Water Conservation and Water Demand Management Strategy for the Industry, Mining and Power Generation Sectors

August 2004
Foreword

In South Africa, water is key to winning the battle against poverty and its scarcity could be a limiting factor to growth. No socio-economic development can take place without water.

South Africa’s water resources are indeed limited and scarce. The situation is worsened by the occurrence of droughts and the increasing demand associated with population growth and a developing economy. As a country, we are approaching the full utilisation of our available water resources. Further water augmentation schemes will be costly and are likely to be detrimental to our environment. Therefore require a strategic change in the use and conservation of our water resources. Our water is a precious resource that has to be used as efficiently as possible before we consider any new water resources development.

There are opportunities to increase water use efficiency in all water use sectors. Most of the sectors are expected to experience growth and use more water as our country develops. The Industries, Mines and Power Generation sectors are no exception to this.

The Water Conservation and Water Demand Management Strategy is a fundamental step in promoting water use efficiency and is consistent with the National Water Act (Act 36 of 1998) which emphasises effective management of our water resources. Water Conservation and Water Demand Management should not be seen as punitive or restrictive but as a responsible approach that will contribute to our prosperity.

All consumers and water institutions have therefore a duty towards our country, our environment and themselves to implement adequate measures that contribute to water use efficiency through Water Conservation and Water Demand Management. The Industries, Mines and Power Generation sectors have their role to play in this regard and as outline in this document.

Let us work together towards the prosperity of our nation and for the benefit of future generations by using our water efficiently and by protecting our environment.

Buyelwa Sonjica
Minister of Water Affairs and Forestry
August 2004
Executive Summary

The management of water resources and the provision of water services in South Africa call for a new approach in which Water Conservation and Water Demand Management (WC/WDM) are expected to play a crucial role to ensure social equity, economic efficiency and environmental sustainability.

The National Water Act (Act 36 of 1998) and the Water Services Act (Act 108 of 1997) have provided an enabling environment for WC/WDM. Newly established institutions with roles and responsibilities are expected to integrate WC/WDM into their activities.

This document, focusing on WC/WDM for the Industry, Mining and Power Generation sector, is one of four documents comprising the Water Conservation and Water Demand Management Strategy. It should be read in conjunction with the National Water Conservation and Water Demand Management Strategy (NWC/WDMS) that serves as the overall framework document for all WC/WDM strategies. The NWC/WDMS outlines the applicable principles and definitions and spells out the eight generic objectives of the overall strategy. The remaining two sectoral strategy documents deal with:

- Water Services, and
- Agriculture.

Each sectoral strategy document provides a detailed background of the sector with regard to WC/WDM, and outlines the expected strategic outputs, which are each linked to at least one of the objectives of the overall strategy. It highlights the outputs and the activities to be carried out to give effect to WC/WDM. The three sectoral strategy documents are complementary to the present NWC/WDMS. They provide more detailed information on each sector, its strategic outputs, activities and responsibilities of key role-players.

The Industry, Mining and Power Generation sector offers numerous opportunities for contributing to WC/WDM because of its diversity. Such opportunities include the efficient use of water during industrial production, re-use of water from other sectors and improved quality of effluent discharge.
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Glossary

**Consumptive use:**
"Consumptive use" of water refers to the water that is utilised by businesses in closed processes that do not generate wastewater and that effectively remove that water from the water cycle. A bottling plant is an example of a business that has closed processes in which large volumes of consumptive use occur.

**Demand-side management:**
Any measure or initiative that will result in the reduction of the expected water use or water demand.

**Departmental:**
Refers to the Department of Water Affairs and Forestry of South Africa.

**Distribution management:**
Any function relating to the management, maintenance and operation of any system of structures, pipes, valves, pumps, meters or other associated equipment, including all mains, connection pipes and water installations that are used or intended to be used in connection with the supply of water.

**Inefficient use of water:**
Water used for a specific purpose over and above the accepted and available best practices and benchmarks or water used for a purpose where very little benefit is derived from it.

**Integrated Water Resource Management:**
This process determines the optimal way of providing water services by analysing the change in water demand and operation of water institutions and evaluating a variety of supply-side and demand-side management measures.

**Non-consumptive use:**
A term used to describe the water that is utilised by businesses in open processes that generate wastewater and which can be recycled or discharged back into the water cycle for use by other users. It should be noted that many open processes are not efficient and that they often contain an element of consumptive use. Cooling is an example of an open process that can consume significant quantities of water, but which also discharges water.

**Retro-fitting:**
The modification, adaptation or replacement of an existing device, fitting or appliance.

**Supply-side management:**
Any measure or initiative that will increase the capacity of a water resource or water supply system to supply water.

**Unaccounted-for water:**
The difference between the measured volume of water put into the supply and distribution system and the total volume of water measured to authorised consumers whose fixed property address appears on the official list of water services authorities.

**Water Institutions:**
Water institutions include both Water Management Institutions and Water Services Institutions as defined in the National Water Act and the Water Services Act respectively.

**Water wastage:**
Water lost through leaks or water usage that does not result in any direct benefit to a consumer or user.

**Water Conservation:**
The minimisation of loss or waste, the care and protection of water resources and the efficient and effective use of water.

**Wastewater discharge:**
In this document, the term "wastewater discharge" is used very loosely and refers to both the quality and the quantity of water discharged. It refers to the discharge to sewer systems as well as to open river systems.
Furthermore, the term also covers the diffuse discharge of polluted water into open river systems.

**Water Demand Management:**
The adaptation and implementation of a strategy by a water institution or consumer to influence the water demand and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and services and political acceptability.

**Water utilisation:**
Used to describe both the consumptive and the non-consumptive uses of water by businesses, whether it is raw or potable water.

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**Acronyms**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>BMP</td>
<td>Best Management Practice</td>
</tr>
<tr>
<td>BR</td>
<td>Business Representative</td>
</tr>
<tr>
<td>CMA</td>
<td>Catchment Management Agency</td>
</tr>
<tr>
<td>CMS</td>
<td>Catchment Management Strategy</td>
</tr>
<tr>
<td>DWAF</td>
<td>Department of Water Affairs and Forestry</td>
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<tr>
<td>IMP</td>
<td>Industry, Mining and Power Generation Sector</td>
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<tr>
<td>IRP</td>
<td>Integrated Resource Planning</td>
</tr>
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<td>IP</td>
<td>Integrated Planning</td>
</tr>
<tr>
<td>IWRM</td>
<td>Integrated Water Resource Management</td>
</tr>
<tr>
<td>NWC/WDMS</td>
<td>National Water Conservation and Water Demand Management Strategy</td>
</tr>
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<td>NWCSF</td>
<td>National Water Conservation Strategy Framework</td>
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<td>NWRS</td>
<td>National Water Resource Strategy</td>
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<tr>
<td>WC/WDM</td>
<td>Water Conservation and Water Demand Management</td>
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<tr>
<td>WMP</td>
<td>Water Management Plan</td>
</tr>
<tr>
<td>WSA</td>
<td>Water Services Authority</td>
</tr>
<tr>
<td>WSAcT</td>
<td>Water Services Act</td>
</tr>
<tr>
<td>WSP</td>
<td>Water Service Provider</td>
</tr>
<tr>
<td>WU</td>
<td>Water User</td>
</tr>
<tr>
<td>WUA</td>
<td>Water User Association</td>
</tr>
</tbody>
</table>
1. Introduction

1.1 Industry, Mining and Power Generation Sector and Water Conservation and Demand Management

The Industry, Mining and Power Generation (IMP) sector uses close to 16% of the total water demand in South Africa. Water users in this sector can be grouped into two broad categories:

a) Those who supply their own water (mainly mines, power stations and large industries); and

b) Those who are serviced by Water Services Providers (WSP), mainly the commercial and smaller industries.

Each one of the three components of this sector – industry, mining and power generation - provide a variety of opportunities for applying WC/WDM, for both water quantity and water quality. WC/WDM can be achieved through the efficient use of water, pollution abatement, re-use and recycling of water and water-efficient technologies. This strategy aims at ensuring that such opportunities are pursued and implemented.

The WC/WDM Strategy for the IMP sector is one of the three components of the National Conservation and Water Demand Management Strategy (NWC/WDMS). The NWC/WDMS is itself a component of Section 3 of Chapter 3 of the National Water Resources Strategy (NWRS) which is the overarching Departmental strategy document.

The development of the NWRS is a requirement of the National Water Act (Act 36 of 1998). It sets out ways in which South Africa aims to achieve Integrated Water Resource Management (IWRM). It describes policies, strategies, plans and procedures by which this will be achieved. It includes contributions received from a wide range of stakeholders across the country, within and outside the Department. It is an interactive document that will continue to grow and change as the needs, capacity and understanding of South Africa's people change and grow.

1.2 Linkage with the National Water Conservation / Water Demand Management Strategy Document

This document should be read as an expanded version of the section on the IMP Sector in the NWC/WDMS. The reader is advised to obtain generic background information from the NWC/WDMS document, in which:

• The introduction provides the background, context and legislative development;
• Chapter 2 explains the need for a WC/WDM strategy, and
• Chapter 3 provides the applicable definitions and principles.

This background information is equally applicable to the two other sectoral strategies.

1.3 Structure of the Industry, Mining and Power Generation Strategy document

The IMP sector strategy document is structured as follows:

• A background to the IMP sector in South Africa (Chapter 2);
• A description of the process followed to develop the strategy as well as the overall generic objectives of the NWC/WDMS to which the IMP sector strategy is a contribution (Chapter 3);
• A situation analysis and the opportunities for WC/WDM in the IMP sector (Chapter 4);
• A description of the institutional roles (Chapter 5);
• Detailed outputs, their linkages to the generic objectives, activities associated to each and the responsible institution. These activities are prioritised to provide a framework for action for achieving the specific output. This chapter constitutes the bulk of the strategy (Chapter 6);
• A description of guidelines and tools to support the implementation of the IMP sector strategy (Chapter 7); and
• Conclusions outlining the contribution of the IMP strategy to the NWC/WDMS and the NWRS, future reviews of the NWRS and challenges (Chapter 8).
2. Background

The nature of water use in the Industry, Mining and Power Generation (IMP) sector is varied, given the diversity of industries and types of mining activity. If the water supplied to industries through the water services sector is included, this sector uses close to 16% of the total water demand in South Africa (Draft NWRS, 2003). The need for WC/WDM in the IMP sector is essential and of high priority, given that, together with the water services sector, it has the largest expected growth in water demand. Failing to implement WC/WDM in this sector might require the continuous development of new water resources, which will become increasingly costly.

2.1 Industries

South African industries include the processing of agricultural and forestry products, construction and manufacturing (including steel and metal), commercial industries and tourism-related industries. All industries use water in either their main or secondary activities, including those uses characteristic of the domestic sector, such as in office buildings. It is important to note that the use of water per unit output can range by an order of magnitude within any one industrial sector. In many cases, the range in water use within a sector is greater than the differences in water use between sectors. There is considerable scope to implement WC/WDM in the industrial sector, particularly for those industries that have not implemented water saving technologies and systems. The opportunity exists for optimising the use of water without significantly raising the cost of production.

Industrial activities impact severely on water quality through pollution. Pollution abatement techniques can be used in the sector by adopting modern technology. Economic tools such as incentives or penalties can be used to achieve the desired levels of pollution, but the sector might not yet be ready to make use of them. This is the focus of the proposed Waste Discharge Charge System. International experience has shown that, because of processes such as treatment, recycling and reuse, charging for waste discharge has a greater impact on the efficient use of water within an industry than the price of abstracted water.

2.2 Mining

South Africa is a major producer of diamonds, gold, platinum and other valuable minerals. Most mining operations require large volumes of water, but many should adopt further measures to use less water. Some mines use water in a closed circuit, only using additional water to compensate for evaporation and other losses. Other mines do not require water of potable quality for their operations and can re-use water from the domestic sector through partial treatment of sewage. This is often linked to the water generated by mine dewatering, although treatment of mine water for agricultural or industrial use is also being considered.

2.3 Power Generation

Power generation offers the opportunity for water conservation through the use of dry cooling technology at power stations as a replacement for wet cooling systems which consume more water. Eskom, the national electricity utility, has taken the lead in this regard, and has demonstrated the ability to develop dry cooling power stations with reduced water demand. These have been useful during periods of drought and should therefore be promoted, regardless of any abundance or scarcity of water. There is little opportunity for significant efficiency improvements at wet cooling power stations because there is already considerable re-use of water, albeit requiring extremely high quality intake water.

2.4 General considerations

Effluent water from the domestic sector is suitable for re-use in certain industries and mines. This has already been implemented in several industries and more opportunities are being explored. The economic value of water re-use in industry is often higher than that water being recycled to the agriculture sector. Cross-sectoral trading in the re-use of water therefore offers the possibility of improving water use efficiency with greater economic benefits. As in other cross-sectoral water trading (between agriculture and mining or industries), careful consideration should be given to the resulting social impacts, such as the job losses that are likely to result from phasing out irrigation activities. The possible impact on food security should also not be overlooked.
3. Process and objectives

3.1 Process

This strategy is the result of a process that began with a consultative workshop in July 1999, and has included:

a) Distribution of the draft Strategy document to all workshop participants for comment;
b) Review of all comments received by the steering committee;
c) Distribution of the edited version to a wider scope of key role-players and interested parties for comment;
d) Consolidation and final review based on all comments received by the steering committee; and

e) Submission of the Strategy to departmental management structures for review and approval.

During the process, pilot studies were undertaken to support and test the strategy and associated guidelines and tools.

The WC/WDMS for the IMP sector is a component of the NWC/WDMS. The NWC/WDMS is itself a component of the National Water Resources Strategy (NWRS) which is the overarching Departmental strategy document. An iterative process was followed to ensure that the IMP Strategy was aligned with the NWC/WDMS document.

3.2 Objectives of the National Water Conservation and Water Demand Management Strategy

The strategic outputs of the IMP Strategy, as further detailed in Chapter 5, are each linked to at least one of the generic objectives of the NWC/WDMS in order to demonstrate their contribution to the overall WC/WDM strategy. The generic objectives of the NWC/WDMS are given in Table 1.

Table 1: National Water Conservation / Water Demand Management Strategy Framework Objectives

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description of Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1</td>
<td>To facilitate and ensure the role of WC/WDM in achieving sustainable, efficient and affordable management of water resources and water services</td>
</tr>
<tr>
<td>Objective 2</td>
<td>To contribute to the protection of the environment, ecology and water resources</td>
</tr>
<tr>
<td>Objective 3</td>
<td>To create a culture of WC/WDM within all water management and water services institutions</td>
</tr>
<tr>
<td>Objective 4</td>
<td>To create a culture of WC/WDM for all consumers and users</td>
</tr>
<tr>
<td>Objective 5</td>
<td>To support water management and water services institutions to implement WC/WDM</td>
</tr>
<tr>
<td>Objective 6</td>
<td>To promote the allocation of adequate capacity and resources by water institutions for WC/WDM</td>
</tr>
<tr>
<td>Objective 7</td>
<td>To enable water management and water services institutions to a dept integrated planning</td>
</tr>
<tr>
<td>Objective 8</td>
<td>To promote international co-operation and participate with other Southern African countries, particularly basin-sharing countries, in developing joint WC/WDM strategies</td>
</tr>
</tbody>
</table>
4. Situation analysis: constraints and opportunities

This chapter analyses the context of the Industry, Mining and Power Generation (IMP) sector in South Africa, outlining the constraints and opportunities for WC/WDM.

The diversity of water use in this sector does not allow for general features that could be characteristic of the entire sector. In developing their own WC/WDM programmes, the various role-players should therefore assess the constraints and opportunities as presented by their own specific circumstances.

4.1 Constraints

Some of the constraints preventing or restricting the implementation of WC/WDM in the IMP Sector include:

- **Financial constraints:** Implementing WC/WDM requires investment that is not always readily available to industries, mines and power generation, particularly where non-efficient technologies are already installed. Recovering such an investment might not always be possible;
- **Institutional constraints:** There is sometimes a lack of co-ordination among the various role-players in the water supply chain during the planning process that involves the Department, bulk water suppliers, water retailers and water users within the sector. This can result in missed opportunities for optimising the use of water resources, given the specific opportunities for re-use of water from other sectors;
- **Limited awareness:** There is often a limited awareness in the IMP sector of the need to plan, implement and maintain WC/WDM measures, even though they may be able to obtain the capacity to do this; and
- **Technical constraints:** There is a lack of appropriate WC/WDM planning tools and guidelines available and no adequate standards and enforcement for the IMP sector. The diversity of this sector is acknowledged.

4.2 Opportunities

The IMP Sector offers a variety of opportunities for WC/WDM. These are summarised:

- New water-efficient technologies, limiting water use within an industrial plant, mine or power station to a minimum;
- Re-use of water within the industry or mine through a closed circuit, limiting additional water supply to meeting shortfalls resulting from water losses by evaporation; or otherwise
- Re-use of water from other sectors through partial treatment of sewage (e.g. mines can re-use water from the water services domestic sector);
- Pollution abatement technologies within an industry, allowing the discharge of effluents of an acceptable quality without polluting the receiving water resource systems; and
- Self-regulation through standards set by the international market.

The use of such opportunities results in benefits not only to the sector but also to society as a whole, through:

- Reduced cost of water (as an economic input) without affecting the profitability of the sector. Such benefits can then be passed down to the consumer;
- Environmental protection and greater sustainability through improved water quality, given that industries are among the major polluters;
- Meeting international standards, thus enhancing the profile of the business; and
- Impact on regional water resources, given that this sector is deemed to be one of the key drivers of new water demand.
5. Institutional roles

The roles and relationships of the various water sector institutions in respect to WC/WDM are reflected in Figure 1. Supporting comments provide a consolidated overview of the different WC/WDM roles and functions of the various water institutions.

It is important to note the different operational boundaries for water resources management and water services. Water resources management is undertaken on a catchment basis, whereas water services are provided according to municipal demarcation. This introduces complexity into the management of relationships between the Catchment Management Agency (CMA) and the Water Services Institutions (WSI).

CMAs are responsible for Water Resource Management (WRM) planning and implementation at a Water Management Area (WMA) level. This includes the entire scope of WC/WDM. However, it is envisaged that a WSI will have a greater focus on demand management for domestic and industrial use within its area of jurisdiction. Each CMA will co-ordinate the activities of those WSIs falling within the WMA, possibly one or more bulk water suppliers and a number of WUAs.

Figure 1: Roles of water sector institutions for WC/WDM
5.1 The role of the Department of Water Affairs and Forestry

The role of the Department with respect to WC/WDM is a generic role and is applicable to all sectors. It includes:

a) Co-ordinate national functions;
b) Develop generic tools and guidelines;
c) Develop policies and regulations;
d) Perform general regulatory functions;
e) Co-ordinate measures to create an education and water conservation awareness culture throughout South Africa;
f) Promote WC/WDM to all WSIs, including Water User Associations (WUA);
g) Monitor the implementation of WC/WDM by WSIs, including WUAs; and
h) Authorise power generation as a strategic use as recognised by the National Water Act (Act 36 of 1998).

5.2 The role of a Catchment Management Agency

The role of a CMA with respect to WC/WDM is:

a) Include WC/WDM as part of its Catchment Management Strategy (CMS), consistent with the NWRS;
b) Set conditions for water use authorisations;
c) Ensure the implementation of National Water Act (NWA) regulations;
d) Develop an implementation plan for the WC/WDM component of its Catchment Management Strategy (CMS);
e) Ensure and monitor the implementation of WC/WDM by Bulk Water Suppliers (BWS), the Water Services Authorities (WSA) and the major water users of the IMP sector (who are responsible for their own water supply) within its jurisdiction; and
f) Co-ordinate multi-sector regional WC/WDM plans, including the setting of targets.

5.3 The role of a Water Services Authority

The role of a Water Services Authority (WSA) with respect to WC/WDM is:

a) Include WC/WDM as part of its Water Services Development Plan (WSDP), being consistent with the NWRS and the CMS of the CMA within which it operates;
b) Develop an implementation plan for the WC/WDM component of its WSDP, including the requirements for those industries falling within its jurisdiction; and
c) Ensure and monitor the implementation of WC/WDM by Water Services Providers and their bulk water suppliers.

5.4 The role of a Bulk Water Supplier (including Water Boards)

The role of a bulk water supplier (as a Water Services Provider) is that assigned by the CMA and WSA as described above. As some of the bulk water suppliers (especially Water Boards) may have sufficient human resource capacity, they may be expected to:

a) Contribute to the development the WC/WDM component of the CMS or WSDP;
b) Assist water users in the IMP sector, and within its own area of water supply, in the implementation of WC/WDM measures, as and when required;
c) Implement WC/WDM measures related to its own service provision functions; and
d) Co-ordinate the implementation of WC/WDM measures through various measures, including a communication/ awareness campaign.

5.5 The role of water users in the Industry, Mining and Power Generation Sector

The role of water users in the IMP sector (responsible for their own water supply) is to implement, in collaboration with the CMA, the WC/WDM component of the CMS as assigned by the CMA and as described in the CMS.
6. Detailed outputs, activities and role-players

6.1 Approach

The outputs of the WC/WDM strategy for the Industries, Mining and Power Generation (IMP) sector are linked to at least one of the objectives of the NWC/WDMS. These strategic outputs are summarised in Table 2 and the list of activities for each output is detailed in Tables 3 to 7.

Table 2: Strategic Outputs for the Industry Mining and Power Generation Sector and links to the NWC/WDMS framework of objectives

<table>
<thead>
<tr>
<th>Output</th>
<th>Description of Output</th>
<th>Link to Objectives</th>
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<tbody>
<tr>
<td>1</td>
<td>Carry out ongoing water audit and water balance</td>
<td>3, 4 and 5</td>
</tr>
<tr>
<td>2</td>
<td>Benchmark, as far as possible and practical, water use for various processes and industries</td>
<td>3 and 4</td>
</tr>
<tr>
<td>3</td>
<td>Performance monitoring against benchmarks</td>
<td>3 and 4</td>
</tr>
<tr>
<td>4</td>
<td>Implement water conservation programme</td>
<td>2, 3 and 4</td>
</tr>
<tr>
<td>5</td>
<td>Marketing and publicising water conservation</td>
<td>3 and 4</td>
</tr>
</tbody>
</table>

Table 3: Description of activities for Output 1: To carry out ongoing water audit and water balance

<table>
<thead>
<tr>
<th>Priority No</th>
<th>Activity</th>
<th>Responsible institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Develop guidelines for water audits and water balance</td>
<td>DWAF, WSA, CMA</td>
</tr>
<tr>
<td>2</td>
<td>Install monitoring systems and devices within the water supply system of users</td>
<td>WU</td>
</tr>
<tr>
<td>3</td>
<td>Carry out yearly water audits and a monthly water balance</td>
<td>WU</td>
</tr>
<tr>
<td>4</td>
<td>Define targets and performance indices (compare to benchmarks within sector)</td>
<td>WU</td>
</tr>
<tr>
<td>5</td>
<td>Analyse audits to measure performance</td>
<td>WU</td>
</tr>
<tr>
<td>6</td>
<td>Monitor progress from previous audits.</td>
<td>WU</td>
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</tbody>
</table>
Table 4: Description of activities for Output 2: To benchmark water use for various processes and industries as far as possible and practical

<table>
<thead>
<tr>
<th>Priority No</th>
<th>Activity</th>
<th>Responsible institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design a classification system</td>
<td>DWAF, CMA, WSA</td>
</tr>
<tr>
<td>2</td>
<td>Design a database for water intensive industries (database could be linked to other existing databases)</td>
<td>DWAF, CMA, WSA</td>
</tr>
<tr>
<td>3</td>
<td>Populate databases (collection of information could be linked to licence authorisations)</td>
<td>CMA, WU</td>
</tr>
<tr>
<td>4</td>
<td>Design a process for benchmarking</td>
<td>DWAF, CMA, WSA, WU</td>
</tr>
<tr>
<td>5</td>
<td>Conduct research to identify best management practices</td>
<td>DWAF, CMA, WSA</td>
</tr>
<tr>
<td>6</td>
<td>Prioritise sub-sectors for benchmarking</td>
<td>DWAF, CMA, WSA</td>
</tr>
<tr>
<td>7</td>
<td>Implement benchmarking process in pilot sub-sectors</td>
<td>DWAF, CMA, WSA, WU</td>
</tr>
<tr>
<td>8</td>
<td>Implement benchmarking process, as far as possible, in all sub-sectors</td>
<td>CMA, WSA, WU</td>
</tr>
<tr>
<td>9</td>
<td>Update benchmarks</td>
<td>DWAF, CMA, WSA</td>
</tr>
</tbody>
</table>

Table 5: Description of activities for Output 4: To implement Water Conservation programme

<table>
<thead>
<tr>
<th>Priority No</th>
<th>Activity</th>
<th>Responsible institutions (in order of priority)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Determine WC/WDM opportunities</td>
<td>Water User (WU)</td>
</tr>
<tr>
<td>2</td>
<td>Undertake cost benefits analyses of WC/WDM</td>
<td>WU</td>
</tr>
<tr>
<td>3</td>
<td>Develop WC/WDM programme</td>
<td>WU</td>
</tr>
<tr>
<td>4</td>
<td>Implement WC/WDM programme</td>
<td>WU</td>
</tr>
<tr>
<td>5</td>
<td>Create awareness and educate employees and other relevant parties about WC/WDM</td>
<td>WU</td>
</tr>
</tbody>
</table>
**Table 6: Description of activities for Output 3: Performance monitoring against benchmarks**

<table>
<thead>
<tr>
<th>Priority No</th>
<th>Activity</th>
<th>Responsible institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Install monitoring system and measuring devices</td>
<td>CMA, WSA</td>
</tr>
<tr>
<td>2</td>
<td>Monitor the consumption and water quality of water users on a regular basis and base water charges on these readings</td>
<td>CMA, WSA</td>
</tr>
<tr>
<td>3</td>
<td>Review the Water Management Plans of water users and give comment</td>
<td>CMA, WSA</td>
</tr>
<tr>
<td>4</td>
<td>Analyse audits to measure performance</td>
<td>CMA, WSA</td>
</tr>
<tr>
<td>5</td>
<td>Monitor progress from previous audits</td>
<td>CMA, WSA</td>
</tr>
<tr>
<td>6</td>
<td>Monitor compliance to water efficiency regulations</td>
<td>CMA, WSA</td>
</tr>
<tr>
<td>7</td>
<td>Comment on the Water Conservation programme submitted by the users</td>
<td>CMA, WSA</td>
</tr>
</tbody>
</table>

**Table 7: Description of activities for Output 5: To market and publicise water conservation**

<table>
<thead>
<tr>
<th>Priority No</th>
<th>Activity</th>
<th>Responsible institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design a national WC/WDM campaign for the sector</td>
<td>DWAF, BR, CMA, WSA, WU</td>
</tr>
<tr>
<td>2</td>
<td>Develop relevant resource materials</td>
<td>DWAF, BR, CMA, WSA, WU</td>
</tr>
<tr>
<td>3</td>
<td>Initiate WC/WDM campaign</td>
<td>DWAF, BR, CMA, WSA</td>
</tr>
<tr>
<td>4</td>
<td>Design education and training programmes</td>
<td>DWAF, BR, CMA, WSA</td>
</tr>
<tr>
<td>5</td>
<td>Develop training material</td>
<td>DWAF, BR, CMA, WSA</td>
</tr>
<tr>
<td>6</td>
<td>Establish facilities for training</td>
<td>OB, CMA</td>
</tr>
<tr>
<td>7</td>
<td>Implement training programme</td>
<td>DWAF, BR, CMA, WSA, WU</td>
</tr>
</tbody>
</table>
Proposed policies to facilitate the achievement of the activities contained in Tables 3 to 7 include:

- Industrial users who require a licence to use water (that is, users who draw their water direct from a water resource) may be required, by February 2006, to develop and submit to the responsible authority a Water Management Plan (WMP) in accordance with guidelines that will be developed and made available by the Department in due course;

- For those users who have to submit a WMP as part of their Environmental Management Plan, the Department may choose to exercise its right to waive this requirement if the provisions of the Plan in this regard are satisfactory; and

- Large industrial or commercial users who draw their water from a municipal supply system and do not have to obtain a water use licence from any water management institution will not have to submit a WMP unless required to do so by the relevant WSA or WSP.

7. Supporting guidelines and tools

The following guidelines were developed to support the implementation of the WC/WDMS for the IMP sector:

- WC/WDM for the Hospitality Industry: Best Practice Guidelines, Benchmarks, Strategies and Business Plans;
- Generic Water Survey Methodology for IMP;
- Guidelines for the Selection of Water installation Components for Commercial (and Residential) Facilities; and
- Guidelines for WC/WDM at Hospitals.
8. Conclusion


This document constitutes the section on industry, mining and power generation of the NWC/WDMS that is the basis of Section 3 of Chapter 3 of the NWRS. The three documents are consistent and each provides sufficient detail at its own level.

Despite the diversity of the IMP sector, it holds the greatest potential for successful implementation of the strategy, assuming that more and more water users in the sector continue to demonstrate their commitment to WC/WDM.

8.2 Future reviews of the National Water Resources Strategy

It is envisaged that the NWRS will be reviewed every five years. The NWC/WDMS will therefore also be reviewed at similar intervals so that the appropriate contributions to the NWRS can be made. As WC/WDM is implemented, some of the eight objectives might become redundant. The local and regional water sector might also dictate other substantial reviews of the NWC/WDMS. The lessons to be learnt during the implementation of the strategy will contribute to these reviews.

8.3 Challenges

This IMP strategy has highlighted opportunities for achieving efficient water use in the wide-ranging industries in this sector. The challenge is to translate the strategy into concrete actions so that future generations can enjoy the benefits that the Department wishes to preserve for them.

This requires commitment of resources and a systematic implementation of the actions outlined in the strategy. Some water users in the Industry, Mines and Power Generation sector might require substantial short-term investments to implement WC/WDM, but the long-term benefits should not be overlooked. The responsibility of the sector towards contributing to the socio-economic development of South Africa should not overshadow the need to achieve equity and environmental sustainability. WC/WDM holds the potential to assist the sector in reaching this balance.

REFERENCES