes but I don't think that I can improve much further	□	□	□	□	□

A number of short statements are presented below. They are based on interviews and other sources. Read each statement and decide if you: agree or mostly agree; mostly disagree or disagree with that statement. A "don't know" option is also provided..	1 -agree 2- mostly agree 3- mostly disagree 4- disagree 5 -don't know				
	1	2	3	4	5
Benefits of the club					
37. Being a club member has improved my relationship with the local authorities (Metro, Water Affairs)	☐	☐	☐	☐	☐
38. Meeting with other metal finishers has been a useful experience for me	☐	☐	☐	☐	☐
39. I have not benefited at all from being a member of the club	☐	☐	☐	☐	☐
40. I have saved money and become more profitable	☐	☐	☐	☐	☐
41. I have a better understanding of the pollution caused by my company	☐	☐	☐	☐	☐
42. I have a greater understanding of waste minimisation	☐	☐	☐	☐	☐
43. If it weren't for the savings I have made through waste minimisation, I would not be in business today	☐	☐	☐	☐	☐
The Metal Finishing Industry					
44. The metal finishing industry is essentially a polluting industry	☐	☐	☐	☐	☐
45. Within South Africa, it is a profitable industrial sector	☐	☐	☐	☐	☐
Usefulness of material					
46. I have gone through most of the written material I've received	☐	☐	☐	☐	☐
47. I have found all the written material useful	☐	☐	☐	☐	☐
48. The training sessions by Enviros March were really good	☐	☐	☐	☐	☐
49. The presentation on waste classification was really useful	☐	☐	☐	☐	☐
50. The presentation on filtration was really useful	☐	☐	☐	☐	☐
51. The presentation on pollution liability was really useful	☐	☐	☐	☐	☐
52. The presentation on government funding schemes was really useful	☐	☐	☐	☐	☐
53. The presentation on benchmarking studies was really useful	☐	☐	☐	☐	☐
54. I found the site visit to Fascor very interesting	☐	☐	☐	☐	☐
55. The presentation by Interactive Training Dynamics was very informative	☐	☐	☐	☐	☐
56. The visit to the land fill sites was very informative	☐	☐	☐	☐	☐
57. I would like more presentations on _____ (list from No. 48 to 56)					
58. Rank the above presentations in order of usefulness to you					

A number of short statements are presented below. They are based on interviews and other sources. Read each statement and decide if you: agree or mostly agree; mostly disagree or disagree with that statement. A "don't know" option is also provided.	1 -agree 2- mostly agree 3- mostly disagree 4- disagree 5 -don't know				
	1	2	3	4	5
Attendance at Meetings					
59. I have personally attended **1 2 3 4 5 6 7 8 9 10 all** meetings (circle the applicable answer)					
60. My company has been represented at every meeting	□	□	□	□	□
Reasons for not attending meetings					
61. I don't have the time	□	□	□	□	□
62. I had a factory emergency and could not leave the premises	□	□	□	□	□
63. There was poor notice of the meetings	□	□	□	□	□
64. I was given insufficient notice of the meetings	□	□	□	□	□
65. The meetings were not interesting to me personally	□	□	□	□	□
66. I was too busy to attend	□	□	□	□	□
67. I don't think there's anything to gain from attending meetings	□	□	□	□	□
68. If the meetings were held after hours I would have attended more frequently	□	□	□	□	□
Barriers to Implementing Waste Minimisation					
69. I don't have the time	□	□	□	□	□
70. I don't have the money	□	□	□	□	□
71. I don't think there are any benefits for my company	□	□	□	□	□
72. Bosses not interested in Waste Minimisation	□	□	□	□	□
Future activities of the Club					
73. The club should continue after the funding is completed	□	□	□	□	□
74. If the club continues, it should be run by the metal finishers themselves and not by an outside person or organisation, and be self – funded	□	□	□	□	□
75. I am interested in being part of the Danced sponsored project in Cleaner Production	□	□	□	□	□
76. I would like more technical seminars on, for example, the theory of electroplating	□	□	□	□	□
77. The club meetings should be held **less / more / same** frequency (circle the applicable answer)					

A number of short statements are presented below. They are based on interviews and other sources. Read each statement and decide if you: agree or mostly agree; mostly disagree or disagree with that statement. A "don't know" option is also provided.	1 -agree 2- mostly agree 3- mostly disagree 4- disagree 5 -don't know				
	1	2	3	4	5
The workers					
78. At our site, relations between management and workers have improved over the last few years	□	□	□	□	□
79. Changing the attitude of our workers is a major barrier for introducing better housekeeping techniques	□	□	□	□	□
80. My workers are the single most important asset of our company	□	□	□	□	□
81. The language barrier is a serious problem in the production	□	□	□	□	□
82. The workers may have poor literacy skills, but they have a good idea of what goes on in the plating baths - of why they do the distinct steps	□	□	□	□	□
83. My workers could contribute with many valuable suggestions on how to reduce the pollution of our company	□	□	□	□	□
84. It is not necessary to supervise the plating, the workers do the jobs by routine	□	□	□	□	□
85. For some plating jobs, I think that the workers know more about plating than I do	□	□	□	□	□
86. My staff have received training in general environmental awareness	□	□	□	□	□
87. My staff have received training in waste minimisation	□	□	□	□	□
88. I would like to train my staff in waste minimisation, but do not have the necessary funds	□	□	□	□	□
89. I am in contact with funding organisations (Dumac; DTI) to arrange finances for training	□	□	□	□	□
Relationship to Suppliers					
90. The technical information from my supplier is important and useful	□	□	□	□	□
91. I would like my supplier to take back any depleted plating baths	□	□	□	□	□
92. I buy chemicals on price only, there is no "relationship" with my supplier	□	□	□	□	□
93. I leave the bath maintenance to the chemical suppliers	□	□	□	□	□
Student Reports					
94. I found the student's assistance valuable	□	□	□	□	□
95. The student offered no useful information and was more of a hindrance than a help	□	□	□	□	□
96. I have used the students recommendations as a basis for my waste minimisation programme	□	□	□	□	□

A number of short statements are presented below. They are based on interviews and other sources. Read each statement and decide if you: agree or mostly agree; mostly disagree or disagree with that statement. A "don't know" option is also provided.	1 -agree 2- mostly agree 3- mostly disagree 4- disagree 5 -don't know				
	1	2	3	4	5
Environmental statements					
97. A company's 'green' image is important for its relation with customers	□	□	□	□	□
98. The introduction of new and more environmental friendly technologies is time consuming and reduces our ability to compete	□	□	□	□	□
99. It is important for companies to be up to date with environmental requirements	□	□	□	□	□
100. The present state of the South African economy does not justify new environmental constraints on companies	□	□	□	□	□
101. I like the idea of going on holiday to game reserves	□	□	□	□	□
102. Compared to similar firms, my firm is in the better half with respect to environmental performance	□	□	□	□	□
103. Some jobs pollute, but if I don't do the job, somebody else will – I might as well benefit financially	□	□	□	□	□
104. Some jobs pollute, but if I don't do the job, somebody else will and cause environmental damage. I would rather ensure it is carried out in the correct manner.	□	□	□	□	□
105. I feel better morally for "cleaning up" my act	□	□	□	□	□
106. I would be happy to live next door to my factory	□	□	□	□	□
107. The most efficient way of improving the environmental impact of our company is to focus on technical issues rather than softer, management issues	□	□	□	□	□
Relationship with Metro Water and Waste					
108. It is a major problem that the Metro don't have the same discharge standards for all areas	□	□	□	□	□
109. The inspector probably cannot tell the difference between a rinse bath and a plating bath	□	□	□	□	□
110. If I comply with their current regulations, they will just formulate a new one next month (i.e. they keep moving the goal posts)	□	□	□	□	□
111. The relation to the Metro has improved over the last 12 months	□	□	□	□	□
112. They don't care about industry, they are bureaucrats that stick to the letter of the law	□	□	□	□	□
113. My current relation with the Metro is an *us-and-them*, we basically have different interests	□	□	□	□	□
114. They are basically reasonable people, you can talk to them and discuss unreasonable demands	□	□	□	□	□
115. I would not mind more frequent visits by the factory inspector, if just my competitors were also visited more frequently	□	□	□	□	□
116. I would be prepared to forward suggestions on improving effluent discharge standards - IF they were enforced across the board	□	□	□	□	□

A number of short statements are presented below. They are based on interviews and other sources. Read each statement and decide if you: agree or mostly agree; mostly disagree or disagree with that statement. A "don't know" option is also provided.	1 -agree 2- mostly agree 3- mostly disagree 4- disagree 5 -don't know				
	1	2	3	4	5
Relationship with Metro Water and Waste (continued)					
117. There should be no regulations on the metal finishing industry	□	□	□	□	□
118. Conflict with the Metro is a healthy sign	□	□	□	□	□
119. I would be interested in self-regulation in place of regular factory inspections	□	□	□	□	□
120. Metal finishers should form an association that would only allow companies that adhere to certain environmental standards to join	□	□	□	□	□
The customers					
121. I have not yet met a customers who was concerned about / showed any interest in the environmental performance of my company	□	□	□	□	□
122. My customers are not interested in my pollution loads	□	□	□	□	□
123. Customers may occasionally enquire about how pollution is addressed, but the customer is essentially interested in price ONLY	□	□	□	□	□
124. I have lost business because the customer was not satisfied with my environmental performance	□	□	□	□	□
125. My customers would go elsewhere for a 10% reduction in price and not ask questions why	□	□	□	□	□
126. I have declined on certain jobs, because I think that the production process pollutes too much	□	□	□	□	□
127. A fair amount of my customers don't have the slightest idea of the type of plating they require	□	□	□	□	□
It would be advantageous if customers enquired before hand as to the best design and specification of materials	□	□	□	□	□
Customers seek my advice in the design of the jobs to be plated / finished	□	□	□	□	□
A fair amount of my customers specify their plating demands according to SABS/ISO standards	□	□	□	□	□
A sign promoting that my company is involved in waste minimisation and is reducing its environmental impact would be useful	□	□	□	□	□
A fair amount of my customers demand a plating "similar to the one last time" because that one worked fine	□	□	□	□	□
I have a considerable influence over the customer's choice of plating	□	□	□	□	□
I have worked up a trust relation with some core customers	□	□	□	□	□

Appendix 17:
Format for Final Report

This appendix contains an outline of the main headings that should be included in a final report. They were developed through referring to final reports prepared for waste minimisation clubs in the UK and the Pilot Clubs in South Africa.

Recommended readings are given in **Section 6** of the Manual.

Project Title

(e.g. Less is More; Waste Mimimisation – A Route to Profit and Cleaner Production)

Final Report on
(Waste Minimisation Club name)

Your name and contact details
Name of sponsors

Date of report

You can also add your logo and the logo of the sponsor organisation.

Executive Summary

Outline when the Club was initiated and the aims of the Club. Summarise the main results.

Acknowledgements

Acknowledge any organisations / people that assisted in the Club in any way, especially those that contributed financially. Where organisations sponsored the project, provide some background information on these organisations and the reasons for their support.

Table of content

Introduction

Provide more detail on the background and aims of the Club**.**

Methodology

This section will cover how the club was formed, the stages involved in the establishment and management of the Club, and the manner in which waste minimisation was encouraged in the companies. Aspects to cover include:

- The recruitment of companies (and provide a profile of these companies, such as the number of employees, the type of industry etc.)
- The number of meetings and how these were run
- Training and transfer of knowledge
- Involvement of other organisations / students / consultants etc.
- How options were implemented on-site

Results

This section analyses the success of the club in terms of the uptake of waste minimisation by the companies and the resultant financial and environmental savings. Aspects to cover include:

- Waste minimisation options identified and implemented
- Categorisation of options
- Financial savings
- Environmental savings
- Barriers
- Success factors

Feedback from companies

A section can be included on any feedback from companies as to their views on the manner in which the Club was run and the success. This can be determined through questionnaires as outlined in Section 6 of the manual.

Project Conclusions

This section summaries the report and provides conclusions as to the success of the Club.

Further Actions / Recommendations

If any lessons have been learned from the Club and how you would do things differently, it is important to include this in the report such that future facilitators can learn from your experiences.

Appendices

Case study information can be included in appendices. Alternatively, these can be compiled onto a CD-ROM and be issued with the report. Any other information you feel is important to the report can be included in an appendix.

Recommended readings are provided in Section 6 of the Manual.

Appendix 18:
Format for Case Studies

This appendix contains an outline for preparing summary case studies on companies that participated in the waste minimisation club. The main headings are provided and tables given for listing waste minimisation options identified and savings achieved.

If photographs of the site are available, these can be inserted in the relevant place in the text. An example of a case study from the Pilot Metal Finishing Club is also provided.

Waste Minimisation at (company Name or description if confidential)
Case Study No
Name of Waste Minimisation Club

Background

This section gives an introduction to the company such as where it is situated, when it was established, the main products, the number of employees, the annual turnover, and any other general information on the company.

The Process

Provide an overview of the process. What the raw materials are and how they are converted into the product. If any details are available on utility use and cost these can be included in this section under sub-headings such as:

Water use and effluent production

Energy Use

Raw material use and wastage

Identification of Waste Minimisation Options

Give the total number of waste minimisation options that were identified for this site, and if known, the number that were implemented, are under investigation, or were not feasible. These options can then be listed in a table as given below and the status of these options provided (**implemented**, **investigating** (and date), **not feasible**, or **not known**)

Table 1: Summary of Identified Waste Minimisation Options

Waste Minimisation Option	**Status**
1	
2	

Implementation of Waste Minimisation

This section provides more detail on the options that have been implemented. They can be broken into sub-sections depending on the type of option. For example:

Water Consumption

Energy Use

Chemicals

Solid Waste

Economic Benefits

Provide details of any savings as shown in the following table. If savings have not been achieved by have been estimated as potential savings, then these can also be included.

Item	Approximate Saving Rands / year	Potential Saving Rands / year	Quantity Unit / year	Payback
Water				
Energy				
Chemicals				

Environmental Benefits

List benefits to the environment, like for example, reduced toxic waste, less solid waste to landfill etc.

Contact Details

Further information is available from:

Your name and contact details.

Note: This case study was prepared as an outcome of (name of waste minimisation club)

Waste Minimisation at an Electroplating Company (MF22)
Case Study 1
Metal Finishing Waste Minimisation Club

Background

MF22 is a small electroplating job shop situated in Seaview, Durban, South Africa. It was established in 1981 and employs 50 staff members. Articles are brought to the factory for plating or polishing by the customer. In general the customers are either not big enough to run their own plating section or the objects to be plated are difficult to handle. Many changes have been made to the factory over the years in order to maintain a leading position among the competing companies in the area. New sections have been added and the design of the existing sections changes regularly to meet the needs of the customer.

The Process

A large number of different processes are carried out in the factory. These include: zinc electro-galvanising; nickel plating; chrome plating; copper plating; cadmium plating (minimal); silver plating; gold plating; irridising; anodising; tin plating; and brass plating. Base metals include Steel, copper, brass, dicast alloy and aluminum. Both line (jig) and barrel plating takes place.

Objects plated include screwdrivers, electrical components, fences stove parts, screws and paraffin lamps and exhaust pipes etc. The factory must therefore be flexible in its process to accommodate these varying plating requirements.

Identification of Waste Minimisation Options

Prior to implementing a waste minimisation programme, the company had one water meter, which was recorded monthly by the local authorities, and there was limited control over water, chemical and energy use in the factory. Effluent discharge was a major concern to the company due to the implementation of new bylaws for discharge of industrial effluents to sewer. This was the main motivating factor for investigating reduction of waste at source.

A total of 25 waste minimisation options have been identified for the site. These are listed in Table 1. The majority were identified by the company themselves, with assistance from students.

Implementation of Waste Minimisation

Of the options identified, 23 have been implemented. The owner of the company was initially skeptical of the benefits of waste minimisation, but has since proved to himself and others that waste minimisation results in both financial and environmental savings.

Table 1: Summary of Identified Waste Minimisation Options

Waste Minimisation Option	Status
1. Install drag-out tanks	Implemented
2. Reduce rinse water flow	Implemented
3. Change to counter flow rinsing	Implemented
4. Fix all leaks	Implemented
5. Close municipal tap at end of Zn line and use borehole water	Unknown
6. Shut - off taps permanently that are not in use	Implemented
7. Monitor water use daily	Implemented
8. Install more water meters on incoming water	Implemented
9. Employ chemical storeman to control chemical use	Implemented
10. Install automatic crane over Cr bath to increase drip times	Implemented
11. Increase drip times over all baths	Implemented
12. Eliminate the use of cyanide	Implemented
Waste Minimisation Option	**Status**
13. Reschedule oven use to reduce heating costs	Implemented
14. Reuse Electro cleaner	Implemented
15. Slow down cranes on Zn line to reduce carry over	Implemented
16. Skim oil off Electro cleaner to prevent contamination	Implemented
17. Undertake staff training	Implemented
18. Rebuild floors	ongoing
19. Optimise hanging articles on the jig to improve drainage	Implemented
20. Redesign stoppers on screwdriver plant	unknown
21. Install effluent treatment plant to reduce SS	Implemented
22. Switch off rectifiers overnight	Implemented
23. Educate customers to use less harmful metals	Implemented
24. Improve insulation on all heated tanks	Implemented
25. Install thermostats to ensure tanks operate at optimum temperature	Implemented
26. Reuse rinse water in the trichloroethylene tank	Implemented

The areas chosen for investigation for improvement included:

- Water consumption (overall and in each department),
- Chemical control,
- Reducing metal concentrations to drain,
- Energy use, and
- Effluent control.

Water consumption:

The company now has 8 water meters, which are read on a daily basis, resulting in the identification of any problems as soon as they occur. Both municipal and borehole water are used in the factory, both of which are monitored. Water flows in all rinse tanks were adjusted to the minimum and unnecessary taps shut-off. Additional drag-out tanks were installed and rinse waters reused where possible. Counter-flow rinsing was installed where ever feasible. Targets for water use in each department were set and monitored on a weekly basis. This has resulted in a 70% reduction in municipal water use (from 2 700 kl / month to 800 kl / month), and a 50% (4000 kl / month to 2000 kl / month) reduction in borehole water use. There is a corresponding decrease in the volume of effluent discharged to drain.

Chemical control:
A storeman was employed to ensure that chemicals were used only when necessary resulting in baths being used to their full potential rather than being topped up or remade at random intervals. Installation of drag-out tanks, increasing drip times and reusing chemical baths has also resulted in less chemicals being wasted. These measures have shown an overall reduction in chemical costs (excluding metals) of between 10 and 15%.

Reducing metal concentrations to drain:
By installing an automatic crane above the chrome plating tank (see diagram on right), the articles are lifted out the tank at a controlled rate and allowed to drip-off over the plating bath for a longer period of time. This has resulted in less drag-out of the chrome salt and therefore less metals being discharged to drain. 25 kg of chrome is saved per month and a corresponding decrease in sodium meta bilsulphite has been achieved due to a reduced treatment requirement.

Replacement of the zinc cyanide plating process by the zinc alkaline process (see diagram on left) has decreased the concentration of zinc being discharged to drain and eliminates the need for cyanide. This has not resulted in a cost saving to the company, but has other benefits such as:

- Reduced metals to drain
- Eliminated the health risks of storing and using cyanide
- Eliminated the need to treat the effluent for cyanide

In addition, the company has managed to convince a customer to accept an alternative finish to cadmium plating. This has resulted in the use of the cadmium plating line being decreased from one day per week to the occasional job.

Energy use:
The company has embarked on an energy survey to identify all areas where heat is used in the factory. By rescheduling the drying of articles, an oven is now used only 3 hours per day, where previously it was left operating for 8 hours a day. Switching off rectifiers overnight has also resulted in energy savings. Insulation on heated tanks has been improved and thermostats installed to ensure that tanks operate at the minimum required temperature. An overall saving of 12% on the electricity bill has been achieved.

Effluent control:
An effluent treatment plant has been installed on site to ensure compliance with the new regulations for discharge to sewer. A filter press has been commissioned to remove the sludge and this is disposed of to landfill. While it is recognised that this is an end-of-pipe solution, it is important to note that by reducing waste in-house, the plant could be sized correctly and less treatment chemicals are required than previously.

Economic Benefits

Item	Saving (Approximate Rands / annum)	Pay-back
Water	60 400	Immediate
Chemicals and Metals	68 400	Immediate
Electricity	33 000	Immediate
Effluent charges	33 800	Immediate
TOTAL	**195 600**	

Environmental Benefits

- A reduction in Zinc metal to drain from 50 to 60 ppm to less than 25 ppm
- Eliminating the need for cyanide and therefore the related health hazards
- A reduction in the use of cadmium and therefore a decrease in its discharge to the environment
- A reduction of 275 kg / year of Chrome being discharged to drain
- A 70% reduction in water use from municipal sources
- A 50 % reduction in the use of river water (borehole)
- A reduction in the volume of effluent discharged to sewer
- A reduction in the use of electricity

Note:

This company has adopted a programme of on-going improvement and therefore changes are being made on a regular basis. This case study information summarises those results achieved from June 1998 to August 2000.

Contact Details

Further information is available from:

Pollution Research Group

School of Chemical Engineering

University of Natal

Durban, 4041

South Africa

Fax: +27 31 260 1118

Email: barclay@nu.ac.za

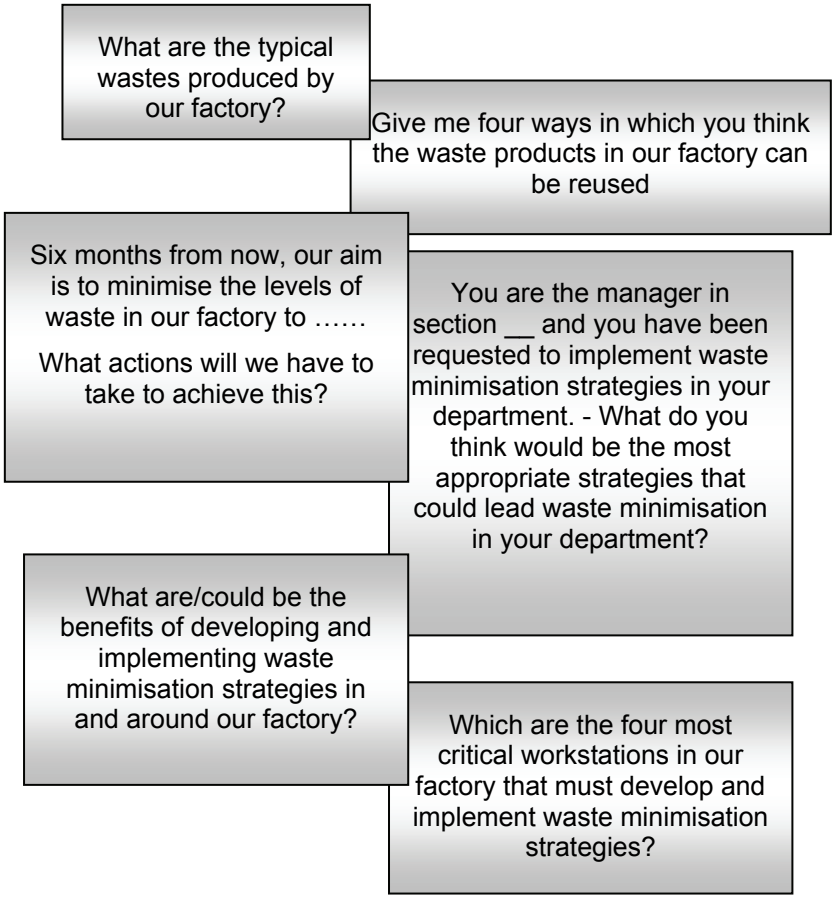
This case study was sponsored by the South African Water Research Commission through Project No. 973: *Waste Minimisation and Effluent Treatment Clubs – Phase 1: Feasibility Assessment.*

Appendix 19:
Environmental Awareness Training for Management

This appendix contains a copy of the questions that were posed to the management and shop-floor staff of member companies in the Hammarsdale Club. These questions were used to highlight areas of concern and brainstorm solutions (solutions provided during the shop-floor training of a company is given in **Appendix 20**).

Handouts were also provided to the management outlining the need for waste minimisation, and these are also included in this appendix.

Below are given a few examples of the questions presented to company management and shop-floor staff.



Environmental awareness

What is the environment? It is everything - the air that we breathe, the water we drink, the soil on which we grow our food, where we live, work and play. In the past, South Africans were encouraged to think of the environment as the game parks, saving the rhino, and preserving the beautiful green areas of our land - the fact that Black South Africans paid the price for environmental degradation was conveniently ignored.

Most landfill sites, including those handling hazardous and toxic waste, are situated near our homes in townships. Polluting industries are also, as a rule, situated near former Black group areas. Workers had minimal information and protection against environmental hazards, and many cases exist where workers have died from problems caused in the workplace.

The hole in the ozone layer, which amongst other things, increases the risk of skin cancer; global warming, which could lead to radical changes in the weather; and nuclear waste, terrible in it's ability to create mutant babies, are some of the issues facing the planet today.

These are not creations of countries far away - it is our actions, both at home and in the workplace, that caused these scenarios - and, in the end, it is us that will pay the full and horrible price, in suffering, illness and even death.

How are we responsible for all this? Simple - by the way we live and work. If we drive unnecessarily, we waste energy, release toxic pollutants, and contribute to global warming when we use electricity unnecessarily, we contribute to air pollution in Mpumalanga, and also to global warming, using too much of the resources of the planet is the common factors in all environmental degradation.

Implications for companies and directors

The new National Environmental Management Act changes the ground rules for the environment in our country in many ways. For example, should a company pollute, not only will it be held liable, but the director/s themselves could be held personally liable. They will also have to pay to clean up the pollution, and pay for all damage caused, including that done to human health. An example is Thor Chemicals, which imported mercury waste for local processing – this happened because our environmental legislation was less strict, if not non-existent, compared to the countries where that waste originated. This resulted in widespread toxic contamination, and also to the death of workers, with other health impacts.

There will also be a new waste register, under the national waste management strategy, which includes all discharges and waste from any production facility, whether to air, water or landfill. There are many more issues that will affect companies directly.

Implications for workers

There are also many implications for workers too. These include the responsibility to avoid causing pollution as a first step. The Act also empowers workers to decide not to carry out a specific order, on the grounds that it could lead to pollution - the company may not act against such a worker.

It is important to note that workers should be joining NGO's and CBO's that are concerned with environment, so that they may inform themselves, and be part of the solution. Many organisations are involved in hands-on work, and know many things about the environment that we may not all be aware of.

Financial Impacts

Impacts to company profits and viability

Waste is simply a product for which no use is found - it all costs the company, because what leaves the factory as waste was bought in at a price, so waste has more of an impact on the bottom line than just the cost of handling such waste. One company, through implementing sound waste management principles, improved it's profits by over R800 000 per annum! And there are many more such examples.

Also, causing and handling less waste makes the company more efficient, and it will find it easier to comply with upcoming legislation.

Impacts on job security and job creation

Why should workers be concerned about waste and pollution?

In the first instance, they are the front-line when pollution is caused, and there health could be seriously affected by such incidents. Secondly, if the company continues to generate more and more waste, the local communities, which is generally where workers live, will also be negatively affected by the pollution.

If the company, on the other hand, minimizes waste, then the health risks are also lessened; the company wastes less money in raw materials, and other costs, making it more viable, and thereby helping ensure it's profitability, which in turn, ensures job security. We know of a company in Durban which is profitable only through the waste minimization programme - without it, they would have to close their doors, with the loss of many jobs.

Other companies did close their doors because the cost of handling waste, hazardous waste in particular, had risen dramatically. With the “polluter pays” principle, the cost of waste handling will continue to rise.

One company thought there waste cost them R49 000 per year (the cost of disposing waste) – after an analysis, and a few minor changes, they were able to save over R800 000 per year!

Rights and obligations

As discussed previously, the worker has the right not to carry out a task that could lead to pollution, or that which will constitute a risk - but workers are also obliged to avoid waste and pollution as well, so it makes sense to do the training that we have begun today.

Consequences of environmental issues on labour issues in general

For general knowledge, the issues surrounding waste and labour go far beyond that which was mentioned above - it also has global implications. This would include the right to a clean environment, as stated in our constitution, but also issues such as job security, economic sustainability, and job creation are at stake. For example, if we were able to design all the processes in this company so hat all waste could be a raw material for some other product, then we would not only ensure that the company remains viable, but would lead to direct job creation, where such raw materials could be downstream businesses, often suitable for small and medium enterprises.

Waste Minimisation - Introduction

Waste minimisation is more than reducing the amount of waste that is carried away by waste contractors – it means a look at how we are working, the production process, all the inputs and outputs of the process, and re-examining production management. The inputs we need to look at are:

- Raw materials
- Packaging
- Energy
- Water
- Consumables
- Product design and manufacture
- Emissions to air
- Waste water
- Solid and liquid waste

The advantages are many:

- Environmental improvement
- Cost savings
- Complying with legislation
- Reduction of risk
- Competitive advantage

To achieve waste minimization, we need to look at people, systems and technology. This training is a beginning. It is also important to carry out a waste audit, to see what you are actually dealing with. This will lead to:

- Understanding what the magnitude of the problem is
- Being able to identify options, beginning with low-cost and no-cost.
- Implementation
- Plans for improvement
- Develop control systems
- Develop control systems
- Continue data collection
- Check improvements on an on-going basis
- Analyze new data
- Continuous improvement

Importance of logging such ideas

Process - develop clear methodology of generating, logging, and implementing ideas. Suggest ideas are logged on a designed form, with copies to relevant personnel

Following up such ideas

Clear lines of communication and responsibility. Shop floor to management decision-makers identified, and made accountable

Implementing such ideas

Laid out procedure for trial and implementation, before and after measurements are taken. Cost accounting applied to be one of the methods of evaluation and charting progress.

Feedback on ideas

Regular feedback process and evaluation - discussion with all role-players

Re-evaluation of original idea

Monitor level of success and value to company

Appendix 20:
Shop-floor Workers Training and Awareness Raising

This appendix contains an example of an agenda that was used by Kagiso-Cowi in the training of shop-floor staff of selected club members in the Hammarsdale Waste Minimisation Club.

Questions were posed to the shop-floor with respect to reducing waste at source. These questions are provided in **Appendix 18.**

The outcomes from this awareness raising session are also included here.

Sample Agenda:

1. Ice-breaking & Team building
2. Introduction to the Waste Minimisation Club
3. General Environmental Awareness
4. Health & Safety Issues
5. Legal & Policy Issues
6. Labour Issues
7. Introduction to the Waste Minimisation Concept
8. Generation of Company Specific Waste Minimisation Ideas
9. Discussion on Communication Structures
10. General Training Support
11. Development of Project Ideas

- Total time 4-8 hours per session

Outcome:

Shop-floor workers were encouraged to identify all those environmental awareness issues within the company. Some of these issues can be summarised as follow:

- Noise - machinery
- Broken Windows
- Water on floor
- Dangerous Machinery
- Handling of chemicals – lack of safety equipment
- Dust
- Smoke
- Smells from neighbouring factory
- Boiler House – affecting air quality
- Fumes
- Ventilation –air conditioning
- Sulphuric Acid
- Oil Spillages
- Wasted Water
- Water Quality
- Effluent
- Drainage
- Leaks of steam pipes
- Dyes
- Waste of Electricity – steaming and running machinery
- Static shocks from machinery
- Dirty toilets
- Water contamination – drinkable water
- Forklift-lift truck
- Lack of skilled personnel
- Lack of awareness training
- Cutting trees with no reason
- Wet floors
- Pesticides
- Soil erosion
- Unprotected sexual contact
- Chemical inhalation
- No safety shoes, gloves masks
- Smashing bottles on street
- Burning plastic bags
- No full time medical staff
- Rust water

These are just some of the many issues that were identified throughout the training sessions with this company. The trainers then assisted the participants in grouping these issues to be tackled as priority projects that could be implemented within the company.

The key areas that were grouped are as follow:

1. Air
2. Water
3. Health and Safety
4. Land
5. Energy
6. Noise

It was found that chemicals and water quality were of particular concern to the participants. The input from participants was impressive as they were given an opportunity to brainstorm some ideas and possible solutions to those issues listed above.

Some of these solutions are summarised as follow:

- Training to be provided
- Safety equipment to be purchased
- Ventilation – more windows and/or air conditioners to be installed
- Research
- Concrete around factory premises
- Dust equipment such as masks, etc.
- Waste minimisation training – to act against pollution
- Boiler smoke – implement better system for steaming
- Use required amount of chemicals for any application
- Chemical labelling
- Safe storage of chemicals
- Decrease waste material
- Reduce chemical use
- User-friendly chemicals to be used
- Employ medical doctor
- Study leave (day off)
- Put tiles inn floor
- Pave car park
- Paint Floors
- Proper extraction system in chemical storage area
- Return containers for chemicals to owner – reuse
- Burning plastic to be kept in safe drums
- Qualified hazardous waste experts
- Clean up spills
- Water purification
- Limit use of fresh water
- Reduce electricity use – install best steam extractor
- Recycling
- Separation of waste water
- Machines to be switched off – when not in use
- Windows to be fixed
- Fix tap leaks
- Drinking water to be available not only in toilets – machines also
- Water samples on regular basis
- Implement checklist on pipelines
- Use water only if necessary
- Close taps properly
- Implement water recycling system
- Motors to be tuned to run silently
- Acoustic tiling
- Cooling systems to be installed
- Milk to be given to employees working with chemicals
- Implement factory cleaning programme
- Sell unwanted chemicals
- Advance Planning
- Offer rewards to staff – for performance
- Identify property effectiveness of chemicals – before and after use

.

Appendix 21:
Sample Budget for running a waste minimisation club

This appendix contains an example of how to calculate the costs involved in running a waste minimisation club.

It takes into account the fixed costs (i.e. costs that remain the same regardless of the number of members) and the variable costs, which depends on the number of members.

In all cases, it has been taken that the Club will run for 1 year, during which time 6 meetings will be held.

Use these Tables as a guideline for determining the costs involved in the running of your Club. Add items where needed and remove those that are not applicable.

A21.1 Overall Budget

An example of a Budget for the running of a Waste Minimisation Club for one year where meetings are held every 2 months (6 meetings per year) are given in Table 1 Break- down of these costs are given in Tables 2 to 6 as shown.

Table 1: Overall Budget for running a Waste Minimisation Club for one year

Item	Cost / member	Cost / y	Cost / y for 10 members
Organising meetings (Table 2)		20 300	20 300
Newsletters (Table 3)		15 560	15 560
Phone calls and faxes (Table 4)	415		4 150
Teas, notes, postage (Table 5)	1 245		12 450
On-site assistance (Table 6)	6 400		64 000
Total	**8 060**	**35 860**	**116 460**

A21.2 Budget for Organising and Attending Club Meetings

Table 2 gives a break-down of the budget for organising Club meetings. Person 1, Person 2 and the secretary are employed by the facilitating organisation and their times are charged at different rates. Therefore, these are included as separate items in the budget. The figures given here are not real figures, but just included as an example of how to make the calculations.

This budget is for a year, with Club meetings held every 2 months (6 in total).

Table 2: Budget for organising a Waste Minimisation Club for one year

Time	Person	Number of days	Rate (R/day)	Total (R)
attendance at meetings	Person 1 and 2	0.5	3 000	1 500
preparation of meetings	Person 1	0.5	1 000	500
preparation of meetings	Person 2	0.25	2 000	500
preparation of meetings	Secretary	0.75	600	450
Total fees per meeting				2 950
Hiring of venue			500	3 000
Organisation of meetings + costs for all workshops (6)				**20 300**

A21.3 Budget for Newsletters

A budget for the preparation of quarterly newsletters is given in **Table 3**. In total, 4 newsletters will be prepared in one year.

A circulation of 120 is estimated per issue and each newsletter will be 5 pages long. Totals are given for all 4 issues and costs for copying etc. are given for the total circulation.

Table 3: Budget for preparing and sending out Newsletters for one year

Item	Person	Number of days	Rate (R/day)	Cost / item (R)	Total (R)
Time for collecting articles, writing, composing per newsletter	Person 1	1.0	1500		6 000
Time for collecting articles, writing, composing and editing per newsletter	Secretary	1.5	600		3 600
Final editing	Person 2	0.25	2000		2 000
Printing (double sided)				0.35 / page	840
Envelopes (A4)				1.5 / envelope	720
Sending				5 / postage	2 400
Subtotal Newsletter					**15 560**

A21.4 Budget for Variable costs

These costs will change depending on the number of Club members. Cost per member is given here together with estimates for a Club size of 10 and 15 members.

Again, these costs are for a year, and there are 6 meetings to be held in the year. A better approach is to realise that these costs are going to be incurred and include them in your total costs and leave them out as itimised costs as it can become very detailed!

Phone calls and faxes (see Table 4)

Table 4: Budget for calls and faxes for one year

Item	Attempts / meeting	Call duration	Total minutes / member / year	Rate / minute	Cost / member	10 members	15 members
Faxes for meetings	2	2.50	30	2.50	75	750	1 125
Calls for meetings	3	2	36	2.50	90	900	1 350
Secretary time for faxes			60	2.5	150	1 500	2 250
Secretary time for calls			40	2.5	100	1 000	1 500
Subtotal					**415**	**4 150**	**6 225**

Teas, notes and postage (Table 5)

Table5: Budget for teas, notes and postage for one year

Item	No. / member	Rate / item	Cost / y per member	10 members	15 members
Teas	1	2.50	15	150	225
Mail	12	5 / stamp	60	600	900
Envelopes	12	1.5 / envelope	18	180	270
Copies of notes	90	0.35 / page	31.50	315	472.50
Subtotal			**124.5**	**1 245**	**1 867.5**

On-site assistance (Table 6)

Table 6: Budget for on-site assistance for one year

	No. visits / member / year	Person	Rate (R/day)	Duration (days)	Cost / member	10 companies	15 companies
On-site consulting	4	Person 1	2000	0.5	4 000	40 000	60 000
On-site assistance	6	Student	400	1	2 400	24 000	36 000
Subtotal					**6 400**	**64 000**	**96 000**

Appendix 22:
Generic PQS

This Appendix contains a generic PQS as used by BECO Institute for Sustainable Business when undertaking an initial walk-through audit. It should be adjusted to your specific requirements depending on the type of industry being audited.

PREVENTION QUICK SCAN

For Company X

Questionnaire

Institute for Sustainable

Team members:

Cape Town, December 2006

BECO Institute for Sustainable Business

Tel: 021-6897117

Work sheet 1: general information

General questions

Name of company

Postal address .....

Postal code .....

Telephone number

Fax number .....

Contact person .....

Function .....

Total no. of employees

Total no. of working hours per year .....

Description of company

Organisation of the company

Draw a simple diagram of the management structure and various departments in your company. Assign to each department the primary functions and the amount of workers. Attach a copy.

Plan of the company

Attach a map of the area covered by the company

History of the company

When was the company established and by who? .....

Worksheet 2: process diagram

What are the most important process steps that take place in the company? (Try to fill in sequentially)

1 .....

2 .....

3 .....

4 .....

5 .....

6 .....

7 .....

8 .....

9 .....

10 .....

Worksheet 3: materials produced

Products

Give the various products that are produced in your company. Give estimates of the percentage total product produced (based on weight) and percentage of the total yield.

Product (group)	Production process	Total production in kg	Total Yield in Rands
……..……	……	……..……	……..……
……	……	……..……	……..……
……	……	……..……	……..……
……	……	……..……	……..……
……	……	……..……	……..……
……	……	……..……	……..……
……	……	……..……	……..……
……..	……	……..……	……..……
	……		
	…		

- Turnover……..……..... Rands per year

  ……..... ton/year (Based on amount of raw material used per year)

By-products

Give the various by-products produced and the amount produced per year

Product (group)	Total production in kg	Outcome/where does it go?	Total Yield in Rands
……..……	……	……..……	……..……
……	….……	……...……...……	……..……
……	……	……...……...	……..……
……	……	……...……	……..……
……	……	……...……...……	……..……
……	……	……	……..……
……	……	……	……..……
……..	……	……	……..……
……..	……	……	……..……
	……	…….	

Losses

Due to different circumstances the loss of (by) products exists. Give an estimate of the amount of losses in your company and the possible cause of the losses.

By product/loss	Total production in kg	Possible Cause
……..……	……..…	……..……..
……	……	……..……...……...
……	……	……...……...……
……	……	……...……...……
……	……	……
……	……	……
…….....	……	……
	……	……
		….

Worksheet 4: Packaging

Packaging method

Which methods of packaging are used in your company for your final products?

.....

....

.....

Worksheet 5: use of materials

In the table provided fill in the most important raw materials used in the various processes/activities.

Materials	Amount/year	Purchase costs (R/year)	Type of packaging (bulk, return- or large packaging)
Production			
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
(After) Treatment			
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……
Packaging			
……	……	……	……
……	……	……	……
……	……	……	……
Other			
……	……	……	……
……	……	……	……
……	……	……	……

Worksheet 6: waste streams and emissions

Fill in the amount and cost of waste streams per year.

Tips

1) The **external costs** consist of the costs involved in hiring containers, transport costs and waste removal/disposal costs. Include the direct costs that your company pays to the various enterprises

2) The **internal costs** consist of the direct costs involved in acquiring the materials, loss of value (utilization of machines, etc.) and internal handling of waste. Include the cost involved in collecting the waste streams, internally, (containers, transport, storage, etc.), internal provision for handling the waste streams, (oil separators, catchments, waste press, wastewater treatment, filter installations, suction installations, etc.).

Waste stream and emission	Separate Streams/outlet (y/n)	Amount per year	External costs	Internal costs
Production waste				
……..	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
General waste				
……..	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
Hazardous waste				
……..	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……

Waste stream and emission	Separate Streams/outlet (y/n)	Amount per year	External costs	Internal costs
Emissions				
……..	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……
……	……	……	……	……

Worksheet 7: Water consumption and wastewater

Water usage:

- How much tap water is acquired on a yearly basis? ……. m^3/year
- How much groundwater is acquired on a yearly basis? …….. m^3/year

What is the water usage of the various processes?

Water users	**Tap water (% of total usage)**	**Ground water (% total usage)**
-Truck cleaning	……	……
-Cleaning	……	……
-Sanitary	……	……
……	……	……
……	……	……
……	……	……
……	……	……
……	……	……
……	……	……
……	……	……
……	……	……
……	……	……
……..	……	……

Wastewater

- Is the water being discharged via the sewerage? ❍ Yes ❍ No
- How much water is being released to the sewerage? ……m^3
- What is the yearly cost for water usage?……R
- Does your company make use of a water purification system? ❍ Yes ❍ No
- If yes, what type of water purification system is implemented?

.....

.....

.....

.....

.....

.....

.....

Worksheet 8: energy consumption

Total energy use

Complete the table by filling in the energy used in your company

Form of energy	Usage per year	Cost per year
Electricity	KWh	R
Gas	m^3	R
Fuel oil	litre	R
Coal	m^3	R

- Is the energy usage being monitored monthly, yearly etc? ❍ Yes ❍ No
- Have you recently investigated the total energy usage? ❍ Yes ❍ No
- If so, when ……
- By whom……..
- Is a copy of this information readily available? ❍ Yes ❍ no

Electricity

- What is the most important utilization for electricity

Consumption	**Percentage of total electricity consumption (%)**
-Production machines	……..
-Compressor	……..
-Lighting	……..
-Air conditioners	……..
……..	……..
……..	……..
……..	……..
……..	……..
…….	……..
	……..

Gas

- What is the most important utilization for gas?

Consumption	Percentage of total gas consumption
-Warm water	……..
-Steam generation	……..
-Heating	……..
……..	……..
……..	……..
……..	……..
……..	……..
……..	…….

Fuel Oil

- What is the most important utilization for Fuel oil?

Fuel oil consumed	Percentage of Fuel oil used (%)
-Warm water	……..
-Steam generation	……..
-Heating	……..
-Kilns	……..
……..	……..
……..	……..
……..	……..
……..	……..
……..	……..
……..	……..
……..	

Coal

- What is the most important utilization for Coal?

Coal consumed	Percenatge of coal conumption
-Warm water	……..
-Steam generation	……..
-Heating	……..
-Kilns	……..
……..	……..
……..	……..
……..	……..
……..	……..
……..	……..
……..	……..
……..	

Worksheet 9: environmental measures

State of environmental and quality assurance.

- Are there employees assigned to the specific functions of environmental care?

❍ Yes ❍ No

If yes: give name of person/s in charge……..

- What are their functions/tasks/role in the company?…….

What environmental measures have been implemented in production and other departments? Give short description in each case.

- Production process

.....

.....

.....

- Water usage

.....

.....

.....

- Energy usage

.....

.....

.....

- Other

……

……

……

Thank You !

Appendix 23:
Checklist for Housekeeping

This Appendix contains some checklist that you can look for in the general operating practices of the company. These checklists were taken from the *Waste Minimisation Self-Assessment Guide for the Textile Industry,* and therefore relate to working practices in textile mills. You can develop your own checklists based on the type of industry you are visiting.

Water consumption:

Are flow and water meters installed throughout the factory ?
Is water use monitored and recorded on a regular basis ?
Is regular maintenance carried out on pipes and taps etc. ?
Are taps left running when not in use ?
Is water running when machines are not in operation (e.g. on wash ranges)?
Is overflow rinsing carried out ? If yes, is it controlled manually / automatically ?
Is cooling water recycled ?
Is any reuse of process water taking place ?
Are concentrated effluent streams segregated from dilute effluent streams ?
Are effluent volumes monitored and recorded regularly ?
Are solid and hazardous waste volumes monitored and recorded regularly ?
Are emissions to air monitored and recorded regularly ?
Are floors washed / swept?
Are drains above or below ground?
Are regular leak checks carried out?
Are there segregated drainage systems?

Chemical use:

Are health and safety data sheets available for all chemicals and dyes ?
Is any chemical recovery taking place ?
Are any dyebaths reused ?
Are recipes mixed manually / or automatically ?
Are recipes and process reviewed regularly ?
Do suppliers take back expired goods ?
Do suppliers accept the return of chemical and dye containers ?
Is there a stock control system ?
Is there a colour match computer ?
Does it do stock control ?
Are there automated colour kitchens ?
Are there automated dispensing systems?
Are bulk chemicals added directly to process machines?
Are they metered?
Are there health and safety induction courses for new employees?
Are there follow-up courses?

Energy use:

Are machines turned off when not in use ?
Are office lights left on unnecessarily ?
Are optimal temperatures used for drying ?
Is use made of heat exchangers to recover energy from high temperature effluent streams ?
Is only cold fresh water used in batch processes ?
Is there electricity load shedding ?
Is there electrical power factor correction ?
Are variable speed drives installed ?
Is there ceiling insulation ?
Is steam trap preventative maintenance carried out ?
Are the steam lines insulated ?
Is there condensate return?
Are the temperature controllers calibrated and checked regularly?
Are stenter gas burners set correctly?

Appendix 24:
Example of a WMC Newsletter

SUSTAINABULLETIN

Working together

Newsletter of the Waste Minimisation Club
for Large Companies in the Western Cape

Issue 8, December 2002

Welcome to the eighth edition of *Sustainabulletin*. This edition gives an update on activities in the Club, articles on Industrial Symbiosis, etc.

We look forward to hearing your comments and suggestions for future editions!

Louis Coetzee & Chrystel Schreuder, BECO-ISB

CONTENTS

Official WMC Members	
Berg River Textiles	*Juan Laubscher*
British American Tobacco	*Henk Paxton*
Caltex	*Terence Parker*
KWV	*Ernest Oliver*
Namakwa Sands	*Johan Slabbert*
SANS Fibres	*Hein Nieman*
Simba	*Hanlie Schreuder*
South African Breweries	*Deon Maritz*

Treasurer:

Henk Paxton *- British American Tobacco*

(021) 872 1851

Secretariat:

BECO - Institute for Sustainable Business

Louis Coetzee

(021) 689-7117

WASTE MINIMISATION CLUB UPDATE

Louis Coetzee – BECO-ISB

Congratulations

We would like to congratulate two of the clubs' member companies, Berg River Textiles and SANS Fibres, on the awards that they have won for good results obtained in their cleaner production activities.

Berg River Textiles (Frame Fibres) and Sans Fibres shared the National Productivity Institute Golden Award. The award criteria were based on: involvement in the community, waste minimisation, environmental impact, productivity improvements, conservation of energy, etc.

Berg River Textiles also won the Special Merit Award for Cleaner Textile Production from Cotton SA. The award was judged on the following criteria:

- Implementation of a Cleaner Textile Programme,
- Legal Compliance,
- Waste Management
- Percentage Saving on Total Production Cost
- Cost of Risk Reduction
- Percentage Risk Reduction on the Environment (monitoring and measuring)

Energy Project

The energy project has finished and we would like to thank all the companies that have participated.

We would also like to thank Jan Roersen and the project team who made some very interesting improvement options in the companies' energy usage. We hope that in the future we can do more projects between the Dutch government and the member companies.

Draft reports have been delivered to all members who participated in this project. The final reports will be finished in January 2003.

November WMC meeting

SANS Fibres hosted the November meeting. SANS gave a presentation on their continuous improvement programme and the successes that they have had by reducing their non-prime product significantly with the programme. Information was shared between the companies on their cleaner production activities.

Students needed

The companies that have shown interest in obtaining a student are: Berg River Textiles (Pre Assessment) and Namakwa Sands (Water Balance).

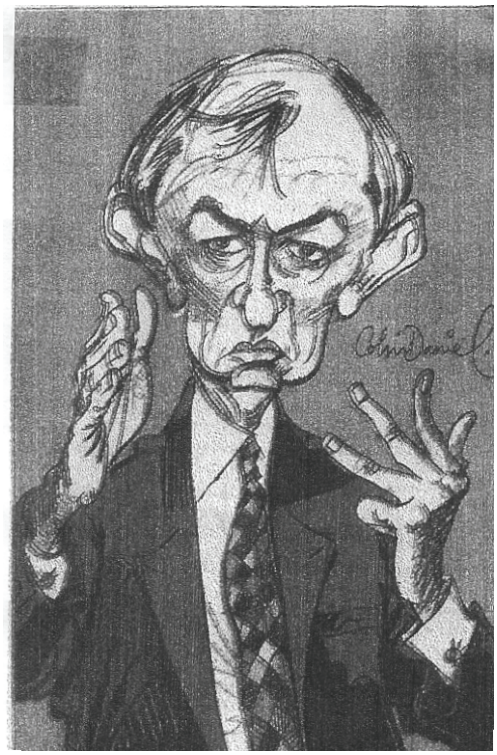
If any other members require students to do a project on cleaner production during next year, please let us know so that we can start making the necessary arrangements.

Our next meeting will be held early next year and we will notify all members in advance. We wish all members a festive season and joyous New Year!

MINISTER ENCOURAGES CO-OPERATION WITH COMPETITORS

Edward West, Cape Times 15/08/02

SA business needs matrix of efficiencies, says Erwin



Cape Town - The business community needed to create **"a matrix of efficiencies" and move away from the mentality of "I can do it better on my own"** if the aim was to build an advanced manufacturing economy, Alec Erwin, the minister of trade and industry, said yesterday.

Business management should talk and work with competitors, Erwin said at a function hosted by Leadership magazine. Differences between businesses were so marginal that success often depended on the efficiencies around it.

Citing the offshore oil and fuel industry as an example, Erwin said if Cape Town wished to attract the offshore rigs to its harbour for repairs, the shipbuilding industry would have to work together to market its products.

The yacht-building industry had grown into a R500 million a year export industry in the space of three and a half years because a few boat builders had discovered a competitive advantage in the quality of their vessels five to six years ago.

They had to work hard to market their product through meetings with buyers during the Volvo international yacht race, plant tours and going on overseas business trips to meet potential buyers, he said.

As part of the government's manufacturing strategy, Erwin's department would try to get business people in similar fields to talk to one another.

The business community also had to deal with two other issues: a lack of adequate training and a lack of research and development, he said.

Confident business leadership was required, South Africa's foreign direct investment inflows had been excellent and the government would do all it could to help investors who wanted to do business locally so that they could supply world markets, he said.

Employment growth would only come through structural changes. This would be achieved through the development of new sectors and innovative ideas, rather than from existing structures.

All businesses needed to think about research and development and while some companies were lagging on training, some were finding the more they trained the better they performed.

THE INDUSTRIAL SYMBIOSIS IN KALUNDBORG

www.symbiosis.dk/b2.htm

Symbiosis is the living together of two dissimilar organisms in any of various mutually beneficial relationships. Here, the expression is used about an industrial cooperation between several companies, which trade by-products with each other.

Networking

The industrial symbiosis in the Kalundborg district is built up as network cooperation between five industrial enterprises and the municipality of Kalundborg. In this symbiosis, the five enterprises: Asnaes Power Station, the plasterboard manufacturer GYPROC, the pharmaceutical and biotechnology company Novo Nordisk, the soil remediating company A/S Bioteknisk Jordrens and the STATOIL refinery trade by-products because the waste of each is valuable raw material to one or more of the others. The result is a reduction of both resource consumption and environmental impacts. The six business Partners also gain financially from the cooperation because all contracts within the symbiosis are based on sound commercial principles.

How the byproducts are used

Steam and heat

Asnaes Power Station produces heat for the town of Kalundborg and process steam for the STATOIL Refinery and Novo Nordisk. Cogeneration of heat and power results in far better fuel utilization (about 30% better) than if the two forms of energy were produced separately. 4, 300 households in Kalundborg receive district heat from Asnaes Power Station.

This has replaced approx. 15 percent of its process steam from Asnaes Power Station. The refinery uses steam for heating oil tanks and pipelines etc. Now Novo Nordisk uses steam from Asnaes Power Station for heating and sterilization purposes.

Some of the cooling water from the Station is used by a fish farm, which produces 200 tons of trout a year. The fish have better growth conditions in the warm water.

Water

The Kalundborg district, which comprises five municipalities – Bjergsted, Gorlev, Hvidebaek, Kalundborg and Tornveld has very limited ground water resource, and the large industrial enterprises there have a big water consumption. Therefore, the enterprises participating in the symbiosis try to re-use as much water as possible.

Asnaes Power Station has managed to reduce its total water consumption by 60%. Previously, it used only municipal ground water in its production of power and heat. Now, the ground water has been replaced by municipal surface water from Tisso (a lake) together with cooling water and treated waste water from Statoil Refinery. This has enabled them to reduce its consumption of ground water by 90%.

As the water from Tisso is not an unlimited resource, the next step has been to reduce consumption of water from the lake by 50%. Asnaes Power Station has done this by reusing its own wastewater. The wastewater is led to re-use basin together with runoff from the surrounding fields and surplus water from Tisso in the winter period. The reuse basin has a capacity of 250,000cu.m water, which is re-used in the power station’s processes.

Refinery Gas

An “external“ flare of surplus gas is part of the system at all refineries. At the STATOIL refinery the flare has been reduced to a night light because of internal reuse and because Asnaes Power Station use the surplus refinery gas as fuel instead of coal and oil (the delivery is for the moment declining).

STATOIL also supplies GYPROC with butane gas. The gas is used to fuel the furnaces for drying the wet gypsum. GYPROC‘s remaining fuel requirement is covered by a standby system with butane gas.

Gypsum

Asnaes Power Station ‘flue gas desulphurisation plant (FGD) which removes sulphur dioxide from the flue gas, produces about 170,000 tons of gypsum a year. A part of gypsum is sold to GYPROC, which makes plasterboard products for the building industry. The gypsum from the power station is used instead of natural gypsum. It is more uniform and cleaner than natural gypsum and is therefore well suited for plasterboard production.

Biomass

Enzyme production at Novo Nordisk is based on fermentation of such raw material as potato flour and corn starch. The fermentation process produces about 97 000 cu.m solid biomass (NovGro/ 30) and 280.000 cu.m liquid biomass (NovoGro) every year. The Biomass used to be mixed with the wastewater and discharged into the sea.

Today it is piped or transported by tanker to about 600 West Zealand and farmers, who use it to fertilize their fields, thereby reducing their need for commercial fertilizers. The biomass contains Nitrogen, phosphorus and lime. Another of Novo Nordisk’s by products is surplus yeast from its insulin production. This is used as animal feed.

Liquid Fertilizer

STATOIL removes sulphur dioxide (So2) from the flue gas, by a process where ammoniumthiosulphate is a major by-product. This by-product is used in the production of liquid fertilizers - around 20.000 tons a year - which roughly correspond to the Danish annual Consumption.

Fly ash

Asnaes Power Station has an electro- filtration unit for removing ash from the flue gas. The fly ash, 70.000 tons a year, is used in the building industry. Most of it goes to Aalborg Portland, where it is used for cement production.

Sludge

Sludge is a major residual from the public water treatment plant in Kalundborg. The sludge is utilized at A/S Bioteknisk Jordrens as a nutrient in the bioremediation process. Thereby a waste product from one process is turned into a useful remedy in another process.

Advantages of the symbiosis

Trading their by-products offers all the participants several advantages:

- Re-use of by-products. The by-product of one enterprise becomes an important raw material for another.
- Reduce consumption of resources, e.g. water, coal, oil, gypsum, fertilizer, etc
- Reduced environmental impact in the form of smaller emissions of carbon dioxide and sulphur dioxide, smaller discharge of wastewater and less pollution of watercourses etc.
- Better utilization of energy resources. Waste gases are used in the energy production process.

Criteria for Symbiosis

The industrial symbiosis developed in Kalundborg can be used to advantage in other industrial areas provided several conditions are satisfied:

The enterprises must function together

Industrial symbiosis can only work with the right composition of enterprises in an area. Waste Products from one enterprise must fit the need of other enterprises in order to turn waste products into raw materials. Diversity in the local industrial structure is therefore a necessary precondition for implementation of industrial symbiosis.

The enterprises must be situated near each other

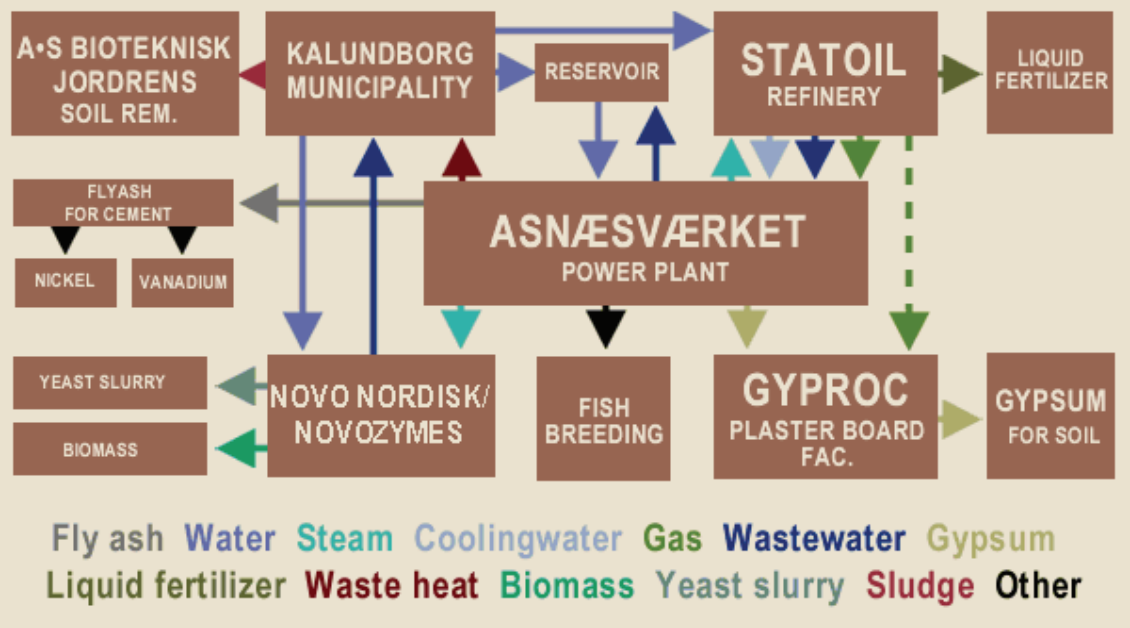
For symbiosis to work, the enterprises must lie reasonably near each other. Long pipelines are costly and the greater the length, the greater the energy losses. Experience from Kalundborg shows the distance is most important when it is energy that is being exchanged between enterprises. Distance is of less importance in the case of other by-products.

Openness between the enterprises

With its relatively small size and isolated situation, Kalundborg has provided soil for an industrial symbiosis because the decision makers working there, all know each other and have developed a relationship characterized by openness, communication and mutual trust.

The industrial symbiosis in Kalundborg is the only one of its kind in the world today. Industrial symbiosis is practiced elsewhere, but rarely between more than two enterprises. In Kalundborg six partners constituents the symbiotic network and the Danish experience has reached worldwide attention.

The Industrial Symbiosis in Kalundborg



USEFUL INFORMATION

Websites

Patel, Z. and R. Peart (1998). Decision Making by firms in South Africa on the Adoption of Cleaner Technologies: A Case Study of the Chemical, Food, and Textile Industries. http://www.environment. gov.za

The Symbiosis Institute (1999). http://www.symbiosis.dk

Quotes

The world we have created today as a result of our thinking thus far has problems which cannot be solved by thinking the way we thought when we created them

Einstein (1879 – 1955)

Measure, compare, see how to improve and then change

P. Pybus (2001)