Good Housekeeping Guide
for
Small & Medium-Sized Enterprises
The motivation to develop this ‘Good Housekeeping’ Guide has two origins:

1. P3U—Pilot Programme for the Promotion of Environmental Management in the Private Sector of Developing Countries (P3U), which is implemented by the German Agency for Technical Cooperation (GTZ), is interested in identifying instruments of environmental management that are less complicated, easy to apply, inexpensive, and suitable for small and medium-sized enterprises (SMEs) in developing countries. In discussions with experts, the importance of ‘Good Housekeeping’ has emerged as an important starting point for improving environmental performance in SMEs. Until now, to our knowledge, there is no easy-to-use methodology on ‘Good Housekeeping’ that could be made available to SMEs in developing countries. Hence, the reason for developing this Guide.

2. When P3U/GTZ became involved in the DELTA programme (aimed at Developing Environmental Leadership towards Action) promoted by Sustainable Business Associates (SBA), both institutions felt that a ‘Good Housekeeping’ Guide could be developed and tested in Tunisia, using the technical expertise available within the country on environment-related issues, in order to present the concept and tool to Maghrebian industrialists during the DELTA North Africa Forum being held in Marrakech in February 1998.

Both P3U/GTZ and SBA hope that industrialists will find this Guide to be a useful tool for integrating the concepts of ‘Good Housekeeping’ and environmental management into their business operations in order to enhance productivity and reduce environmental impact in their communities.
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PREFACE

The objective of this Guide is to enable small and medium-sized enterprises (SMEs) to identify simple, practical, common sense measures of ‘Good Housekeeping’ that can be undertaken to reduce the costs of production, enhance the company’s overall productivity, and mitigate environmental impact.

‘Good Housekeeping’ practices relate to a range of measures dealing with preventing the loss of materials, minimising waste, conserving resources, saving energy, and improving operational and organisational procedures. The implementation of these practices is relatively easy and the cost is usually low. Thus, they are particularly suitable for SMEs.

This Guide is intended to be used by those individuals who are responsible for managing daily operations within SMEs.

It is hoped that this Guide will enable managers in SMEs to understand the main elements of ‘Good Housekeeping’, put in place the management procedures to integrate these practices into the daily operations of the business, and lay the ground for taking a more systematic approach to improving the ‘eco-efficiency’ and competitiveness of their companies.
1. INTRODUCTION
1.1 Why and For Whom has this Guide been Developed?

- specifically for SMEs
- for use by Managing Directors, Operations Managers, and/or their Technical Staff
- to be applied without major requirements of time and money; i.e. used by existing staff to go through a company’s operations during 1/2 to 1 day
- to identify specific areas related to ‘Good Housekeeping’ and actions that can be undertaken to achieve cost savings and reduce environmental impact
- to set priorities for further action
- to be used by companies as a modest management tool to track actual results achieved
- to be built upon by more sophisticated tools of environmental management (such as environmental cost management, quality environmental management systems)
- to be applied with very modest external support or consultancy (eg. 1/2 to 1 day), if needed

1.2 What is ‘Good Housekeeping’?

‘Good Housekeeping’ refers to a number of practical measures based on common sense that enterprises can undertake to improve their productivity, obtain cost savings, and reduce the environmental impact of their operations.

‘Good Housekeeping’ practices relate to voluntary actions, aimed at:
- ✔ Rationalising the use of raw materials, water, and energy inputs
- ✔ Reducing the volume and/or toxicity of waste, waste water, and emissions related to production
- ✔ Reusing and/or recycling a maximum of primary inputs & packaging materials
- ✔ Improving working conditions and occupational safety in the company.
‘Good Housekeeping’ practices can provide a real economic asset and advantage for a company in terms of minimising waste, as well as the use of raw materials and energy. Minimising waste can enable enterprises to reduce the loss of valuable material inputs and therefore reduce operational costs.

Furthermore, by adopting ‘Good Housekeeping’ practices, companies can reduce the amount of pollution created in the community, thereby improving the image of the enterprise and its products with customers, suppliers, neighbours, and regulatory authorities. In this respect, much can be accomplished at a low cost and in ways that are easy for SMEs to implement.

<table>
<thead>
<tr>
<th>An important statistic to consider:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>50 % of waste</strong> can be reduced by adopting ‘Good Housekeeping’ practices and making small operational changes!</td>
</tr>
<tr>
<td><strong>Source:</strong> United Nations Programme for Environment (UNEP)</td>
</tr>
</tbody>
</table>

### 1.3 What is Needed to Implement ‘Good Housekeeping’?

**a) Organisational Culture**

In the first instance, reducing waste is related to changing behaviour and creating a culture of productivity and waste minimisation among personnel at all levels of the company.

**b) Problem - Awareness**

In this regard, it is important for companies to draw the attention of their employees to the problem and identify opportunities for them to take action.

**c) Information Dissemination**

This process can be enhanced by ensuring that there is good dissemination of relevant information internally, and that effective ‘Good Housekeeping’ procedures are developed, followed, and integrated into the daily operations of the company.
d) Simple Actions

The adoption of ‘Good Housekeeping’ practices does not require major investments in cleaner technologies, which may be very costly, especially for an SME. The aim is to continuously improve the production process through a more rational use of resources and by optimising production processes.

1.4 How Can this Guide be Used?

The Guide is set up in the form of Checklists covering 5 areas:

1. Reducing the Loss/Use of Raw Materials & Supplies
   - preventing unnecessary waste
   - undertaking preventive maintenance
   - establishing plans & effective procedures in case of emergency

2. Managing Waste Responsibly
   - separating wastes into different categories
   - reusing / recycling wastes as primary materials
   - disposing of waste in an economically efficient and environmentally sound manner
3. Effectively Handling and Transferring Materials & Products
   - ensuring proper handling and stocking
   - undertaking effective inventory control
   - planning & optimising production
   - keeping good records

4. Saving Water
   - preventing leakage / spillage
   - reusing water
   - monitoring water usage

5. Saving Energy
   - providing for proper insulation
   - monitoring energy use
   - recuperating and reusing energy
1.5 Contents of the Checklists

For each ‘Good Housekeeping’ area, the included 5 Checklists contain:

- **A list of possible actions** that can help you in identifying ‘Good Housekeeping’ opportunities in your enterprise
- **A column where you can designate responsibility** to a specific individual for follow-up actions and monitoring of the results achieved over time
- **A column where you can assign a priority** to suggested actions, including the time for tasks to be completed
- **A column where cost savings** achieved and other benefits obtained can be estimated and noted.

Within each ‘Good Housekeeping’ area covered within this Guide, examples of real companies that have obtained cost savings and reduced the environmental impact of their operations are described.

1.6 Integrating ‘Good Housekeeping’ into Daily Business Practices

The Guide addresses 3 additional areas (for more details, refer to Section 3), which can assist you in creating effective processes and structures for the integration of ‘Good Housekeeping’ practices into your company’s daily business operations and maintaining better performance over the long run:

A. Organisational Issues

- determining responsibilities for waste minimisation
- establishing objectives & targets
- identifying priority areas for action
- undertaking training for employees
- developing & implementing required procedures
- following-up, checking results, establishing new targets.

B. Estimating the Costs

- estimating / calculating the costs & savings of actual resource use
- allocating environmental costs to the operations that have generated those costs
- including investment and operational costs in the calculation of waste management costs.

C. Analysing Inputs & Outputs of the Production Process

- optimising the production process
- using resources more efficiently (raw materials, etc.)
- closing flows of materials and substances (through reuse/recycling).
2. CHECKLISTS FOR IMPLEMENTING ‘GOOD HOUSEKEEPING’ PRACTICES IN AN ENTERPRISE
### Section 2.1 Checklist for Efficiently Using Raw Materials & Supplies

<table>
<thead>
<tr>
<th>Objective: Reduce the Loss &amp; Use of Raw Material Inputs &amp; Supplies</th>
<th>Action to be taken</th>
<th>Individual Responsible</th>
<th>Priority and Timing for Action</th>
<th>Savings Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Repair leakages in pipes and equipment</strong></td>
<td>• <em>make a visual assessment within each department in order to identify problem areas</em>&lt;br&gt;• <em>undertake repairs using appropriate materials</em>&lt;br&gt;• <em>monitor to ensure leakages have been eliminated</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prevent accidental spillage</strong></td>
<td>• <em>take extra care when removing materials from storage containers for use in production</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Establish a preventive maintenance programme for equipment</strong></td>
<td>• <em>prevent unexpected interruptions in production</em>&lt;br&gt;• <em>determine intervals &amp; responsibilities for regular checks</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Keep the maintenance manuals provided by equipment suppliers in a convenient place</strong></td>
<td>• <em>follow the recommendations given in the maintenance manuals</em>&lt;br&gt;• <em>undertake the necessary training of personnel</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Keep up-to-date records on equipment</strong></td>
<td>• <em>make note of the location of equipment, their characteristics, and maintenance schedule</em>&lt;br&gt;• <em>regularly check the compliance with maintenance schedules</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Optimise production planning</strong></td>
<td>• <em>dedicate equipment to producing one product</em>&lt;br&gt;• <em>maximise the number of same products manufactured; eg. work 1 day or 1 week on one process, one production line</em></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Evaluate waste volumes and products that do not meet specifications</strong></td>
<td>• <em>identify quality problems</em>&lt;br&gt;• <em>take corrective actions</em></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Example of results achieved from reducing the loss of raw materials in a Meat Processing Plant

<table>
<thead>
<tr>
<th>Description of actions undertaken</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- elimination of water leakage</td>
<td></td>
</tr>
<tr>
<td>- installation of regulating valve on incoming water pipe</td>
<td></td>
</tr>
<tr>
<td>- continuous control of water usage</td>
<td></td>
</tr>
<tr>
<td>- change of cleaning procedures</td>
<td></td>
</tr>
<tr>
<td>- recuperation of waste water from containers that is polluted with Sodium Chloride</td>
<td></td>
</tr>
<tr>
<td>- change of procedures in utilising chemical products</td>
<td></td>
</tr>
<tr>
<td>- training of operators</td>
<td></td>
</tr>
</tbody>
</table>

| Annual savings                                                                                   | USD$ 48,800   |
| Results achieved in reducing the loss of raw materials                                          |               |
| - reduction of waste of Sodium Chloride by 67%                                                 |               |
| - reduction of waste water by about 30%                                                        |               |
| Investment cost                                                                                 | Low           |
| Payback                                                                                        | Immediate     |
| Reference                                                                                       |               |
| Databrowna Gornicza Meat Processing Plant Project WCPS / Norway                                 |               |
### Section 2.2 Checklist for Managing Waste Responsibly

**Objective:** Reduce, Reuse, Recycle, and Dispose of Waste in an Environmentally Sound Manner

<table>
<thead>
<tr>
<th>Action to be taken</th>
<th>Individual Responsible</th>
<th>Priority and Timing for Action</th>
<th>Savings Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examine the major sources of wastes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>identify the places where these sources occur throughout the production process</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the possibility to substitute toxic materials &amp; substances by non-toxic materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sort wastes according to their nature and toxicity, for reuse, recycling, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>separate dangerous waste from other wastes in order to avoid contamination of other wastes</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>separate liquid waste from solid waste, etc.</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place different groups of waste into different containers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>provide designated containers for each waste group</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>instruct employees to use the different containers for collecting &amp; storing different wastes</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>check implementation regularly</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reuse / recycle different wastes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>identify possibilities for reusing &amp; recycling the different wastes</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>dispose of non-reusable &amp; non-recyclable waste using appropriate methods that comply with existing regulations</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reuse / recycle materials and substances</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>identify possibilities for reusing materials in different phases of the production process</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>identify possibilities for selling materials for reuse in other enterprises or production processes</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>dispose of non-reusable &amp; non-recyclable waste using appropriate methods</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separate the different flows of liquid waste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <em>avoid mixing together the different flows of liquid waste</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reuse / recycle waste water
• study possibilities to reuse / recycle waste water
• verify that the reuse of waste water does not harm the quality of the product

Separate solvents used in production processes
• regenerate solvents to recover valuable material for reuse in production processes

Reuse packaging material
• identify possibilities to reduce packaging material
• identify possibilities to reuse packaging material
• check possibilities for introducing a deposit system to facilitate the retrieval of packaging

Example of results achieved from separating wastes in a Textile Manufacturing

<table>
<thead>
<tr>
<th>Description of actions undertaken</th>
<th>- emptying and cleaning of plastic containers holding chemical products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective of action</td>
<td>- reduced risk of contamination related to waste</td>
</tr>
<tr>
<td></td>
<td>- reuse of chemical products in baths</td>
</tr>
<tr>
<td>Investment cost</td>
<td>Low</td>
</tr>
<tr>
<td>Payback</td>
<td>Immediate</td>
</tr>
<tr>
<td>Reference</td>
<td>Project EP3 Tunisia / USAID</td>
</tr>
</tbody>
</table>
Chart #1: Flow Chart for Separating Solid & Liquid Waste

This flow chart gives an overview of a systematic approach that can be used to implement the suggestions contained within Checklist 2.2

The objective is to identify possibilities to reduce, reuse, recycle and finally treat and dispose of waste. There is a natural sequence to considering these possibilities.

First of all, possibilities for reducing waste should be identified. Secondly, possibilities for reuse should be identified, and so on.

The identification and separation of the different waste flows is needed to identify these different possibilities:

1. The separation of the different waste flows leads to the identification of valuable materials in the waste.
2. In principle, reusing and recycling can be achieved by identifying and extracting valuable materials or water contained within the waste.

Thus, the materials or water flows need to be separated to ensure the purity and high quality of the reused/recycled waste.
### Section 2.3 Checklist for Handling and Transferring Materials & Products

| Objective: Effectively Handle, Stock, and Transfer Materials & Products |
|---|---|---|---|
| **Action to be taken** | **Individual Responsible** | **Priority and Timing for Action** | **Savings Achieved** |
| Inspect raw material upon receipt from suppliers  
• verify that the packaging is in good order  
• ensure that the contents are secure  
• accept only good quality raw materials | | | |
| Respect the stocking conditions recommended by the suppliers of raw materials  
• establish stocking policies according to instructions provided by suppliers or as listed on packages, especially for toxic products  
• keep security records close to where material is stocked and near the working area | | | |
| Stock dangerous products in a designated and secure area  
• in order to reduce the risk of accident  
• in order to reduce the need to pay supplementary insurance costs  
• train personnel to avoid accidents | | | |
| Stock raw materials in compatible groups | | | |
| Keep the stocking zone clean  
• visually inspect the area periodically in order to detect contamination  
• use stocking methodologies & devices that avoid damage during storage | | | |
| Verify the expiration dates for raw materials  
• do regular checks and keep records  
• apply the ‘first-in first-out’ principle (FIFO) for managing stocks of raw materials | | | |
| Keep stocks at levels based on actual needs  
• avoid excessive buying of raw materials  
• minimise loss and waste of inputs (e.g. from leaving containers open) | | | |
| Take appropriate safety measures in moving, transferring, and utilising dangerous products  
• wear appropriate protective clothing  
• use appropriate equipment  
• provide personnel with required training | | | |
| Replace dangerous products with alternatives | | | |
Example of results achieved through improved handling of raw materials in a Sugar Refinery

| Description of actions undertaken | - reuse of jute and plastic bags |
| Objective of action | - reduce solid waste  
| | - reuse packaging materials |
| Annual savings | 1,650,000 Egyptian pounds |
| Investment cost | 500,000 Egyptian pounds |
| Payback | 3-4 months |
| Reference | Project EP3 Egypt / USAID |


## Section 2.4 Checklist for Saving Water

**Objective:** Conserve, Reuse, and Reduce Water Flows

<table>
<thead>
<tr>
<th>Action to be taken</th>
<th>Individual Responsible</th>
<th>Priority and Timing for Action</th>
<th>Savings Achieved</th>
</tr>
</thead>
</table>
| **Eliminate water leakages**  
  • replace poor seals on pipes  
  • examine water pipes for holes and make needed repairs  
  • monitor water tanks in production processes and prevent spillage  
  • close running taps  
  • install meters in areas where large amounts of water are being used  
  • install inexpensive water-saving devices, where appropriate | | | |
| **Stop using sources of water that are not absolutely needed**  
  • remove water taps that are not being used  
  • seal certain taps to avoid unnecessary use  
  • install inexpensive water-saving devices, where appropriate | | | |
| **Regulate water pumps and pipes**  
  • match flow to specific production needs | | | |
| **Cut unnecessary flows of industrial water outside the functioning hours of the company** | | | |
| **Reuse rinse water**  
  • determine the quantities, qualities, and locations of reusable water sources  
  • verify that the reuse of such water does not harm the quality of the end product | | | |
| **Avoid continuous rinsing with water**  
  • install valves on equipment to reduce water flow  
  • check possibility of rinsing in still baths | | | |
| **Equip departments having high water consumption and/or savings potential with water measurement instruments**  
  • verify the efficient utilisation of water, especially in high water-using processes / departments  
  • install inexpensive water-saving devices, where appropriate | | | |
Example of results achieved from saving water in Textile Manufacturing

<table>
<thead>
<tr>
<th>Description of actions undertaken</th>
<th>- reuse of clear rinse water in the dyeing process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective of the action</td>
<td>- save water</td>
</tr>
<tr>
<td></td>
<td>- reduce flow of waste water</td>
</tr>
<tr>
<td>Annual savings</td>
<td>USD$ 11,500</td>
</tr>
<tr>
<td>Investment</td>
<td>USD$ 500</td>
</tr>
<tr>
<td>Payback</td>
<td>2-3 weeks</td>
</tr>
<tr>
<td>Reference</td>
<td>Project EP3 Tunisia / USAID</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of actions undertaken</th>
<th>- collecting and recycling water from rollers used to squeeze out water in the washers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective of the action</td>
<td>- reduce generation of waste water</td>
</tr>
<tr>
<td>Annual savings</td>
<td>35,300 Egyptian pounds</td>
</tr>
<tr>
<td>Investment</td>
<td>2,500 Egyptian pounds</td>
</tr>
<tr>
<td>Payback</td>
<td>1 month</td>
</tr>
<tr>
<td>Reference</td>
<td>Project EP3 Egypt / USAID</td>
</tr>
</tbody>
</table>
### Section 2.5 Checklist for Saving Energy

<table>
<thead>
<tr>
<th>Objective: Conserve, Reuse, and Reduce Energy</th>
<th>Action to be taken</th>
<th>Individual Responsible</th>
<th>Priority and Timing for Action</th>
<th>Savings Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maintain good insulation of hot pipes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• periodically check the state of insulation to avoid heat losses and repair when needed</td>
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<tr>
<td></td>
<td>Maintain good insulation of cold water pipes</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• ensure cooling and air conditioning systems do not heat up unnecessarily</td>
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</tr>
<tr>
<td></td>
<td>Maintain compressed air pressure pipes</td>
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</tr>
<tr>
<td></td>
<td>• avoid the loss of pressure</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• periodically check for leakages and repair when needed</td>
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<tr>
<td></td>
<td>Maintain energy-using equipment (eg. heaters, boilers)</td>
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<tr>
<td></td>
<td>• optimise combustion efficiency through regular maintenance</td>
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<tr>
<td></td>
<td>• avoid unnecessary cold / heat losses from open doors, exhausts, etc.</td>
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<tr>
<td></td>
<td>Use air conditioning systems efficiently</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• check whether air conditioning can be avoided</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• ensure there is a good insulation of air conditioned rooms</td>
<td></td>
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<tr>
<td></td>
<td>• switch off air conditioning systems when not needed (eg. at night)</td>
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<tr>
<td></td>
<td>• regularly adjust the air conditioning to an adequate temperature level</td>
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<tr>
<td></td>
<td>Recuperate/reuse energy in production process</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• install a heat exchanger if temperatures differ more than 50°C</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• clean heat-exchanging surfaces regularly to ensure the best possible transfer of heat</td>
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</tr>
<tr>
<td></td>
<td>Regulate the energy input according to the needed energy level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• for example, if an energy input of 50°C is needed, do not provide an input of 70°C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Use a temperature thermostat in processes that involve water (eg. in rinse baths)
- ensure the temperature does not become too hot or too cold, requiring further energy to moderate

Control the dimensioning of electric compensation equipment at source
- install a condensation battery at the transfer level

Check where alternative or renewable energy sources could be used and substitute these for non-renewable energy inputs

Example of results achieved from saving energy in a Textile Factory

| Description of actions undertaken | - regular cleaning of the roof  
|                                 | - painting the roof with white paint instead of black |
| Objective of the action          | - bring down the temperature in the production compound |
| Investment cost                  | negligible |
| Payback                          | immediate |
| Reference                        | Peter Johnston, Zimtrade, Zimbabwe |
3. ADDRESSING ORGANISATIONAL ISSUES
3.1 Enhancing Operational Processes & Structures

The following measures could be of use in efforts to create more effective processes and structures for the integration of ‘Good Housekeeping’ practices into your company’s daily business operations:

- **Establish realistic, quantifiable objectives for the reduction of waste.**
- **Give responsibility to one individual within each department for each specific action to be undertaken and for monitoring the results achieved over time.**
- **Identify processes where large quantities of water and energy are used, and those that generate a high volume of waste water, and assign priority to action to be taken in these areas.**
- **Assign responsibilities for waste management in order to have a precise idea about the quantities of waste generated by the company.**
- **Make a regular inventory of raw material.**
- **Adapt and improve the qualification of personnel according to the specific tasks to be accomplished throughout the production process.**

**Training staff regarding:**

- the correct handling of materials to minimise losses and avoid hazards & accidents
- the use of equipment to save water, energy and raw materials (eg. keep equipment settings at a regular, continuous level rather than frequently moving them between high & low power)
- the detection and minimisation of raw material losses to air, water, and soil
- emergency procedures that can be implemented when there are accidents in order to minimise the loss of raw materials

- **Regularly monitor the application of procedures by employees to ensure that procedures are applied saving water, energy, and raw materials.**
- **Involve employees in voluntary actions to reduce waste and economise water, energy, and raw materials.**
- **Undertake a regular, yearly ‘cleaning of the house’.”**
### 3.2 Calculating Environmental Costs and Savings

The following strategies could be useful to you in identifying and allocating environmental costs to the operations responsible for generating those costs:

- **Estimate / calculate the savings potential of actual resource use and waste creation.**
- **Estimate / calculate the necessary investment and running costs for measures to use raw materials, water & energy more sustainably.**
- **Allocate the cost of treatment & waste disposal to the operations that generate those wastes, rather than allocating this cost to the general expenses of the company.** This will be an incentive for the responsible departments to reduce the level of waste generated, identify opportunities to use raw materials more effectively, and recycle & reuse waste in production processes, or outside the company (e.g. by specialised firms).

To simply estimate or calculate needed investments & running costs, use the Calculation Sheet on the next page. Some examples are included for illustration. With respect to the Calculation Sheet, please note the following points:

**Production Step / Department** in row 1 refers to the specific department or production step being assessed.

**Actual Cost** in row 2 should be calculated for the target process before any further measures are undertaken.

The **Measure** undertaken can then be described in row 3.

**Gross Savings by Implementing the Measure** in row 4 represents the estimated savings per year that can be achieved by carrying out the measure.

**Running Costs after the Measure** in row 5 represents the additional running costs incurred due to the implementation of the measure.

**Net Savings** in the row 6 represents the "real savings" per year, that is: Gross Savings per year (row 4) minus the Running Costs after the Measure (row 5).

**Investment** in row 7 refers to the investment necessary to operationalise the measure.

**Payback Period** in row 8 is an indicator for the moment when the level of Net Savings achieved through the measure are higher than the investment costs. The payback period can be calculated by dividing the Investment by the Net Savings per month. The Net Savings (row 6) must first be divided by 12 months. Then the Investment (row 7) can than be divided by the Net Savings per month.

**Simple Return on Investment (ROI)** in row 9 is a simple indicator for the level of Net Savings achieved in one year by operationalising a measure. ROI is given as percentage of the Investment. A simple ROI can be calculated by dividing the Net Savings (row 6) per year by the Investment (row 7).
## Chart #2: Calculation Sheet for Simple Estimation of Investment Costs (including examples)

<table>
<thead>
<tr>
<th>row</th>
<th>Production Step / Department</th>
<th>Coffee Roasting</th>
<th>Product Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>row 1</td>
<td><strong>Actual Costs</strong></td>
<td><strong>Description:</strong> Material loss in roasting due to the loss of small coffee particles through chimney</td>
<td><strong>Description:</strong> Use of packaging material</td>
</tr>
<tr>
<td></td>
<td><strong>Amount:</strong> 700 currency units per year</td>
<td><strong>Amount:</strong> 378 currency units per year</td>
<td></td>
</tr>
<tr>
<td>row 2</td>
<td><strong>Measure</strong></td>
<td>Recovered coffee particles from gaseous emissions</td>
<td>Reduced amount of packaging material by changing packaging design</td>
</tr>
<tr>
<td>row 3</td>
<td><strong>Gross Savings by Implementing the Measure</strong></td>
<td>356 currency units per year (representing 51% of the actual costs)</td>
<td>113 currency units per year (representing 30% of the actual costs)</td>
</tr>
<tr>
<td>row 4</td>
<td><strong>Running Costs after the Measure</strong></td>
<td>0</td>
<td>50 currency units per year</td>
</tr>
<tr>
<td>row 5</td>
<td><strong>Net Savings</strong></td>
<td>356 currency units per year</td>
<td>63 currency units per year</td>
</tr>
<tr>
<td>row 6</td>
<td><strong>Investment</strong></td>
<td>300 currency units</td>
<td>45 currency units</td>
</tr>
<tr>
<td>row 7</td>
<td><strong>Payback Period (months)</strong></td>
<td>10 months</td>
<td>9 months</td>
</tr>
<tr>
<td>row 8</td>
<td><strong>Simple ROI</strong></td>
<td>119%</td>
<td>140%</td>
</tr>
</tbody>
</table>
4. GOING FURTHER:

ANALYSING INPUTS & OUTPUTS
IN THE PRODUCTION PROCESS
4.1 Why Analyse Inputs & Outputs?

By analysing the inputs and outputs of the production process in a detailed way, companies have an opportunity to look closer into their operations and identify further opportunities to:

- optimise the production process
- use resources more efficiently (raw materials, etc.)
- close flows of materials and substances (through reuse / recycling)
- address economic and environmental "weak spots".

Two **Charts** have been included within the Guide to help you in analysing the inputs and outputs of your production process.

The inputs and outputs of the production process refers to the sum of the inputs and outputs of all the different production steps.

4.2 How to Use the Included Forms for Analysing Inputs & Outputs

**Chart 3** is intended to facilitate the analysis of Inputs and Outputs through the entire production process. Most of the needed data might already be available in your administration or accounting department. The consumption of raw materials, auxiliaries, water and energy used per year, and the amount of products produced during one year is usually data that you can easily collect or estimate.

The outputs are more difficult to analyse: Therefore, you will need to estimate or calculate the outputs of solid waste, waste water (present substances), waste heat, and emissions in order to get an overview.

Alternatively, you can undertake a detailed analysis of the outputs at each production step (**using Chart 4**).

The advantage of doing a detailed analysis at each production step is that you can obtain a differentiated and more complete view of your production process, which makes it much easier to identify opportunities to optimise the production process, use raw materials more efficiently, and so on.
Please note: All data filled in the form must relate to the same product output (eg. production / year / month, etc.)

**Example:**

<table>
<thead>
<tr>
<th>Product output in 1997</th>
<th>9,800 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption of water in 1997</td>
<td>500 m³</td>
</tr>
<tr>
<td>Solid waste output of organic waste in 1997</td>
<td>310 kg</td>
</tr>
</tbody>
</table>

These data can be converted into:

<table>
<thead>
<tr>
<th>Production output</th>
<th>100 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water consumption per 100 kg of product</td>
<td>5.1 m³</td>
</tr>
<tr>
<td>Solid waste output of organic waste per 100 kg of product</td>
<td>3.16 kg</td>
</tr>
</tbody>
</table>

Fill in the form using either:

- **Output of product:** 9,800 kg
- **Input of water:** 500 m³
- **Solid waste output of organic waste:** 310 kg

or:

- **Output of product:** 100 kg
- **Input of water:** 5.1 m³
- **Solid waste output of organic waste:** 3.16 kg
CHART #3
FLOW CHART OF THE COMPLETE PRODUCTION PROCESS

INPUT

Raw materials:
..........................kg
..........................kg
..........................m³
..........................m³

Water.......................m³

Energy.....................kW

Auxiliaries:
..........................kg
..........................kg
..........................kg

Step 1

Production Process

Step 2

etc.

Waste Water.............m³
Substances:
..........................kg
..........................kg
..........................kg

Emissions..............kg
Waste Heat............kW

Solid Waste:
..........................kg
..........................kg
..........................kg

OUTPUT

Product:
..........................kg
..........................m³

Consumer
CHART #4

FLOW CHART OF INDIVIDUAL STEPS
OF THE PRODUCTION PROCESS

Raw Materials:
......................kg
......................kg
......................kg
......................m³
......................m³

Water......................m³

Energy....................kW

Auxiliaries:
.........................kg
.........................kg
.........................kg

Production Process
Step # .....  

Substances:
...............................kg
...............................kg

Emissions..............kg
Waste Heat..............kW

Waste Water..............kW

Solid Wastes:
...............................kg
...............................kg
...............................kg

Intermediate Product:
......................kg
......................m³

Production Process
Step # .....  

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5. CONCLUSIONS

The adoption of ‘Good Housekeeping’ practices can considerably enhance the competitiveness of small and medium-sized enterprises by reducing the costs of production, thus protecting the financial resources of a company. At the same time, measures related to saving energy, water, and raw materials can help decrease the pressure on a country’s natural capital, by reducing an individual company’s resource use.

Many companies have already noticed that they can achieve significant reductions in wastes and costs by paying attention to production procedures and quality management, as well as environmental issues.

The use of the Checklists and suggested measures contained within this Guide are intended to enable SMEs to establish a first basis for taking a step-by-step, more systematic approach to improving the economic efficiency and ecological sustainability of their enterprises. Applying ‘Good Housekeeping’ practices allows companies to start with easy-to-implement actions related to improving management procedures. These actions are close-at-hand, based on common sense, and also result in financial savings.

Building upon 'Good Housekeeping', companies can then move towards 'eco-efficiency' and become even more sustainable and profitable. Eco-efficiency means taking into account the following 7 key dimensions:

1. Reducing the material intensity of goods & services
2. Reducing the energy intensity of goods & services
3. Reducing toxic emissions
4. Enhancing the recyclability of materials used
5. Maximising the sustainable use of natural resources
6. Extending product durability
7. Increasing the service intensity of goods & services

This is a process that companies should expect to engage in through subsequent steps, beginning with improvements.

Any comments, suggestions, reports about experiences with the application of these practices are welcomed by GTZ/P3U and SBA.

* As defined by the World Business Council for Sustainable Development, which coined the term eco-efficiency.