

WATER CONSERVATION AND WATER DEMAND MANAGEMENT STRATEGY FOR THE INDUSTRY, MINING AND POWER GENERATION SECTOR



WATER IS LIFE - SANITATION IS DIGNITY

SOUTH AFRICA IS A WATER- SCARCE COUNTRY



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA



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FOREWORD BY THE DIRECTOR-GENERAL



South Africa is located in a predominantly semi-arid part of the world. The climate varies from desert and semi desert in the West to sub-humid along the Eastern Coastal Area, with an average rainfall for the country of about 450 mm per year (mm/a), well below the world average of about 860 mm/a, while evaporation is comparatively high. As a result, South Africa's water resources are, in global terms, scarce and extremely limited (NWRS1, 2004).

In addition, South Africa is facing increasing water demands to meet the needs of a rapidly growing and urbanising population, changing lifestyles, and economic growth. At the same time, climate change is driving the country towards a warmer and drier future, with longer and more extreme droughts, and more intense floods. The results are less water available to meet the growing demand, thus a threat to water security. Given constraints and demands on the resource, we

cannot afford practices which reduce water supply, such as inefficient water management practices, lack of infrastructure maintenance, non-revenue water and poor governance.

Water demand is likely to grow at about 1.2% over the next ten years, therefore a need to find new ways of reducing water demand and increasing availability – which move beyond 'traditional engineering solutions' of infrastructure development (NWRS2, 2013). Water Conservation and Water Demand Management (WC/WDM) is an integral part of broader strategies needed to reconcile the available supply with the demand for water. It is key to ensure sustainable use of our water resources, and to ensure sufficient water is available for the current and future requirements. The Water Conservation and Water Demand Management Strategy is a fundamental step in promoting water use efficiency as provided in the United Nations Sustainable Development Goal number 6. This is consistent with both the National Water Act (Act 36 of 1998) and Water Services Act, 1997 (Act 107 of 1997) which emphasizes effective management of our water resources and conservation. Water Conservation and Water Demand Management should not be seen as punitive or restrictive but as a responsible approach that will contribute to postponement of infrastructure augmentation, mitigation against climate change, support to economic growth and ensuring that adequate water is available for equitable allocation.

This WC/WDM strategy emphasizes the fact that all consumers and water institutions have 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.

Let us work together towards the prosperity of our nation for the benefit of future generations. Let us seize all opportunities of ensuring responsible use of our water resources.

DR SD PHILLIPS
DIRECTOR-GENERAL

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EXECUTIVE SUMMARY



Water is a critical socio-economic enabler. Water is fundamental in the production of food and energy and, in South Africa, access to water is a constitutional right. Inequality and poverty are widespread in South Africa and the economic growth required to alleviate poverty needs water for the production of goods and services. South Africa is a water-scarce country where water creates significant socio-economic challenges. Population growth is increasing demand for water. Additionally, increased temperatures due to the effects of climate change are likely to exacerbate water scarcity in South Africa in the future. In order to enable economic growth to reduce poverty and inequality in an increasingly water-scarce environment, South Africa needs to maximise the benefit of every drop of water and ensure that not a single drop of this precious resource is wasted.

The National Water and Sanitation Masterplan (NWSMP) puts the National Water Resource Strategy (NWRSS2, now updated to NWRSS3) into action and comprises a number of interventions with a specific focus on reducing water demand. The Department of Water and Sanitation (DWS) has also developed its first Integrated Water Quality Management Policy and Strategy in support of this. This indicates acknowledgement of the necessity to formulate enhanced water sector strategies in order to improve South Africa's resilience to climate change. A water deficit is predicted for South Africa by 2030 (DWS, 2018) and it is amidst increasing concern regarding water security that the importance of

updated strategies targeting water use efficiency (WUE) in various sectors has become apparent.

Water Conservation and Water Demand Management (WC/WDM) constitutes a vital initiative that supports the implementation of integrated water resources management (IWRM) principles in order to strengthen the country's ability to address future water deficits. Water conservation and water demand management (WDM) are respectively defined as follows (DWAF, 2004):

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

WC/WDM is thus concerned not only with reducing water usage and water wastage but also safeguarding the quality and quantity of water resources. Figure i presents a graphical representation indicating how demand can be constrained to within supply augmentation plans and that this can delay the need for augmentation.

The potential benefits of WC/WDM include the following:

- Water security whereby water demand does not exceed the reliable supply or there is balanced water supply and demand.

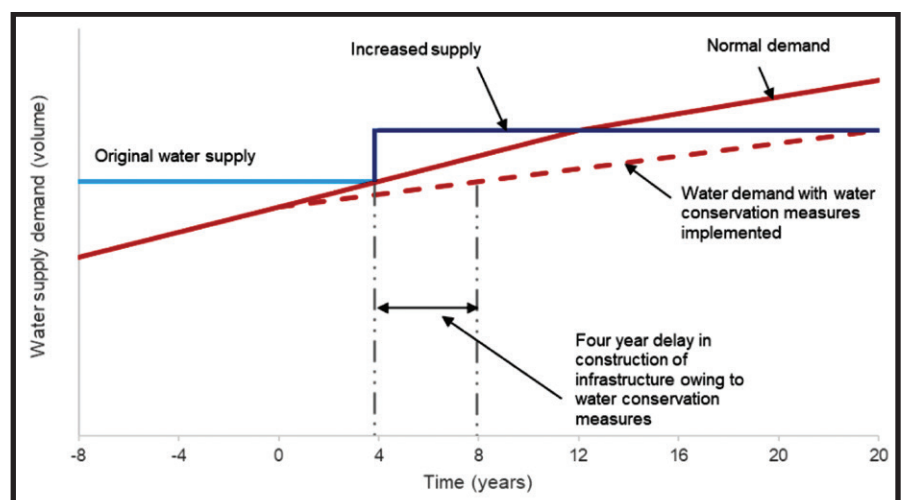


Figure i: Graphical illustration of the positive impact of WC/WDM in a system water balance

- Financial sustainability of the water utility, particularly in those instances where metering, billing and cost recovery are properly implemented.
- Effective operation and maintenance of infrastructure which prevents excessive leakages, avoids deterioration in service delivery, prevents intermittent supply and water rationing, reduced pressures etc. This also prevents intermittent supply which is often caused by excessive leakages as well as depressurisation which damages water supply infrastructure and contributes to water borne diseases due to contaminants seeping into water distribution pipelines.
- Well maintained water supply infrastructure and assets resulting in good service delivery and decreased water leakages.
- Prevention of the creation of unnatural wetlands at micro-environment level which provides a breeding ground for mosquitoes and other health hazards to communities.
- Relatively short timeframes and cost-effective approaches are possible at a macro-level through WC/WDM interventions. By postponing the construction of augmentation schemes such as large dams, WC/WDM can be implemented in a relatively short time span with a relatively smaller budget as opposed to large augmentation schemes which usually require major capital investment with considerable implementation times of 10 to 25 years, with associated environmental impacts.
- Improved water production through reduced pumping and pipe failures, reduction in chemical costs and associated greenhouse gases.
- Reduction in water use which requires less infrastructure, less debt and lower fixed water costs.
- Flexibility in implementation of WC/WDM intervention measures which can be introduced incrementally.
- Build relationships between government and citizens as the community plays an active role in successful WC/WDM projects.
- Cost reflective water charges that support sustainable water services by implementing WC/WDM that creates well measured components of the water cycle. This promotes improved knowledge management and costs reductions.

This context led DWS to develop WC/WDM strategies in 2004. The aim of these strategies was to promote sustainable use and management of water resources in South Africa. Since the development of these strategies, new information, concepts and guidelines have been developed which promotes the effective implementation of WC/WDM. To incorporate these advances, the WC/WDM strategies have been updated.

It is important to note that the WC/WDM strategies and implementation plan provide guidance for the water sector as a whole. Although these documents have been developed by DWS, the sector needs to mobilise and work together to implement WC/WDM.

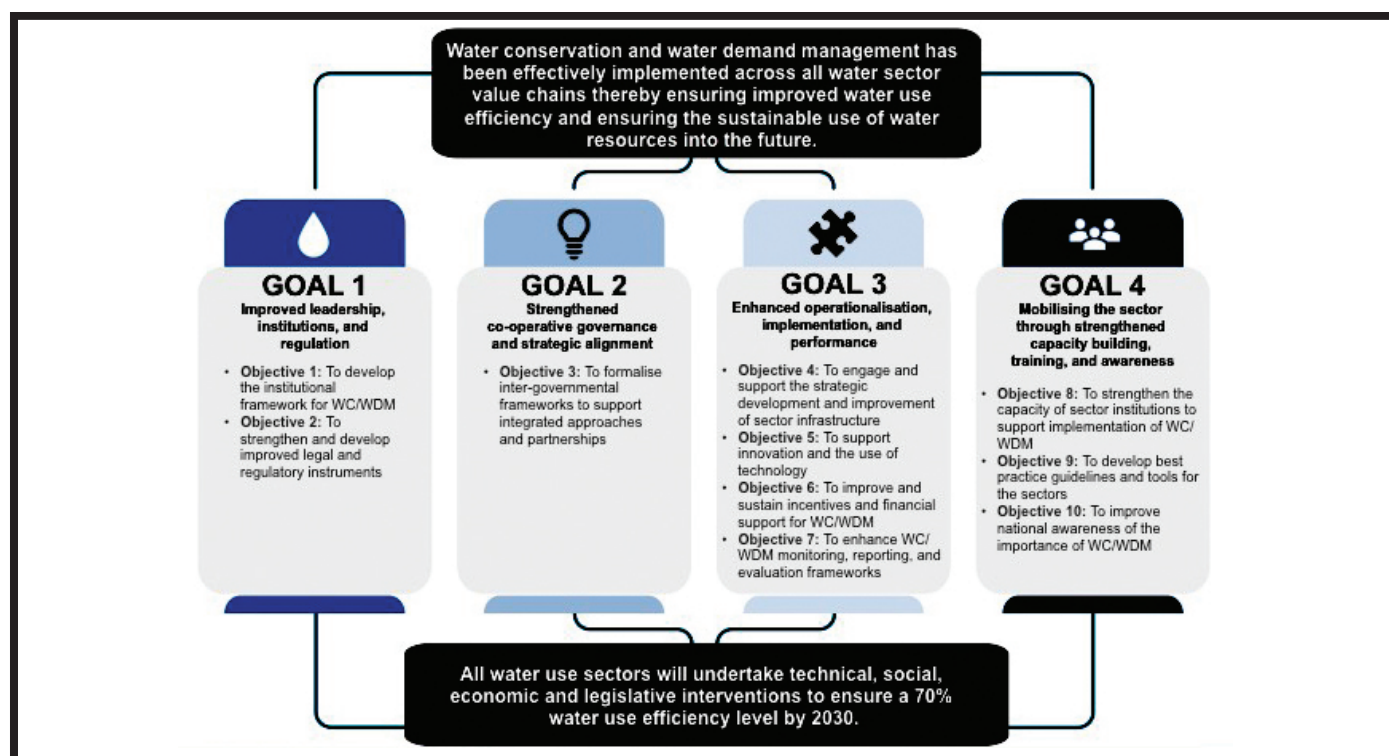
The National WC/WDM strategy provides the overarching framework for the sector strategies. The National WC/WDM strategy provides a number of core purposes:

- To provide a framework against which the more practically focused sub-sector strategies can be structured. This coherence is important in ensuring alignment in approach at local, provincial and national levels, as well as being consistent between sectors.
- To support in unlocking more strategic aspects that enable the sub-sector strategies to be implemented.
- To create an improved enabling environment that will facilitate the implementation of WC/WDM nationally and locally.

Towards this end, the WC/WDM strategies have three core focal areas, namely, 1) effective government structures to oversee and regulate the implementation of WC/WDM; 2) strategic development and

management of best practice, supporting tools, and financial instruments that guide the effective implementation of WC/WDM; and 3) knowledge management, capacity building and innovation that are

leveraged to support improved WC/WDM implementation. These have been translated into Goals and Objectives, as follows:



There are four WC/WDM strategies with the National Strategy serving as the overarching strategy for South Africa. Three sector strategies have been developed which includes a strategy for the agricultural sector; the industry, mining and power sectors; and the water services sector. These sectors are significant water users in South Africa, and thus sector-specific strategies have been designed to define the way forward to improved water use and management in these sectors. This document presents the IMP sector strategy.

IMP WC/WDM SUMMARY

The **industry, mining and power generation (IMP) sectors** are increasingly concerned about their water security. South Africa is overexploiting its freshwater resources, and water could become a large constraint on the

implementation of the National Development Plan (Hedden & Cilliers, 2014). If demand continues at current levels, by 2030 there will be insufficient surface and groundwater resources available to meet the projected demand – an estimated national water deficit of 17 % (DWS, 2018). The projected gap is driven by low tariffs, inadequate cost recovery, over-consumption, inefficient use, wastage, leakages, inappropriate infrastructure choices, inadequate planning, and implementation, as well as population and economic growth (DWS, 2018).

The IMP sector's water demand is equivalent to 7 % of the country's total water demand with projections indicating that the sector will have the largest growth in water demand in coming years.

IMP represents key economic sectors contributing collectively to

a quarter of GDP as illustrated in the figure below. Manufacturing is the fourth largest industry in South Africa (13.5%), followed by the mining industry (8.7%), and electricity (4%) (Leonard, 2019). When energy related taxes and levies in the energy sector are included, energy contributes to around 15 % of GDP (Department of Minerals and Energy, 1998).

The demand for water in South Africa is expected to increase in all sectors. The largest increase in water demand by 2035 will likely come from the municipal sector, which will increase from 5.5 km³ to 7.2 km³ by 2030, followed by the IMP sector that will increase from 1,2 km³ to over 3 km³, and the agricultural sector, from 8.9km³ to 9.7 km³ (Hedden & Cilliers, 2014). Table i shows the IMP sector's water use in 2000, 2018 as well as the projected future demand in doubling 2030 and 2035.

Table i: IMP current and projected future water use

Sector	Sub-sector	2000 (Statistics South Africa, 2006)		2018 (DWS, 2018)	Future demand (Hedden & Cilliers, 2014)		
		Volume of water used (Mm ³ /year)	% of total water use	% of total water use	Current	2030	2035
Industry	Food processing	123	1	-	1 200	3 300	2 800
	Other manufacturing	577	4	-			
	Total Industry	700	5	3			
Mining	Gold mining	127	1	-			
	Other mining	261	2	-			
	Total Mining	388	3	2			
Power	Total Power ¹	297	2	2			
IMP Total		1 385	10	7			

¹ This refers to consumptive use in the power sector, such as through evaporative power generation, and excludes non-consumptive use as associated with hydropower.

With limited “new water sources” becoming available and demand continuing to increase in all sectors, WC/WDM become critically important over the next decade. This strategic analysis various identifies problems and barriers to address while also highlighting opportunities for improvement. These feed into the Theory of Change as the focus areas to address.

- Business risk related to assurance of supply and quality of intake. The business case for water use efficiency illustrates that while upfront costs for WC/WDM interventions may be high, improving performance through operations, performance standards and technology can improve assurance of supply.
- Inability to enforce regulation due to limited data collected or submitted. The lack of an integrated system within the DWS where data can be reported and stored is limiting the efficiency of monitoring, compliance and enforcement. Strengthening the regulatory environment enable implementation, monitoring and enforcement. There is a need to ensure that the Compliance, Monitoring and Enforcement strategy is aligned with the requirements for implementing WC/WDM in the IMP sector.
- Uneven awareness understanding, and uptake of lesson learning. There is inequitable access to/sharing of resources across the sector. Integrated knowledge sharing platforms allows users to share knowledge more effectively, facilitated by training and awareness to improve uptake of lesson learning.

- The broadness of the IMP sector and its considerable intra-sectoral variability presents both a challenge and an opportunity. Strategic alignment and co-development of solutions and partnerships will improve uptake of new technology and provide technical support.
- Competing mandates such as economic development of the country vs WC/WDM can also be facilitated by strategic alignment and tighter and more effective regulation. This implies better definition of institutional roles and capacity to support these roles.
- Limited strategic guidance and policy implementation around issues such as water re-use and recycling, as well as weak co-operative government links to the requirement for a strengthened regulatory environment and additional human resources to improve implementation of identified measures.
- Identification of appropriate incentives (subsidies, preferential treatment when additional water allocation is required) and reduction in disincentives (paying for allocation vs actual use) to encourage WC/WDM measures.

The Theory of change below builds on the learnings, findings and recommendations arising out of the Strategic Analysis, highlighting the key issues, the barriers that require addressing and the focus areas for change in order to make an impact. This identifies problems both specific to the IMP sector but also broader issues that link to the National Strategy. The Theory of Change has been translated into the actions for the IMP strategy and is presented in Table ii.

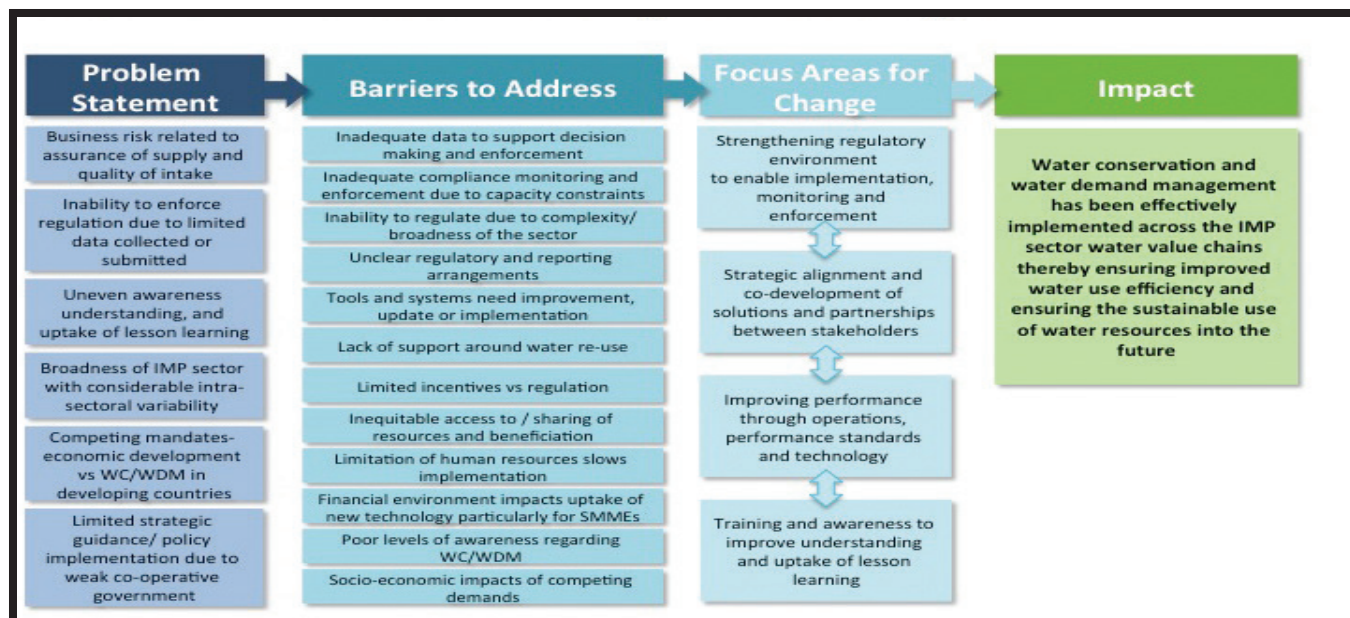
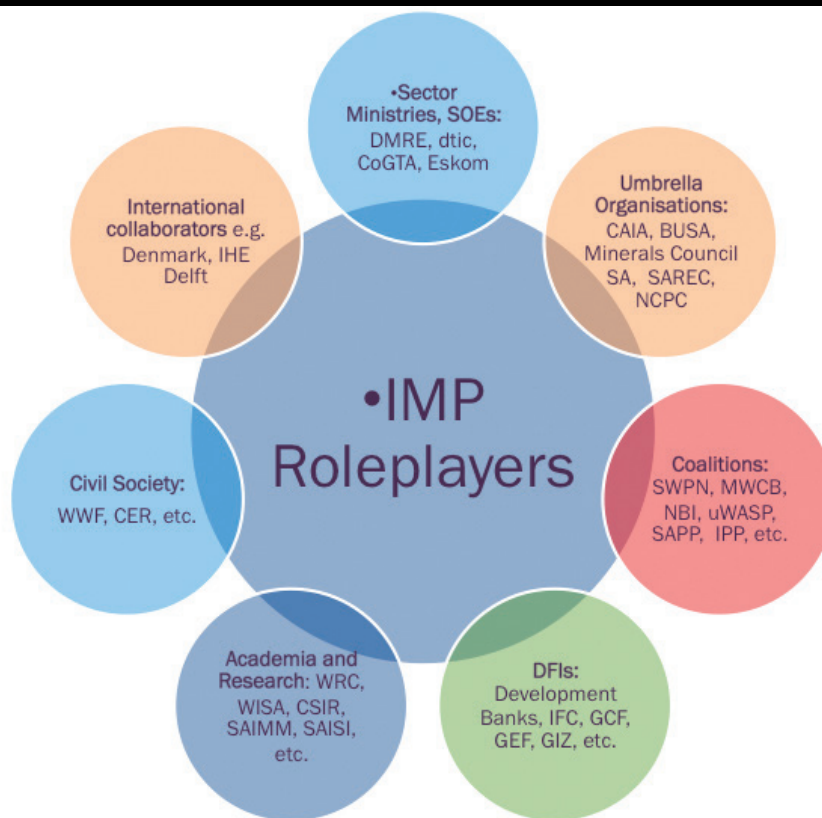


Table ii: IMP WC/WDM Strategic Goals, Objectives, and Actions

GOALS	OBJECTIVES	STRATEGIC ACTIONS	RESPONSIBLE*
GOAL 1 Improved leadership, institutions, and regulation	Objective 1: To develop the institutional framework for WC/WDM	1.1 Institutionalise WC/WDM in the water resource management value chain	DWS, Regional Offices, CMAs
	Objective 2: To strengthen and develop improved legal and regulatory instruments	2.1 Strengthen WC/WDM Regulatory tools and implement key strategies	DWS, Regional Offices, legal support
		2.2 Ensure that WC/WDM conditions are included in Water Use Authorisations	
		2.3 Ensure that compliance monitoring and enforcement is undertaken regularly	
GOAL 2 Strengthened co-operative governance and strategic alignment	Objective 3: To formalise inter-governmental frameworks to support integrated approaches and partnerships	2.4 Promote self-regulation and reporting	DWS, DMRE, DTIC, WRC, government departments, CMAs, NT
		3.1 Engage sector Departments to discuss and agree on roles, responsibilities, and targets for implementing WC/WDM measures	
		3.2 Create alignment of the institutional frameworks, industrial programmes and principles of the relevant government departments and stakeholders in support of WC/WDM	
		3.3 Continue to engage sector stakeholders through existing platforms (e.g., Water Sector Leadership Group, CMAs, Water Forums, MWCB, SWPN, amongst others) to embed and encourage Private-Public Partnerships (PPP)/ Coalitions	

GOALS	OBJECTIVES	STRATEGIC ACTIONS	RESPONSIBLE*
GOAL 3 Enhanced operationalisation, implementation, and performance	Objective 4: To engage and support the strategic development and improvement of sector infrastructure	Not applicable	Not applicable
	Objective 5: To support innovation and the use of technology	5.1 Promote and encourage the sharing of WC/WDM instruments/ tools/ technology, research, and the uptake of new technology in WUE	DWS, WRC, DMRE, DTIC
	Objective 6: To improve and sustain incentives and financial support for WC/WDM	6.1 Reinstate WC/WDM incentives, such as the WC/WDM sector awards, innovation recognition awards 6.2 Ensure that WC/WDM is entrenched as part of the sustainable financial solutions provided by the banking sector	DWS, DMRE, DTIC, DBSA, etc.
	Objective 7: To enhance WC/WDM monitoring, reporting, and evaluation frameworks	7.1 Harmonise existing data collection and reporting systems, where appropriate, and expand to all water users 7.2 Establish Water Use Efficiency baselines for all IMP sectors and sub-sectors 7.3 Develop a simplistic, consistent, easy to access, and easy to integrate monitoring and reporting tool for all sectors and sub-sectors	DWS, WRC, Regional Offices, WRC, DTIC
GOAL 4 Mobilising the sector through strengthened capacity building, training, and awareness	Objective 8: To strengthen the capacity of sector institutions to support implementation of WC/WDM	8.1 Expand and implement an awareness and training campaign to improve understanding and operationalisation of WC/WDM support tools for the IMP sector and uptake of lesson learning/ sharing	DWS, Regional Offices, CMAs, DMRE, DTIC, DALRRD, WRC
	Objective 9: To develop best practice guidelines and tools for the sectors	9.1 Develop, update and extend benchmarks, and set performance standards and guidelines to improve operational efficiency	DWS, WRC, DMRE, DTIC, DALRRD, DFFE
	Objective 10: Improve national awareness of the importance of WC/WDM	10.1 Develop and collate knowledge products to be shared widely through an easily accessible integrated platform 10.2 Engage more actively on existing platforms for shared learning and engagements (Water Stewardship Platforms, Partnership Platforms, WRC dialogue, WISA, etc.) 10.3 Develop and publish annual reports on status quo of WC/WDM	DWS, WRC, Regional Offices, academia

*The parties listed as responsible for these actions may not comprise an exhaustive list.



The National Water Act (Act 36 of 1998) recognises the pivotal role that WC/WDM plays in water resource management with the objective of reconciling water supply and demand. An enabling environment is required to implement WC/WDM strategies and legislation. Although local government is ultimately responsible for implementing WC/WDM in the water services sector, other government departments, institutions and citizens all have an important role to play by influencing, through co-operative governance, and implementing WC/WDM in all spheres of government and at home. The IMP sectors and sub-sectors are cross-cutting in many instances with both Agriculture (agri-processing) as well as Water Services in that many industries are within municipal boundaries. There are a range of key role-players identified who, not only inform the Strategy, but also will be implementers.

There is a suite of interventions required for achieving the Vision for WC/WDM in the country. Given the

current resources available, it is not possible to address all of WC/WDM Strategic Actions simultaneously; human, technical and financial resources as well as information and systems constraints will inhibit this. Nevertheless, it is critical that all water use sectors undertake the necessary interventions to improve the levels of water use efficiency that currently exist. As such, the strategic target is that all water use sectors must ensure a minimum of 70% water use efficiency by 2030, understanding that there is an obligation on all water use sectors to be continually seeking for improvements in these levels.

Therefore, the focus of the implementation plan is to be on delivering change for prioritised challenges. This does not mean that work on other areas pertinent to WC/WDM will not continue, but it serves to guide the allocation of human and financial resources for the 5-year period of the strategy, with the objective of building for longer term improvements. Therefore, a key

approach will be to prioritising critical concerns, while ensuring that other issues are addressed through ongoing management or monitoring for future prioritisation and action.

The following aspects are critical to create an enabling environment:

- Political Will and Leadership
- Financing
- Institutionalisation
- Coordination
- Public Support
- Enforcement
- Monitoring and Evaluation.

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DEFINITIONS

Catchment: An area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.

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

Groundwater: Rainfall that infiltrates into the soil surface and percolates downwards, seepage from water in streams, lakes and artificial impoundments, and irrigation water that percolates down into the ground and accumulates in aquifers comprising permeable underground layers of sand, gravel and rock.

Net zero water: Where the amount of alternative water used, and water returned to the original water source is equal to the total water consumed.

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

Surface water: Runoff that occurs in streams and rivers, also in natural lakes and reservoirs, a major resource for water supplies.

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

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 Institutions: Water institutions include both Water Management Institutions and Water Services such as Catchment Management Agencies, Water User Associations, Water Boards, etc.

Water licence: A general authorisation issued by a responsible authority for water use is authorised by a licence under the National Water Act, 1998.

Water Positive: A term used to describe an industry or corporation that makes more water available than it uses.

Water resource: Water that can be used to contribute to economic activity, including a water course, surface water, estuary and ground water in an aquifer.

Water use efficiency: The ratio of water used productively.

Yield: The average annual volume that can be drawn from a supply source or supply option to meet a specific demand at a specified service level.

ABBREVIATIONS

AMD	Acid Mine Drainage
A-NDC	NDC first adaption communication
ARC	Agriculture Research Council
BUSA	Business Unity South Africa
CAIA	Chemical and Allied Industries Association
CMA _s	Catchment Management Agencies
CMS	Catchment Management Strategy
COGTA	Cooperative Governance and Traditional Affairs (consists of the Department of Cooperative Governance (DCOG) and the Department of Traditional Affairs (DTA); the Municipal Demarcation Board (MDB), South African Local Government Association (SALGA) and South African Cities Network (SACN) are entities reporting to the COGTA Minister; the Municipal Infrastructure Support Agent (MISA) reports to DCOG.)
CSIR	Centre for Scientific and Industrial Research
DME	Department of Minerals and Energy
DPME	Department of Planning, Monitoring and Evaluation
DMRE	Department of Mineral Resources and Energy
DTIC	Department of Trade Industry and Competition
DWS	Department of Water and Sanitation
ECA	Environment Conservation Act
EIP _s	Environmental Implementation Plans
ESG	Environmental, Social, and corporate Governance
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ICP _s	International Cooperating Partners
IFC	International Finance Corporation
IGCCC	Intergovernmental Committee on Climate Change
IMP	Industry, Mining and Power generation
IPAP	Industry Policy Action Plan
IPAP2	Industrial Policy Action Plan
IRP	Integrated Resource Plan
IWRM	Integrated Water Resources Management
M&E	Monitoring and Evaluation
MPRDA	Mineral and Petroleum Resource Development Act
MWCB	Mine Water Coordinating Body
Natsurv	National Industrial Water and Waste-water Survey
NCCAS	National Climate Change Adaptation Strategy
NCPC	National Cleaner Production Centre
NDC	Nationally Determined Contribution
NDP	National Development Plan

NECSA	National Energy Corporation of South Africa
NEMA	National Environmental Management Act
NSoW	National State of Water
NWA	National Water Act
NWRS	National Water Resource Strategy
OECD	Economic Co-operation and Development
PCC	Presidential Climate Commission
PMC	Project Management
PPPs	Public-Private Partnerships
PSC	Project Steering Committee
SAAFWUA	South Africa Association of Water User Associations
SADC	Southern African Development Community
SAIPPA	South African Independent Power Producer Association
SALGA	South African Local Government Association
SAPP	Southern African Power Pool
SDGs	Sustainable Development Goals
SMMEs	Small-, Medium- and Micro-Enterprises
SWPN	Strategic Water Partners Network
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
US EPA	United States Environmental Protection Agency
WASH	Water, Sanitation and Hygiene
WC/WDM	Water Conservation and Water Demand Management
WDM	Water Demand Management
WISA	Water Institute of South Africa
WMAs	Water Management Areas
WMC	Waste Mitigation Charge
WRC	Water Research Commission
WSA	Water Services Act
WSA	Water Services Authorities
WSDP	Water Services Development Plan
WSIs	Water Service Institutions
WSLG	Water Sector Leadership Group
WUAs	Water User Associations
WUE	Water Use Efficiency

1 Introduction



1.1 BACKGROUND

The developmental imperatives of South Africa are significant and challenging in the face of increasing socio-economic pressures, climate change and ever-increasing demands on a limited water resource. South African livelihoods are dependent on water which is essential to day-to-day life as well as a broader economy that requires water as part of processes and production. Due to the uneven distribution of water resources across the country, the water sector has developed extensive infrastructure to transfer water between catchments to address supply deficits, particularly for key economic nodes. Nevertheless, South Africa falls within the top quarter (25%) of the world's most water-stressed nations (Water Resources Institute, 2023). South Africa is situated in a region that is predominantly semi-arid with an average rainfall for the country of about 450 mm per annum (mm/a), which is well below the world average of about 860 mm/a, while evaporation is comparatively high (DWAF, 2004). According to the 2020/2021 National State of Water (NSoW), 98% of the country's available water resources are already allocated (DWS, 2022). The third edition of the National Water Resource Strategy (NWRS3) highlights that South Africa is currently over-exploiting its renewable water resources on a national level and requires both demand-side and supply-side interventions to address a projected supply deficit of 17% by 2030 (DWS, 2021). There are also limited opportunities to supplement

future water requirements with conventional surface water resources.

South Africa is ranked amongst the top half of most vulnerable countries in terms of climate change vulnerability and particularly with regards to water-related climate change vulnerability (University of Notre Dame, 2023). It is also ranked amongst the top half of countries that have suffered the most climate change-related historic losses in the last two decades (Eckstein, Kunzel, Schafer, & Winges, 2019). Therefore, the need to develop improved levels of climate resilience in conjunction with efforts to address developmental objectives will be important for the medium- to long-term.

This will require a coherent multi-sectoral response, undertaken with the leadership of the Department of Water and Sanitation (DWS). A climate resilient water sector, that underpins the country's sustainable development objectives, will require the combined efforts of public sector, private sector and civil society stakeholders.

While the national strategic framework sets the overall direction, its development was the result of concurrent top-down and bottom-up approaches in which the emerging issues from the sectors were taken into account at the national level while the national context also informed the sectoral frameworks. This allowed for alignment between the national and sector frameworks, while allowing for the sectoral frameworks to capture

the sector-specific nuances that may not be applicable across all sectors at a national level. The strategy development process incorporated an ongoing dialogue with key stakeholders.

1.2 RATIONALE

South Africa falls within the top quarter (25%) of the world's most water-stressed nations (Water Resources Institute, 2023). According to the 2020/2021 NSoW, 98% of the country's available water resources are already allocated (DWS, 2022). The second edition of NWRS2 (issued in 2013, now in its third revision) already highlighted that South Africa is currently over-exploiting its renewable water resources on a national level and requires both demand-side and supply-side interventions in order to address a projected supply deficit of 17% by 2030 (DWS, 2018). There are also limited opportunities to supplement future water requirements with conventional surface water resources.

Water has been identified as key to ensure social, economic and environmental viability, sustainability and growth. The water-energy-food interrelationship is critical to building more resilient and sustainable economy. Not taking water insecurity into account when planning can – apart from affecting a country's economic growth – also lead to fragility and conflict. Ensuring that the available water supplies are optimally utilised, and the current resources are optimally stretched

is important in ensuring equitable access to and sharing of resources. This contributes directly to the National Development Plan (NDP) 2030 goal of **“reducing demand rather than increasing supply”**, particularly when considering the impact of climate change that will continue to disrupt the already stressed water resources.

Water demand in South Africa is expected to increase over coming years especially in the agricultural, industrial, and municipal sectors. The rising demand is driven by a combination of population growth, urbanisation, rising incomes, irrigation expansion, non-renewable electricity generation and a growing manufacturing sector (Donnenfeld, et al., 2018). Despite this, South Africa has managed to enable continued socio-economic development through the strategic use of bulk water transfers and the ongoing development of large-scale infrastructure. Nonetheless, the national water resource system is under pressure.

The above is further exacerbated by South Africa’s vulnerability to climate change and is ranked amongst the top half of most vulnerable countries in terms of climate change vulnerability overall, and water-related climate change vulnerability in particular. The increased frequency and severity of droughts in recent years – such as Cape Town’s ‘Drought of the Century’ between 2016 and 2018 – and other similar extreme weather events such as the Cape storms and occasional flooding in Gauteng and Kwa-Zulu Natal have exacerbated the situation. At the time of publishing the NSoW, water restrictions were still applicable for all water supply systems in the Eastern Cape (which is currently experiencing a drought), the Polokwane system in Limpopo, and the Bloemfontein system in Free State Province (DWS, 2022). While the water required for human consumption (including commercial and industrial use), is not as large as other uses, it can be highly significant in catchments where there are high levels of

allocation, and this is exacerbated in drought conditions which are expected to increase in frequency and severity due to climate change.

When water resources become scarce, domestic water supply will generally be prioritised over agriculture and the environment. This is becoming increasingly important as South Africa works towards the attainment of the Sustainable Development Goals (SDGs) Goal 6, as well as addressing historic imbalances in terms of access to safe and secure water and sanitation services. This while also considering the increasing challenges related to population growth and urbanisation.

While the quantity of water is the main focus in improving water use efficiency (WUE), water quality cannot be removed from the discourse as South Africa is plagued with a range of pollution problems in many of its catchments, further impacting on the water security of the country. Poor water quality impacts upon the fitness for use of water resources and can reduce the volumes of water available for use. As such, effective and efficient use of scarce water resources is becoming increasingly critical. Adaptation actions are considered essential to building resilience to climate change impacts and the WC/WDM strategy is a key strategy to address growing water stress.

There are many dimensions to the business of water resource management that are interdependent and interconnected, and as such this creates considerable complexity in ensuring the attainment of strategic objectives. Towards this end, progressive development of the NWRS (now in its third edition) has endeavoured to provide structured implementation plans to support the national development agenda.

Giving effect to the NWRS3, is the National Water and Sanitation Masterplan (NWSMP), with its rallying “Call to Action”, makes a specific note to reduce water demand among

other intervention options. In support of this, and the NWRS, DWS is undertaking important studies such as the updating of the water reconciliation strategies and updating the national water balances to provide a more informed baseline from which directed actions can be developed and implemented. This demonstrates the recognition of the need to develop improved water sector strategies that help to build a more climate resilient South Africa. In response, the National Water and Sanitation Masterplan is also being updated to ensure the country is incrementally improving its sectoral resilience. Noting the water security concerns and the projected deficit by 2030 (DWS, 2018), the development of updated strategies to drive WUE across various sectors have become equally important.

At the centre of all these strategic instruments, WC/WDM is an essential part of the national imperative to address all three of the integrated water resources management (IWRM) principles (social equity, economic efficiency and environmental sustainability) and to underpin the country’s ability to address future water deficits. According to the 2004 National WC/WDM strategy (DWAF, 2004), water conservation and water demand management (WDM) are respectively defined as follows:

- **Water Conservation:** The minimisation of loss or waste, the care and protection of water resources and the efficient and effective use of water.
- **Water Demand Management (WDM):** 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.

The Organisation for Economic Co-operation and Development (OECD, 2001) defines water conservation as “the preservation, control and development of water resources, both surface and groundwater, and prevention of pollution”. According to Brooks, WDM can be seen as any actions that reduce the amount of water used or enable water to be used more efficiently or any action that keeps the water cleaner during that use than it otherwise would be (Brooks, 1997). Other scholars have defined WDM as a strategy or approach that stresses making better use of existing water supply rather than developing new ones; and uses a set of incentives to achieve this (Savenije & Van Der Zaag, 2002). From these definitions, it can be concluded

that while water conservation has a broader scope which includes the protection of water resources and prevention of pollution, WDM is specifically focused on reducing water use/consumption by water users. WC/WDM intervention are thus concerned not only with reducing water usage and water loss but also preserving the state of water resources both in terms of quality and quantity. Figure 1-1 illustrates graphically how water conservation can be used to constrain demand to levels that align with planned supply augmentation. The reduced demand can also delay the need for increased supply projects.

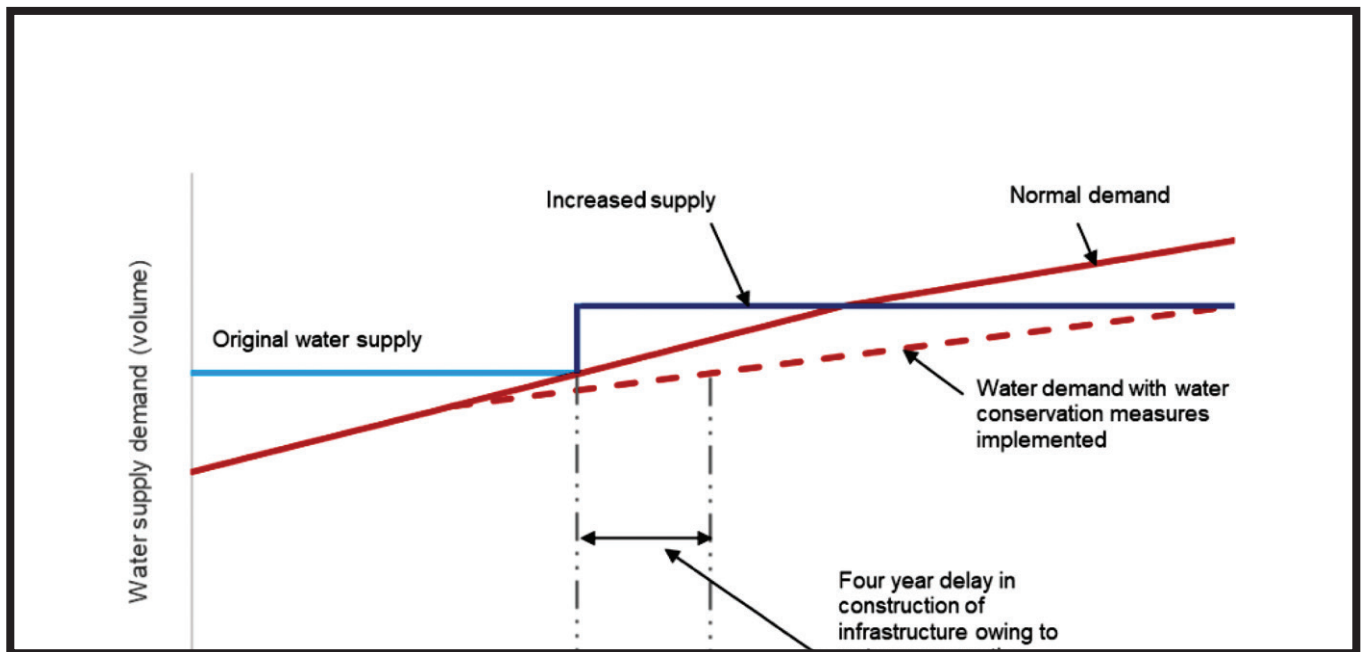


Figure 1-1: Graphical illustration of the positive impact of WC/WDM in a system water balance

Unfortunately, the term ‘water use efficiency’ is used with different meanings in the literature and by stakeholder groups and sectors, creating confusion. The California Water Code calls water use efficiency “the efficient management of water resources for beneficial uses, preventing waste, or accomplishing additional benefits with the same amount of water.” This aligns with the fact that for many water use efficiency is generally understood to be the ratio between water use and water withdrawn from the resource. In this regard, the NWRS (Editions 2 and 3) both recognise that WC/WDM strategies are an important approach to driving water use efficiency across the various socio-economic sectors.

The current national and sectoral WC/WDM strategies were developed in 2004 with sectoral strategies covering the agriculture, water services, and industry, mining, and power generation (IMP) sectors. Since 2004, it can be appreciated that there have been significant shifts in

the status of the country’s water resources, both in water availability and quality, as well as a range of changes to the broader social economy of the country. The past decade has also seen significant changes in the understanding of climate change and the detrimental impacts that this is having on water resource globally. The onset of the Covid-19 pandemic has also placed renewed focus on SDG 6 and has specific water, sanitation and hygiene (WASH) implications. With water now being considered Personal Protective Equipment in the fight against Covid-19, and other future pandemics, it becomes even more critical to improve our country’s WUE. Additionally, there have also been advancements in technology and innovative approaches to water management. It is in this regard that the 2004 WC/WDM national and sectoral strategies have been updated.

Parallel to the updating of the WC/WDM strategies, DWS has undertaken the development and finalisation of the NWRS3, is updating of the National Water and Sanitation

Masterplan, is updating and revising the country's National Water Balances which looks to support the reconciliation of water supply and demand, is undertaking processes to establish Catchment Management Agencies while reforming other elements of the institutional framework, as well as a significant range of other essential interventions to improve water security and ensure sustainable growth and development. The water sector is inherently complex and as such these concurrent processes create the unique opportunity for improved levels of alignment that provide the basis for a resilient and sustainable future. The developmental agenda as set out in the National Development Plan (National Planning Commission, 2012) recognises the importance of water and as such this will require horizontal integration between sectors as well as vertical integration between levels of government, the private sector and society. This requirement is well understood by the water sector, albeit complex, and will require active support and guidance. Towards this end, it will be essential to:

- Provide clear sector leadership that fosters engagement and active

participation in interventions to ensure a water secure future.

- Progressively establish, develop and capacitate the institutional frameworks that manage and develop water resources to provide effective water governance.
- Improve the levels of cooperative government between the spheres of government to ensure aligned approaches that support development while recognising the criticality of reducing water demand.
- Develop approaches to operational management and development of water resources that underpin improved levels of WUE.
- Undertake initiatives to build capacity and create awareness so that the WC/WDM becomes an entrenched behaviour amongst all South Africans.

1.3 IMP SECTOR INSTITUTIONAL CONTEXT

The **industry, mining and power generation (IMP)** sectors are increasingly concerned about their water security. South Africa is overexploiting its freshwater

resources, and water could become a large constraint on the implementation of the National Development Plan (Hedden & Cilliers, 2014). If demand continues at current levels, by 2030 there will be insufficient surface and groundwater resources available to meet the projected demand – an estimated national water deficit of 7 % (DWS, 2018). The projected gap is driven by low tariffs, inadequate cost recovery, over-consumption, inefficient use, wastage, leakages, inappropriate infrastructure choices, inadequate planning, and implementation, as well as population and economic growth (DWS, 2018).

The IMP sector's water demand is equivalent to 7 % of the country's total water demand as seen in Figure 1-2 (DWS, 2018) with projections indicating that the sector will have the largest growth in water demand in coming years.

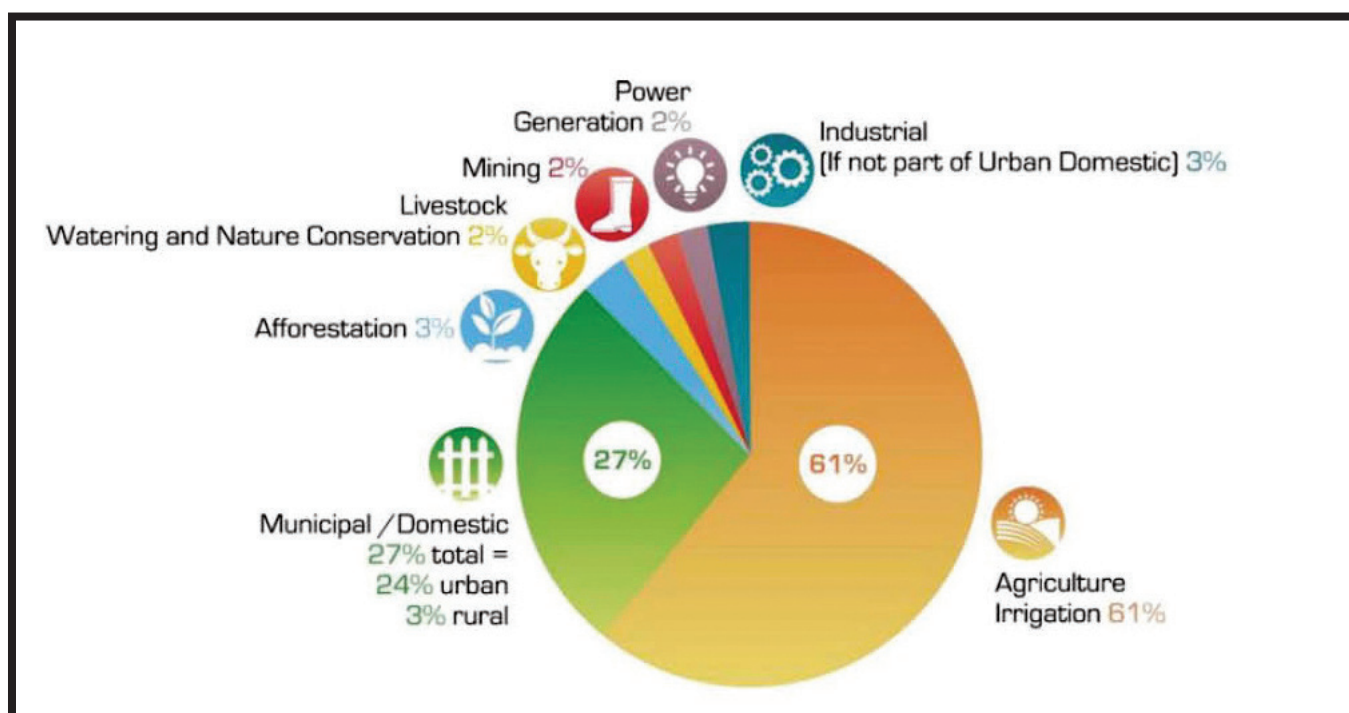


Figure 1-2: Water use in South Africa by sector (DWS, 2018)

IMP represents key economic sectors contributing collectively to a quarter of GDP as illustrated in Figure 1-3. Manufacturing is the fourth largest industry in South Africa (13.5%), followed by the mining industry (8.7%), and electricity (4%) (Leonard, 2019). When energy related taxes and levies in the energy sector are included, energy contributes to around 15 % of GDP (Department of Minerals and Energy, 1998).

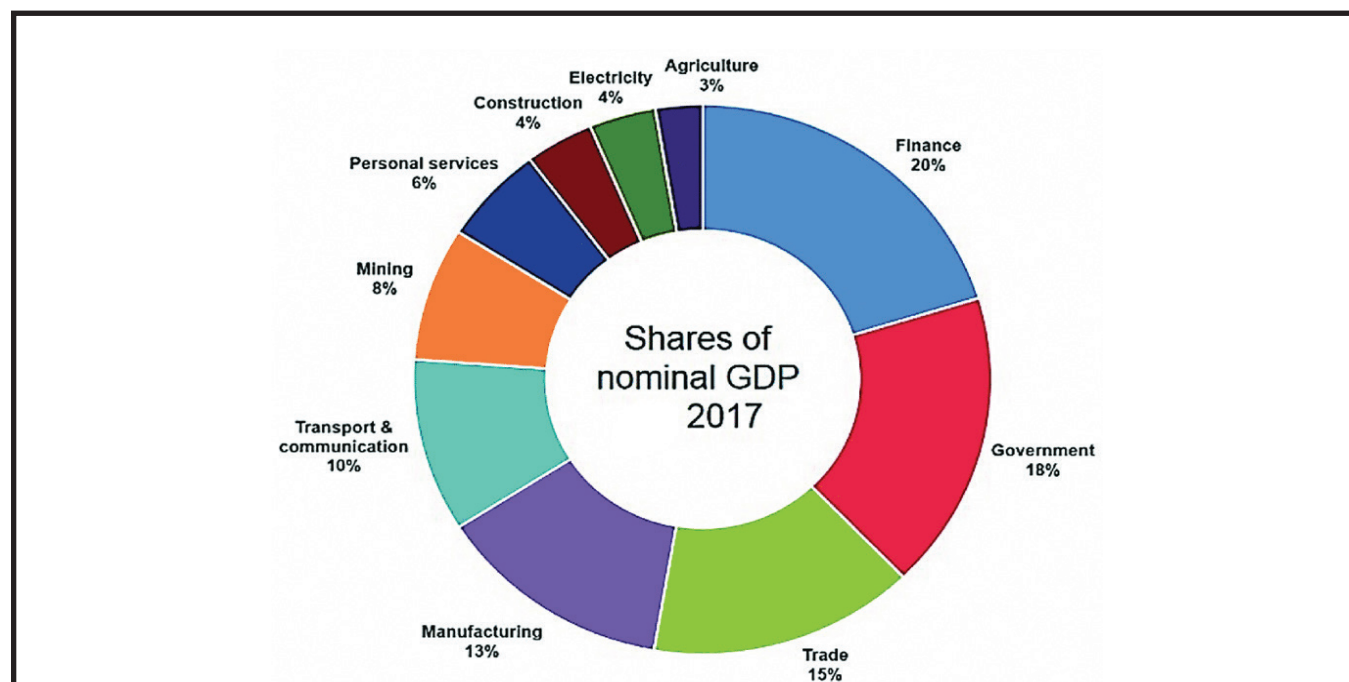


Figure 1-3: Contribution of the manufacturing, mining and energy sectors compared to other sectors

The demand for water in South Africa is expected to increase in all sectors. The largest increase in water demand by 2035 will likely come from the municipal sector, which will increase from 5.5 km³ to 7.2 km³ by 2030, followed by the IMP sector that will increase from 1,2 km³ to over 3 km³, and the agricultural sector, from 8.9km³ to 9.7 km³ (Hedden & Cilliers, 2014). Table 1-1 shows the IMP sector's water use in 2000, 2018 as well as the projected future demand in 2030 and 2035.

Table 1-1: IMP current and projected future water use

Sector	Sub-sector	2000 (Statistics South Africa, 2006)		2018 (DWS, 2018)	Future demand (Hedden & Cilliers, 2014).		
		Volume of water used (Mm ³ /year)	% of total water use	% of total water use	Current	2030	2035
Industry	Food processing	123	1	-	1 200	3 300	2 800
	Other manufacturing	577	4	-			
	Total Industry	700	5	3			
Mining	Gold mining	127	1	-			
	Other mining	261	2	-			
	Total Mining	388	3	2			
Power	Total Power ¹	297	2	2			
IMP Total		1 385	10	7			

¹ This refers to consumptive use in the power sector, such as through evaporative power generation, and excludes non-consumptive use as associated with hydropower.

2 Strategic Imperatives

2.1 ALIGNING TO DEVELOPMENT AGENDAS

2.1.1 Global

Populations continue to increase increasing demand and putting strain on water resources. Globally 2.2 billion people lack access to safely managed drinking water (UN, 2023). The quality of water resources is threatened by improper sanitation and wastewater discharges. Additionally, rising global temperatures due to climate change have the potential to increase water scarcity in many regions. It is against this background that world leaders and companies are raising the alarm and targeting ways to use less water and reduce our impacts on water resources. Some of the concepts that are gaining traction worldwide are water use efficiency, Net Zero Water and Sustainable Development Goal 6.

By improving water use efficiency, aims to do more with less, i.e., producing more revenue or product per volume of water consumed. This is a common metric for companies to use to track their performance and is often included in annual environmental, social, and corporate governance (ESG) reporting. More recently, aspirations have shifted to targeting Net Zero Water or becoming Water Positive. Companies such as BP, PepsiCo, Facebook, Procter & Gamble have set water positive or Net Zero Water targets (BP, 2023; PepsiCo, 2021; Meta, 2021; Procter & Gamble, 2021). The terminology of Net Zero originated in the energy space with targets to achieve Net Zero greenhouse gas emissions. According to the United States Environmental Protection Agency (US EPA), “achieving Net Zero Water means limiting the consumption of water resources and returning it back to the same

watershed so as not to deplete the resources of that region in quantity or quality over the course of the year” (US EPA, 2022).

The United Nations (UN) Sustainable Development Goals (SDGs) form part of the 2030 Agenda for Sustainable Development which aims to “provides a shared blueprint for peace and prosperity for people and the planet, now and into the future” (UN, 2023). SDG 6 focuses on water and sanitation and aims to ensure availability and sustainable management of water and sanitation for all (UN, 2023). SDG 6 has the following eight targets which are as follows:

- 6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all.
- 6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.
- 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.
- 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.
- 6.5 By 2030, implement integrated water resources management at all levels, including through

transboundary cooperation as appropriate.

- 6.6 By 2030, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.
- 6.7 By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.
- 6.8 Support and strengthen the participation of local communities in improving water and sanitation management.

Under the eight targets sit twelve indicators for the targets. South Africa adopted the SDGs in 2016 and reports on all twelve of the indicators for SDG 6 (Goal Tracker, 2023). SDG 6 has strong linkages with the other 16 SDGs (Figure 2-1). Water provides the means for development contributing to food security, energy production and health, while access to sanitation has health and environmental benefits. Additionally, water and sanitation are enablers for development and well-being in that access to water and sanitation will contribute to reduced inequality and poverty and help to foster a quality learning environment and reduce conflict.

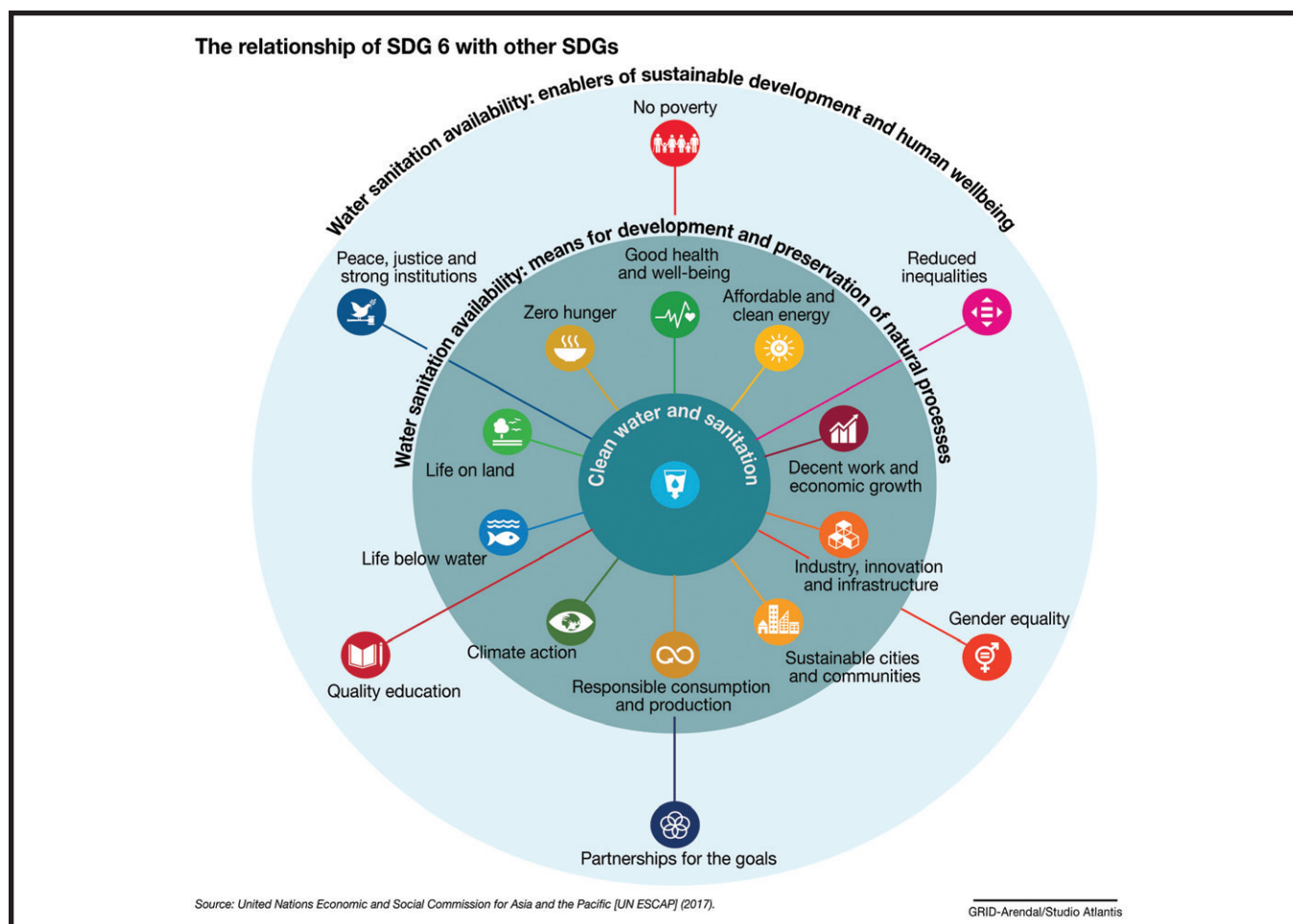


Figure 2-1: The relationship of SDG 6 with the other SDGs (GRID-Arendal/Studio Atlantis, 2020)

2.1.2 National

Development

South Africa's vision for 2030 is presented in the NDP 2030 (National Planning Commission, 2012). The primary aim of the NDP is to eliminate poverty and reduce inequality by "growing an inclusive economy, building capabilities, enhancing the capacity of the state and promoting partnerships throughout society" (National Planning Commission, 2012). The NDP recognises that access to water and sanitation services are cross cutting issues and necessary enablers for addressing poverty, unemployment and inequality. In terms of water, the NDP envisages that by 2030:

- All main urban and industrial centres will have reliable water supply to meet their needs, while increasingly efficient agricultural water use will support productive rural communities.
- Natural water sources will be protected to prevent excessive extraction and pollution. Water will be recognised as a foundation for activities such as tourism and recreation, reinforcing the importance of its protection.

- Where rivers are shared with other countries, South Africa will ensure that it continues to respect its obligations.
- Before 2030, all South Africans will have affordable, reliable access to sufficient safe water and sanitation. Service provision arrangements will vary in different parts of the country, with different approaches adopted for densely built-up urban areas and scattered rural settlements.
- Water demand will be reduced by 15 percent below baseline levels in urban areas by 2030.

Although the NDP pre-dates the SDGs, there is alignment and a strong resonance. The Department of Planning, Monitoring and Evaluation (DPME) found that 74% of the 169 SDG targets are addressed by the NDP as shown in Figure 2-2 (Leigh, 2021). Of the 26% targets that are not addressed in the NDP, 19% are addressed in other sectoral programmes and 7% are not applicable to South Africa such as targets related to small islands and fragile states (Leigh, 2021). Thus, working towards the vision of the NDP will also drive progress on achieving the SDGs.

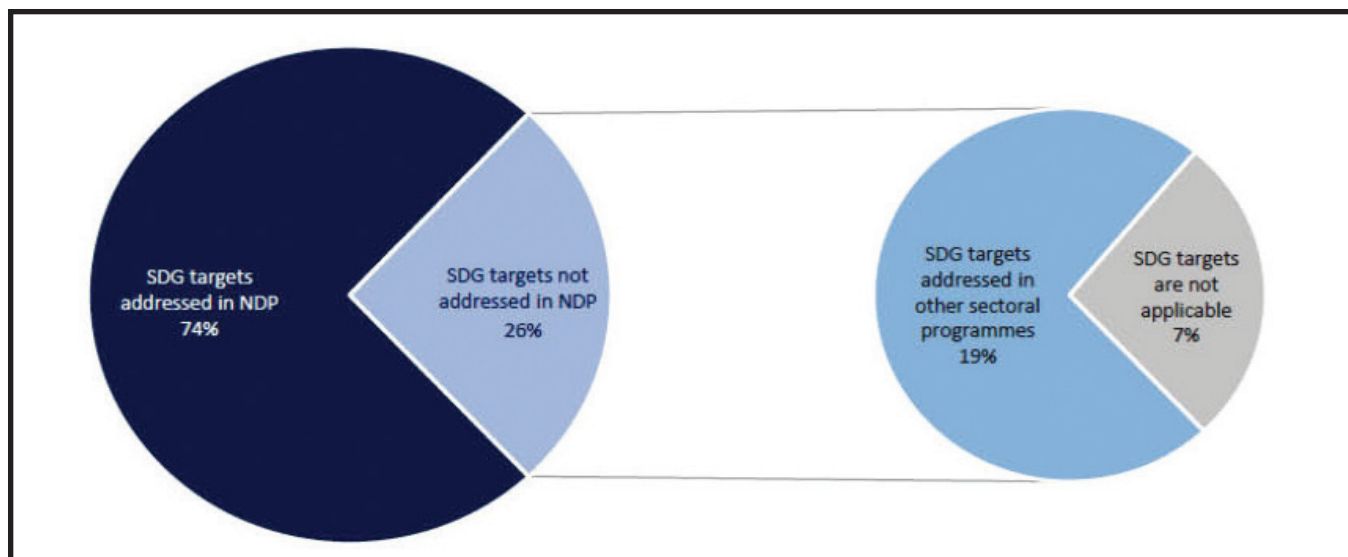


Figure 2-2: Alignment of the NDP to the SDGs (Leigh, 2021)

The NWRS is the planning instrument for implementing the National Water Act (NWA) and provides strategic guidance to the broader water sector as to the range of activities required over a five-year period, to realise identified water resource management goals. Hence, it provides the framework for managing water resources across all sectors. Since the promulgation of the NWA in 1998, three editions of the NWRS have been published. NWRS2 and 3 build on the progress that was made with the implementation of the NWRS1 and are tasked to ensure that national water resources are managed towards achieving South Africa's growth, development and socio-economic priorities in an equitable and sustainable manner over the next five to ten years. The NWRS gives effect to the achievement of various SDGs Targets, 6.3, 6.4, 6.5, 6.6. Through NWRS the setting of water quality targets for different water resources is prioritised demonstrating support for target 6.3. The NWRS stipulates the principles for water conservation and water use and determines how much water is available in each water management area. This mandate directly aligns with the SDG 6.4 tenets. Moreover, the NWRS provides for the delivery of SDG 6.5 through the establishment of water resource management institutions and the

inter-relationships between these institutions including international obligations. The NWRS also discusses how to manage water and sanitation under a changing climate.

Climate

South Africa is committed to combatting climate change and submitted its first Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2015. The NDC was subsequently updated in 2021 (Republic of South Africa, 2021). The NDC provides South Africa's target for greenhouse gas (GHG) emissions in order to mitigate climate change and is aligned to the Paris Agreement. Achieving the NDC requires decarbonisation of the energy sector as this contributed 80.1% of the 2017 emissions (DFFE, 2021). The Integrated Resource Plan (IRP) of 2019 is key to this transition. Although primarily concerned with energy production, the IRP acknowledges the challenge of water scarcity in South Africa and considers adopting technologies which reduce water usage (DMRE, 2019). It also discusses the water-energy nexus and the possibility of deploying energy technologies for desalination to improve water security (DMRE, 2019).

The 2021 NDC also contains South Africa's first adaption communication (A-NDC) which provides goals and investment requirements for implementing the adaption plan. Future projections indicate a decline in average rainfall accumulation in the Western Cape and increased frequency and severity of drought in the central interior (Republic of South Africa, 2021). Lower priority water users, such as agriculture, are expected to be impacted by increased pressure on the water sector in the South-Western Cape and the West Coast (Republic of South Africa, 2021). The A-NDC is informed by the National Climate Change Adaptation Strategy (NCCAS) which was adopted in 2020.

The NCCAS consists of four strategic objectives which are supported by interventions, outcomes and actions (Republic of South Africa, 2020). The four strategic objectives of the NCCAS are:

- 1) Build climate resilience and adaptive capacity to respond to climate change risk and vulnerability.
- 2) Promote the integration of climate change adaptation response into development objectives, policy, planning and implementation.

- 3) Improve understanding of climate change impacts and capacity to respond to these impacts.
 - 4) Ensure resources and systems are in place to enable implementation of climate change responses.
- objective to improve water quality and halve the proportion of untreated wastewater and increase recycling. Actions 1.1.7, 1.1.27 and 1.1.32 support the improvement of water-use efficiency furthering progress towards SDG 6.4. SDG 6.6 aims to protect and restore water-related ecosystems and is supported by action 1.1.23.

Table 2-1 summarises the water-related actions in the NCCAS. Action 1.1.32 supports improving the quality of treated wastewater in urban areas which supports the

Table 2-1: Actions related to WC/WDM in the NCCAS (Republic of South Africa, 2020)

Action		Description
Intervention 1: Reduce human, economic, environment, physical and ecological infrastructure vulnerability and build adaptive capacity		
Outcome 1.1: Increased resilience and adaptive capacity achieved in human, economic, environment, physical and ecological infrastructure		
1.1.7	Invest in knowledge and capacity building for climate-resilient rural livelihoods.	Support rural livelihoods through knowledge and capacity building, particularly for women from vulnerable households. This could include capacity in areas like climate-smart and conservation agricultural practices, water-saving practices and building climate resilient structures.
1.1.27	Support farmers (male and female) to use and manage water more sustainably.	This will involve the promotion and subsidisation of water conservation technologies, taking into account gendered roles and responsibilities in relation to water management.
1.1.28	Ensure that water management institutions incorporate adaptive management responses.	This will involve providing continued support and advice to water management institutions on how to incorporate adaptive management responses.
1.1.32	Adopt water-wise water management practices in urban areas.	This will involve identifying and adopting suitable water-wise water management practices in urban areas such as sustainable drainage systems and wastewater treatment systems that are able to clean wastewater to a high enough water-quality level that it can be re-used.

The Presidential Climate Commission (PCC) was established by President Cyril Ramaphosa with the purpose of “oversee(ing) and facilitat(ing) a just and equitable transition towards a low-emissions and climate-resilient economy” (PCC, 2023). The PCC’s Just Transition Framework defines a just transition in relation to water as follows:

“... A just transition builds the resilience of the economy and people through affordable, decentralised, diversely owned renewable energy systems; conservation of

natural resources; equitable access of water resources; an environment that is not harmful to one’s health and well-being; and sustainable, equitable, inclusive land use for all, especially for the most vulnerable” (PCC, 2022).

3 IMP WC/WDM Context

3.1 LEGAL INSTRUMENTS

Alignment with major national and sector specific legislation, strategy or policy such as the NWRS3, NDP 2030, Climate Change Bill, the Industry Policy Action Plan (IPAP), Waste Discharge Charge System and sector-based roadmaps, which set out the country's intentions for expanding each sector, will be vital to ensure that there is alignment and provide the link between water quality management measures and how these impact on the quantity and availability of water.

Industrial activity is regulated through the Industrial Development Corporation Act, 1940. Act No. 22

of 1940 embeds water stewardship approaches during the establishment of new or development of existing industries and industrial undertakings, the National Water and Sanitation Master Plan -2019 and the NWRS 2 (2013).

Mining and related activities in South African are regulated by the Mineral and Petroleum Resource Development Act, 2002 (MPRDA) in conjunction with the National Environmental Management Act (Act 107 of 1998) (NEMA), and the regulations promulgated thereunder regulate the environmental aspects related to mining. The mining industry is governed and administered by the National Department of Mineral Resources and Energy (DMRE).

The power and energy related sectors are regulated by the National Energy Act, 2008 (Act 34 of 2008), which ensures that diverse energy resources are available in sustainable quantities and at affordable prices in South Africa. In addition, the Act provides for the increased use of renewable energies, contingency energy supplies, the holding of strategic energy feedstock and carriers, and adequate investment in energy infrastructure. The DMRE is mandated to govern and administer the energy sector.

The legislative documents and policies summarised in Table 3-1 contribute to shaping and framing the IMP sector.

Table 3-1: Key Legislation in the IMP Sector

	Title	Description
Legal/ Regulatory	Section 39 of National Water Act, 36 of 1998	Regulates the discharge of waste or water containing waste into a water resource through a pipe, canal, sewer, or other conduit; and the disposal of water which contains waste from, or which has been heated in any industrial or power generation process
	Section 28 of National Environmental Management Waste Act, 59 of 2008	Requires that any industry activity that generated waste that affects more than one province to submit an industry waste management plan
	Industrial Development Corporation Act, Act 22 of 1940	Embeds water stewardship approaches during the establishment of new or development of existing industries and industrial undertakings
	Government Notice 704 of 4 June 1999	States that mines must collect, confine, and take reasonable measures to prevent water resource contamination as well as ensure that water used in any process at a mine or activity is recycled as far as practicable
	The Water Services Act (No. 108 of 1997) (WSA)	Enable DWS to intervene in municipalities where monitoring of municipal water and sanitation services by DWS indicates failure to adhere to national norms and standards, subject to section 139 of the Constitution
	National Energy Act, 2008	The National Energy Act, 2008 (Act 34 of 2008) ensures that diverse energy resources are available in sustainable quantities and at affordable prices in South Africa. In addition, the Act provides for the increased use of renewable energies, contingency energy supplies, the holding of strategic energy feedstock and carriers, and adequate investment in energy infrastructure

	Title	Description
	Nuclear Energy Act, 1999	<p>Provides for the establishment of the National Energy Corporation of South Africa (NECSA) and defines its functions, powers, financial and operational accountability, governance and management:</p> <ul style="list-style-type: none"> • To provide for responsibilities for the implementation and application of the Safeguards Agreement and any additional protocols entered by the Republic of South Africa and the International Atomic Energy Agency in support of the Nuclear Non-Proliferation Treaty acceded to by the Republic; • To regulate the acquisition and possession of nuclear fuel, certain nuclear and related material and certain related equipment, as well as the importation and exportation of, and certain other acts and activities relating to, that fuel, material and equipment in order to comply with the international obligations of the Republic; • To prescribe measures regarding the discarding of radioactive waste and the storage of irradiated nuclear fuel; and to provide for incidental matters.
	Petroleum Products Act, 1977	<p>Provide measures in the saving of petroleum products and an economy in the cost of the distribution thereof, the maintenance and control of a price, for the furnishing of certain information regarding petroleum products, and for the rendering of services of a particular standard, in connection with petroleum products;</p> <ul style="list-style-type: none"> • Provide for the licensing of persons involved in the manufacturing and sale of certain petroleum products; • Promote transformation of the South African petroleum and liquid fuels industry; • Provide for the promulgation of regulations relating to such licenses; and • Provide for matters incidental.
	The Gas Act, 2001	<p>The aims of the Gas Act are as follows:</p> <ul style="list-style-type: none"> • To promote the orderly development of the piped gas industry; • To establish a National Regulatory Framework; • To establish a National Gas Regulator as the custodian and enforcer of the National Regulatory Framework
	Mineral and Petroleum Resources Development Act 28 of 2002	<p>The Mineral and Petroleum Resources Development Act 28 of 2002 intends:</p> <ul style="list-style-type: none"> • to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources; and • to provide for matters connected therewith.

	Title	Description
	National Environmental Management: Biodiversity Act 10 of 2004	<p>The National Environmental Management: Biodiversity Act 10 of 2004 intends:</p> <ul style="list-style-type: none"> • to provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; • the protection of species and ecosystems that warrant national protection; • the sustainable use of indigenous biological resources; • the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; • the establishment and functions of a South African National Biodiversity Institute; and • for matters connected therewith
	National Environmental Management: Protected Areas Act 57 of 2003	<p>The National Environmental Management: Protected Areas Act 57 of 2003 intends:</p> <ul style="list-style-type: none"> • to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; • for the establishment of a national register of all national, provincial and local protected areas; • for the management of those areas in accordance with national norms and standards; • for intergovernmental co-operation and public consultation in matters concerning protected areas; and • for matters in connection therewith.
	The Environment Conservation Act (Act 73 of 1989) (ECA)	To provide for the effective protection and controlled utilization of the environment and for matters incidental thereto.
	Mine Health and Safety Act 29 of 1996	To provide for protection of the health and safety of employees and other persons at mines.
	National Environment Management: Air Quality Act 39 of 2004	<p>The National Environment Management: Air Quality Act 39 of 2004 intends:</p> <ul style="list-style-type: none"> • to reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; • to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; • for specific air quality measures; and • for matters incidental thereto.

3.2 POLICY INSTRUMENTS

Table 3-2: Key Legislation in the IMP Sector

Policy	Title	Description
Policy	Mine Water Management Policy	<p>Aimed at:</p> <ul style="list-style-type: none"> ensuring improved water quality management and reduction of water pollution, including through Acid Mine Drainage (AMD) treatment strengthening the protection of water resources from mine water contamination from short to long term providing a basis for holding parties potentially liable for negative effects and damages through AMD-related pollution
	Eskom Zero Liquid Effluent Discharge Policy, 1987	Aims to reduce freshwater usage and eliminate liquid effluent discharge to avoid impacting water resources through effective water management processes and the use of mine water
	Nuclear Energy Policy, October 2008	South African government's vision for the development of an extensive nuclear energy programme by ensuring that Government's objective on the prospecting and mining of uranium ore and the use of uranium (or other relevant nuclear materials) as a primary resource of energy must be regulated and managed in a manner that will be for peaceful purposes
	White Paper on the Energy Policy, December 1998	<p>The White Paper on the Energy Policy was developed to clarify government policy regarding the supply and consumption of energy for the next decade. This White Paper gives an overview of the South African energy sector's contribution to GDP, employment, taxes and the balance of payments. The main objectives of the White Paper are the following:</p> <ul style="list-style-type: none"> Increasing access to affordable energy services. Improving energy governance. Stimulating economic development. Managing energy-related environmental impacts. Securing supply through diversity.
	White Paper on Renewable Energy, November 2003	<p>The White Paper on Renewable Energy supplements the Government's overarching policy on energy as set out in its White Paper on the Energy Policy (as above), which pledges 'Government support for the development, demonstration and implementation of renewable energy sources for both small and large-scale applications'. This White Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. Additionally, it has the following two goals:</p> <ul style="list-style-type: none"> to inform the public and the international community of the Government's goals, and how the Government intends to achieve them, and; to inform Government agencies and Organs of State of these goals, and their roles in achieving them.
	Industry Policy Action Plan	The revised Industrial Policy Action Plan (IPAP2) is a radical shift to grow a developmental economy by taking a deliberate decision to ensure that investment targets production sectors of the economy to arrest the decline in manufacturing and accelerate employment creation.

3.3 STRATEGIES AND OTHER INSTRUMENTS

Table 3-3: Key Legislation in the IMP Sector

	Title	Description
Strategy/ Plans	WC/WDM IMP Strategy	A situation analysis and opportunities for WC/WDM, as well as a summary of the strategic outputs in the IMP sector
	Biofuels Industrial Strategy (adopted in 2006 and revised in 2007)	The biofuels Industrial Strategy stipulates a 2% (400 million litres per year) penetration into the national liquid fuels mix. While this is considerably small, when finally implemented, this would contribute to a shift in the country's energy and emissions profile considering that liquid fuels (petrol and diesel) account on average for half the total energy consumed in the major urban centres. The biofuels strategy offers an opportunity for municipalities to participate. The rapidly increasing liquid fuel prices, for instance, enhances the viability of conversion of landfill gas into biofuels at the municipal level.
	National Energy Efficiency Strategy (DME, 2005, 2008, 2011)	The national energy efficiency strategy came into effect in 2005 and was revised in 2008 and 2011, strives for affordable energy for all and to minimise the negative effects of energy usage on human health and the environment through sustainable energy development and efficient practices. The recently updated strategy prioritises energy efficiency programmes and has an overall target of 12% of energy efficiency for the country, 10% for residential and 15% for other sectors by 2015.
	Waste Discharge Charge Strategy	Waste Discharge Charge System (DWA, 2014) has been developed as a key instrument in supporting water quality management of the country, with the Waste Mitigation Charge (WMC) being a critical financial resource to support catchment water quality management.
	Water Pricing Strategy	The Pricing Strategy for Raw Water Use Charges provides a framework for implementing the charge system for water use.
	IRP 2010-30	<p>The IRP is an electricity infrastructure development plan based on least cost supply and demand balance considering security of supply and the environment (minimise negative emissions and water usage). When promulgated in March 2011, it was envisaged that it would be revised frequently due to the increasing demand of electricity in South Africa.</p> <p>The IRP, together with Ministerial Determinations issued in terms of Section 34 of the Electricity Regulation Act No. 4 of 2006, help investors to plan their investments in the country's energy sector and are used as a roadmap to meet the country's electricity demand.</p> <p>It refers to the coordinated schedule of generation expansion and demand-side intervention programmes, considering multiple criteria to meet the electricity demand. This national electricity plan makes provision for efficiency and renewable energy development and yet also calls for new coal-fired power stations and nuclear. It has given priority to the deployment of RE technologies and calls for RE to make up 42% of new power generation and is considering small scale embedded generation at the municipal level.</p>

	Title	Description
Guidelines/ SOPs	WC/WDM Guideline for the development and implementation of water conservation and water demand Management Plans for the Mining Sector	<ul style="list-style-type: none"> • Development of a commodity-based national water use efficiency (WUE) benchmarks • Based on actual current and specific data to guide the acceptable levels of water usage by the mining industry
	Water Stewardship for Sustainable Water Management Standard Operating Procedures for Industrial Parks	<ul style="list-style-type: none"> • Aim to embed water stewardship practices, promote efficient water use and value creation in industrial parks • Provides defined steps and actions to foster practical ease and seamless internalisation across the various levels of an industrial park
	National Cleaner Production Centre – South Africa	<p>Developed easy-to-use tools and guides to promote sustainable transformation of industrial water use practices through programmes such as the Industrial Water Efficient (IWE) project.</p> <p>The IWE has five components:</p> <ol style="list-style-type: none"> 1) Policy and strategy 2) Establishing and promoting national or international standards for water efficiency measures and practices 3) Establish training modules and programmes to develop internationally recognised local skills 4) Performing water efficiency assessments for industry 5) Deliver advocacy and awareness campaigns through conferences, workshops and access to online tools. <p>Resources include:</p> <ul style="list-style-type: none"> • Metering and monitoring guideline for the agri-processing sector in South Africa • Best practice guideline for the food processing subsector • Detailed water assessments
Programmes/ Projects	Water Efficiency and Community Engagement at Distell's Berg-Olifants Facility	Developing and implementing several engineering solutions/projects to reduce water usage, increase water recycling and treat wastewater to potable standards
	IFC Agri-processing Resource Efficiency Programmes	Aimed at improving water efficiency and overall water consumption, and mitigating water supply decline risks in the agriculture sector

Industry must also comply to the effluent release quality and quantity, which are based on municipal by-laws or the applicable Water Use License, as well as the ISO 9001 Quality Management and ISO 14 0001 Environmental Management standards and specifications. The Water Research Commission conducts relevant WC/WDM research for Industry such as the National Industrial Water and Waste-Water Survey (Natsurv) documents, which produces

data such as the specific water intake for various industries, sets best practice guidelines for industry and develops WC/WDM decision support tools. The Centre for Scientific and Industrial Research (CSIR) is also becoming increasingly responsive to support the country's industrial development needs by assessing the reuse and recycling of industrial effluent.

3.4 INSTITUTIONAL AND GOVERNANCE FRAMEWORK

Through the NWA and NWRS, the concept of integrated water resource management (IWRM) was introduced with water conservation being considered as part and parcel of good IWRM practice. The NWA provides for the establishment of several water institutions including the DWS, CMAs and Water User Associations (WUAs). The DWS (and its regional offices) is mandated to oversee and regulate the use of South Africa's water resources including formulating and implementing national policy to ensure water resources are protected, managed, used, and conserved sustainably. At a regional level, CMAs are responsible for managing, developing, and protecting water resources within their water management areas (WMAs) while WUAs are mandated to manage water

on behalf of end users (DWS, 2000). In compliance with the NWA and the drive to conserve water, both CMAs and WUAs are able to implement measures and programmes within their areas of jurisdictions that promote WC/WDM.

Similar to the NWRS and NWA, the Water Services Act further enshrines the need to conserve water while also ensuring the right to access basic water supply and sanitation services. Through the Act as well as the Municipal Structures Act, local government is placed with the responsibility of supplying water and sanitation services at a local level. In order to comply with the Water Services Act, these municipalities have to be designated water service authorities (WSAs) which are responsible for carrying out water supply and sanitation services. However, not every municipality is a WSA with only 169 of South Africa's

278 municipalities being WSAs. Considering this, municipalities (and WSAs in certain instances) can enter into contractual agreements with water service providers to perform these functions for the municipality. Often, these are water boards who are organs of state established by the Minister of Water and Sanitation and are mandated to provide, as their primary activity, bulk water services to other water service institutions (WSIs) within a specific area. Depending on the contractual agreements in place, most municipalities, WSAs, water boards and water service providers implement some form of WC/WDM including conservation measures being levied on users as a condition of supply (Trade and Industry Chamber, 2009). The institutional framework for the water sector is presented below and includes water services and water resource management.

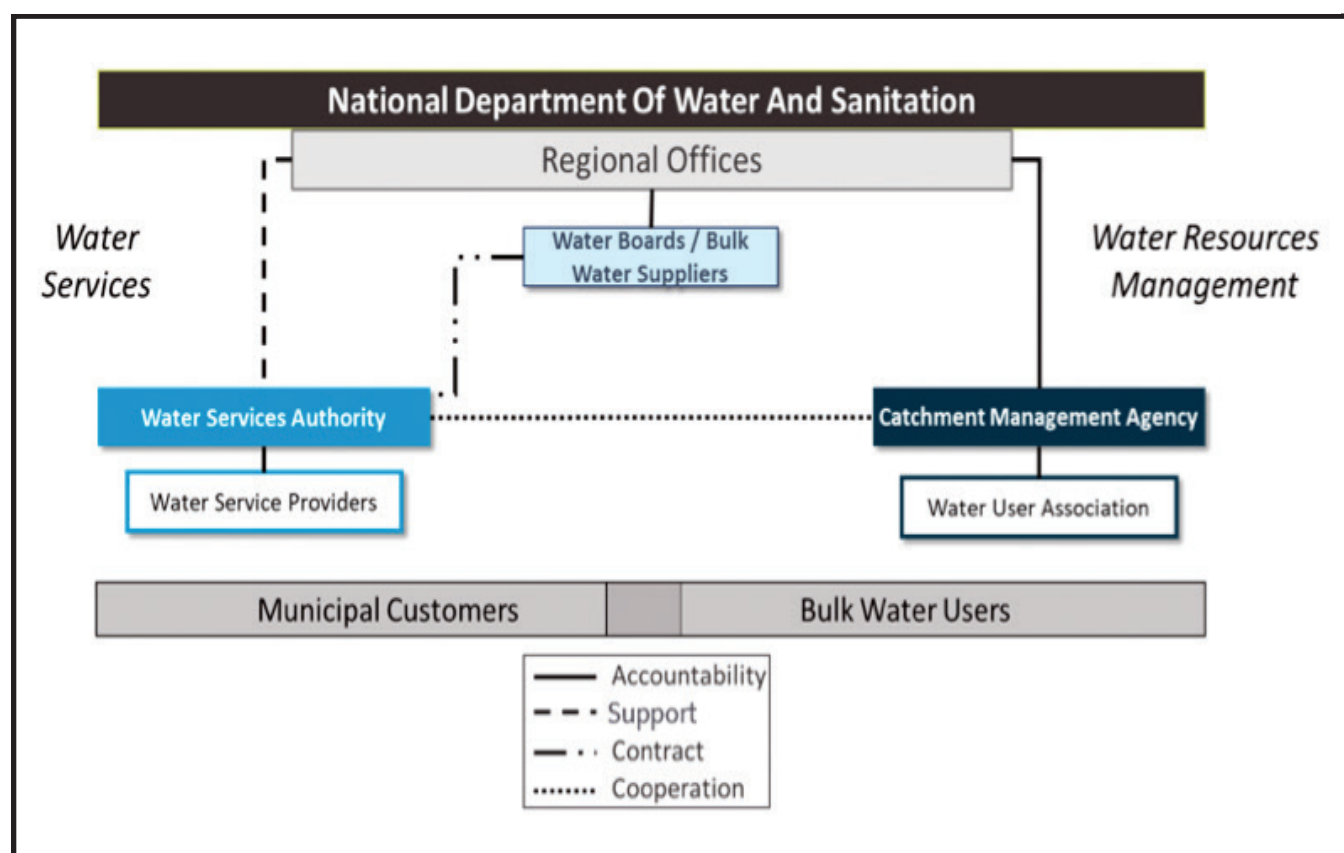


Figure 3-1: Institutional framework for the water sector. Adapted from the National WC/WDM Strategy (2004).

However, while the NWA, NWRS and WSA provide for the establishment of relevant institutions to undertake WC/WDM initiatives, the difference in operational boundaries between water resource management and water services have introduced complexity in managing WC/WDM across the different institutions. The National WC/WDM Strategy (2004) attempts to resolve this issue by detailing the roles of the different institutions with regards to WC/WDM implementation, coordination, and planning (see Figure 3-1). It notes that CMAs are responsible for undertaking WC/WDM measures at a WMA level while

municipalities and WSAs focus on WC/WDM amongst domestic and industrial users within their areas of jurisdiction. There are also other local water services institutions (WSIs) such as bulk water suppliers, water boards and water service providers that play a role in WC/WDM. Following this model, CMAs should also coordinate activities of WSIs within their WMA alongside bulk water suppliers and WUAs in the area (DWAF, 2004). Bearing the above in mind, the roles and responsibilities of the different WSI institutions in South Africa are detailed below.

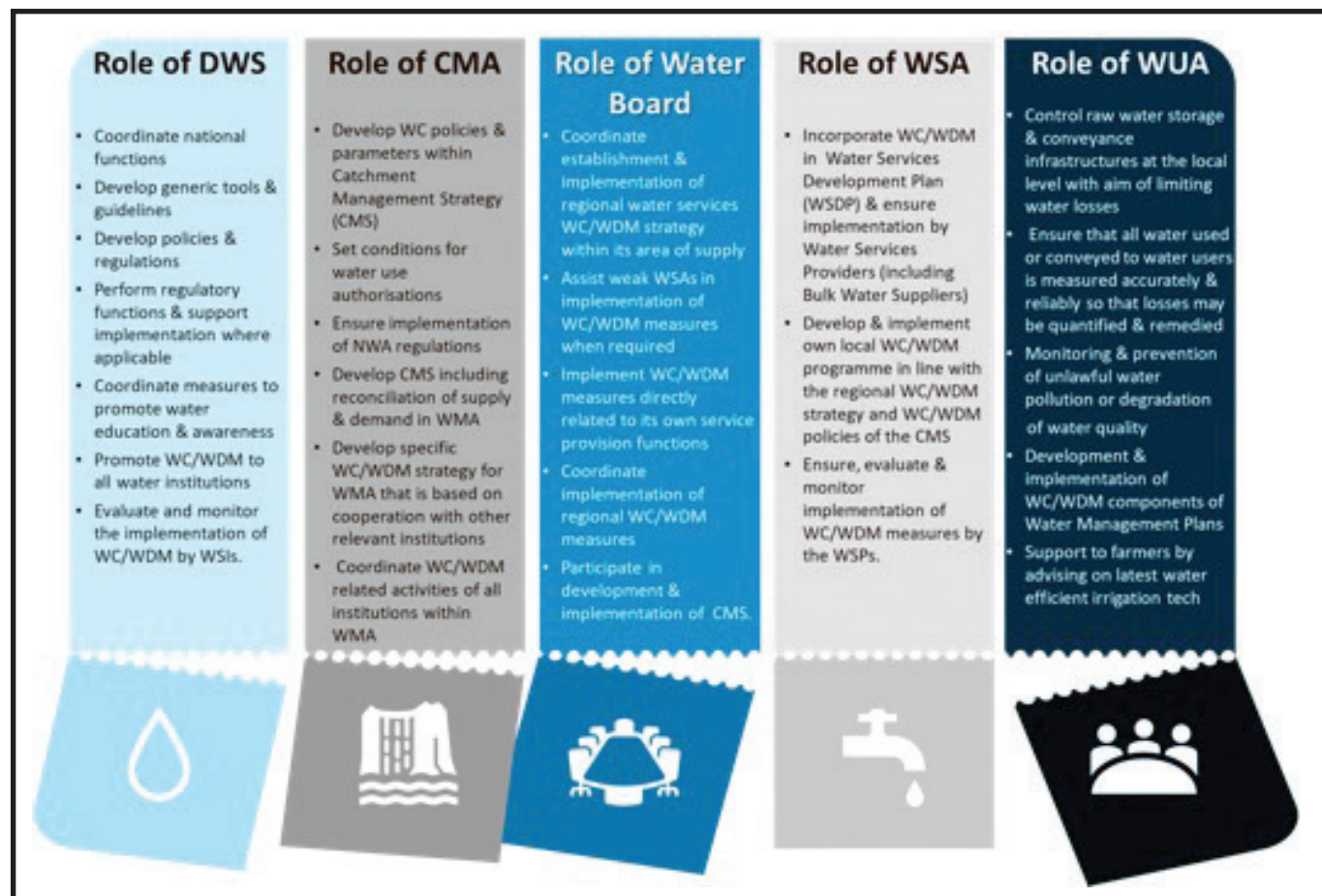


Figure 3-2: Roles of the different institutions in terms of WC/WDM. Adapted from the National WC/WDM Strategy (2004)

In support of establishing a holistic approach to WC/WDM that incorporates the different WSIs and players in the water value chain, several frameworks and supporting strategies were developed after publication of the National WC/WDM Strategy (2004). This includes DWS's WC/WDM Strategies for the Agriculture, Water Services and the Industry, Mining and Power Sectors, all of which aim to provide an overarching

framework for the different sectors in South Africa that have major roles to play in WC/WDM.

The IMP role-players and the institutional roles with respect to WC/WDM for the IMP sector are summarised in Figure 3-3 and Table 3-4, respectively.

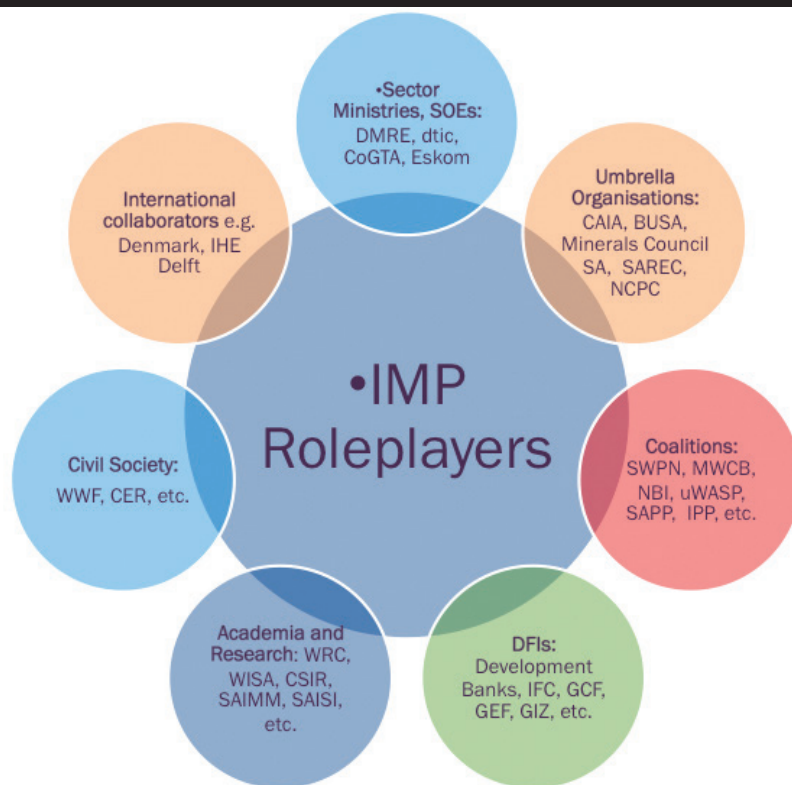


Figure 3-3: IMP Role-players

Table 3-4: Institutional roles for IMP

Institution	Role in WC/WDM
Department of Water and Sanitation	Develop policy, regulation, generic tools, and guidelines promote and monitor the implementation of WC/WDM by all WSIs, including WUA;
CMA	Develop an implementation plan WC/WDM as part of its Catchment Management Strategy (CMS), ensure and monitor the implementation of WC/WDM by bulk water suppliers, the Water Services Authorities (WSA) and the major water users of the IMP sector, coordinate multisectoral regional WC/WDM plans, including the setting of targets.
WSA	To 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, develop implementation plan for WC/WDM component of its WSDP, ensure and monitor implementation of WC/WDM by WSP and bulk water suppliers
Water Boards	Contribute to the development the WC/WDM component of the CMS or WSDP, assist water users in the IMP sector, implement WC/WDM measures related to its own service provision, coordinate the implementation of WC/WDM measures.
Water users in the industry:	Implement, in collaboration with CMA, the WC/WDM component of the CMS
Department of Trade, Industry and Competition	Required in schedule 1 of NEMA to develop Environmental Implementation Plans (EIPs). A part of the EIPs is that the Department of Trade, Industry and Competition (DTIC) must assist industries through the National Cleaner Production Centre (NCPC) to improve resource efficiency and cleaner production. This also includes energy and water efficiency.
Department of Mineral Resources and Energy	This is the National Department mandated to regulate, transform and promote the minerals and energy sectors, in line with the national strategic instruments such as the NDP and NWRS3.

Institution	Role in WC/WDM
Department of Cooperative Governance and Traditional Affairs	This is a National Department mandated to improve cooperative governance across the three spheres of government, in partnership with institutions of traditional leadership, and to ensure that provinces and municipalities carry out their service delivery and development functions effectively, in line with the WSA.
Eskom	Is currently the primary power producer of the country.
Umbrella Bodies	<p>These bodies are member-serving associations that serve to work collectively towards a coordinated approach.</p> <p>Chemical and Allied Industries Association (CAIA): Seeks to improve efficiency through the Responsible Care initiative where companies that are signatories to the initiative have water conservation measures in place as part of their commitment to improving the environmental performance of the chemical sector.</p> <p>SWPN: Is a platform for facilitating new partnerships between DWS, the private sector, civil society to identify opportunities for the development and scaling up of projects to improve water security.</p> <p>Business Unity South Africa (BUSA): Is exploring, together with COGTA and DWS, the development of new water models for water related Public-Private Partnerships (PPPs) as well as the replication and scaling of existing interventions such as those employed under the National Business Initiative Western Cape drought crisis team</p> <p>Minerals Council South Africa is the mining industry's primary representative and is a key stakeholder in mining WC/WDM measures.</p>
Coalitions	<p>These are a broader range of stakeholders, that are not sector specific, and are driven by a common goal, either through geographical location (uWASP and MWCB) or business interests (NBI).</p> <p>Southern African Power Pool (SAPP): The SAPP, or Southern African Power Pool, is the first formal international power pool in Africa. It was created with the primary aim of providing reliable and economical electricity supply to the consumers of each of the SAPP members, consistent with the reasonable utilisation of natural resources and the effect on the environment. The SAPP allows the free trading of electricity between Southern African Development Community (SADC) member countries, providing South Africa with access to the vast hydropower potential in the countries to the north, notably the significant potential in the Congo River.</p>
Development Finance Institutions	Are specialised organisations that invest in primarily private sector projects in low and middle-income countries to promote job creation and sustainable economic growth. A good example is the IFC Agri-processing Resource Efficiency Programme.
Academia and Research	Research and development through academic institutions and private sector, play a critical role in developing innovative solutions, in understanding issues and in driving improvement and efficiency. These organisations help to take existing opportunities and threats and develop them into useful solutions, reducing costs and new technology and data comes to light.
Civil Society	These organisations play a key role in advocacy of critical issues and obtaining citizen inputs into processes.
International Collaborators	These organisations have formal or informal partnerships with countries that help knowledge transfer and information and skills sharing on an international level.

4 Situational Analysis

4.1 STATUS QUO

4.1.1 Strategic Aspects

South Africa is a water-scarce country, and the sustainable provision of water is amongst its most significant socio-economic challenges. The country is located within Southern Africa's 'drought belt' and, according to the World Bank, is the fifth most water-scarce country in Sub-Saharan Africa. Since the 1960s, South Africa has already experienced a rise in average annual temperatures country-wide, by 1.5o C. While the temperature has increased more markedly across arid, inland areas of the country, with records showing that daily temperatures have risen, rainfall trends display less clarity, with significant inter-annual variability. There are also considerable geographic variances in historic rainfall patterns.

With mean annual precipitation being only 60% of the global average and with this being spatially and temporally variable, the country has challenges in meeting water requirements with some regional disparities. This is exacerbated by major urban centres and growth nodes not being situated in alignment with water resource availability. These nodes, such as Cape Town, Port Elizabeth, and Johannesburg (amongst others) are therefore interconnected with key water resources through a network of bulk water transfers. These transfers have enabled the continued socio-economic development of the country; however, this also means that the status of water resources within these water supply systems is very dependent on water resources within other catchments in other parts of the country.

Noting this context, the DWS developed a suite of WC/WDM strategies to promote water use efficiency indicating that these

strategies would provide guidance as to a responsible approach with multiple water sector institutions playing an important role in the implementation of these strategies.

The IMP sectors are extremely diverse in nature and equally unique in the sense that businesses under these sectors can supply their own water, i.e., abstraction from the resource (mainly mines, power stations and some industries) and also those businesses that are serviced by water service providers, i.e., they receive water and discharge water to local municipalities. This creates complexities, as these sectors then are generally dealing with two to three separate ministries, with differing mandates, and not always aligned in terms of implementation of the Water Acts nor the by-laws. However, this also creates opportunities to apply WC/WDM across these two water supply sources.

A key consideration for the IMP sectors is not only quantity, but also equally important is their water quality management that often needs to go outside the bounds of a factory fence to be more aware of catchment or local/municipal level water management, both give rise to significant business risk if not considered in strategy and planning. Polluted discharge has the potential to create a much larger footprint as it contaminates nearby freshwater sources. Therefore, it is clear that considering the full impact of the water footprint from both quantity and quality perspective is crucial and improving the quality and quantity of discharge should be a key objective corresponding to the focus on reducing freshwater use. Linkages to the water services sector further ensure shared accountability to manage their water resources, infrastructure, maintenance and billing.

Furthermore, the IMP industries are generally part of a value chain, either being upstream (mining) or downstream (coal-power generation, agri-processing), and considerations need to be given to this full water value chain, including the relationships between air emissions, water use, energy efficiency, and material consumption throughout the value chain. The following section gives a high-level summary for the Industry, Mining and Power sectors, respectively. More detail is provided in the Summary Findings Report (July 2022).

4.1.2 Sub-sector Aspects

Industry

South African industry is highly vulnerable to water supply risks and the World Economic Forum ranked 'water crises' as the second highest risk for doing business in the country, closely behind unemployment (Water for Africa, 2009). Water is a critical enabler of economic growth and if the projected national water deficit is left unresolved, water constraints may impose constraints on business activities going forward. The Industry Policy Action Plan (IPAP) sets out the country's intention of expanding the manufacturing sector (DWS, 2018). This will further increase the demand as water is a primary raw material in many industries, and is widely used as a solvent, coolant, cleaning medium and carrier.

The industrial sector is concerned with adding value through the manufacturing of goods. Not all industries are water intensive, and the industrial section of this report has focused on the agri-processing, clothing textile footwear and leather sub-sectors, as well as other smaller industries including amongst others iron and steel, metal finishing, and cement. The current bulk industrial water use in South Africa is 3 %. This

value does not include the commercial and industrial users that are supplied water through the water services sector and categorised as urban use. For example, in Gauteng the highest sectoral use is urban industrial (73.5 %), followed by irrigation (20.2%) and non-urban Industry (1.7 %).

The current status of industrial water demand and water conservation in South Africa has not been comprehensively determined. Table 4-1 presents the reported industrial water demand according to the data contained in the industry Natsurvs, the IFC report for the agri-processing sector (IFC, 2019) and the water use inventory to the WRC conducted by Cloete *et al.* (2010).

The total annual water demand reported in the second edition of the Natsurv documents is less than 200 million m³, which is significantly less than the 700 million m³ for the industrial sector indicated by Statistics South Africa (2006), which included petroleum and mineral processing plants as part of manufacturing and according to DWS these are classified as energy and mining sectors, respectively. The information presented in Table 4-1 provide only a baseline of industrial water usage. Therefore, it will not be possible to precisely determine which industrial sub-sector impacts the most on water quantity and quality.

Table 4-1: Annual water demand in various industrial sub-sectors

Sector		Water usage (million m³/a)			
Natsurv	IFC	Natsurv		IFC (2019)	Cloete <i>et al.</i> (2010)
		1st	2nd		
Agri-processing					
Pulp and paper excluded	Pulp and paper			58.5	44.1
Red meat	Animal slaughtering	5.8	8.8	19	
Poultry		-	13		
Clear beer brewing industry	Brewing and malting		10.5	12	
Sorghum Malt and Beer					
Malt brewing					
Dairy	Dairy	4.5	-	9	
Sugar	Sugar			7	
-	Wine			7	
Fruit and vegetable	Fruit and vegetable			6	
Soft drinks	Cold beverages excluded	4.0		-	
Edible oils	Edible oil	-		3	
Pelagic fish and fish processing	Fishery			0.8	
Sub- total		14.3	162.3	122.3	44.1
Clothing, textiles, footwear, and leather					
Tanning and Leather finishing		-	-	-	0.17
Textile		30			5.05
Other					
Iron and steel	Ferrous metals	-	30		133.8
Metal finishing		9			
Cement					4.65
Chemical					0.74
Cleaning					0.74

Sector		Water usage (million m ³ /a)			
Natsurv	IFC	Natsurv		IFC (2019)	Cloete <i>et al.</i> (2010)
		1st	2nd		
Dye and colouring					0.90
Laundry		3	0.234		
Petroleum					136.3
Plastics					0.003
Paint					0.02
Total		56.3	192.5	122.3	326

Mining

The mining industry is an important contributor to South Africa's economy, contributing significantly to the GDP of the country and creating over 550,000 direct jobs. While mining creates jobs and generates capital, it has negative effects on the health and safety of mine workers and the environment. Compared to other industries in South Africa, the mining industry does not consume significant amounts of water; however, the effect of certain mining activities on water quality can be severe. Contamination of water resources means that there is less water available for human consumption and environmental processes resulting in large amounts of capital required to clean up contaminated water (Makhaye, et al., 2002).

Mining and heavy industry out of urban areas; particularly downstream users of coal, i.e., Eskom and Sasol, are responsible for about 8% of the annual water use in South Africa. More important, however, is the fact that the water resource systems within which most of mining is concentrated i.e., the Upper and Middle Vaal, Olifants, Inkomati and Crocodile (West) and Marico Water Management Areas, are all under stress. In addition, a single mine can potentially consume a significant volume of water that influences local or catchment-level supplies. The amounts of water allocated to users often exceeds the available supply in these catchments

once all legitimate uses are accounted for. Most mining and processing operations have the opportunity to adopt measures to reduce water consumption and improve wastewater quality (Makhaye, et al., 2002). In a few instances, there are mining operations that are water positive or produce excess volumes of mine-impacted water. This can be re-used by other processes and potentially other industries/sectors. This is evident through the work of the Mine Water Coordinating Body and its effort on using mine-impacted water for irrigation purposes. This water has also been used for dust suppression at the mines themselves. Water generated by mine dewatering can be used in a similar manner and treatment of mine water for agricultural or industrial use is becoming important in many water-scarce areas and in the consideration in the discussion towards WC/WDM. Additional guidance and policy regarding water re-use and discharge should be considered.

Mines often use water in a closed circuit, where additional water is only used to compensate for evaporation and in-process losses. Many 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.

The DWS, in collaboration with the Minerals Council South Africa commissioned a project to undertake the "Setting of Water Conservation and Water Demand Management

(WC/WDM) Targets for the Mining Sector". This project entailed several key tasks that were aimed at supporting the development of these WC/WDM targets (DWS, 2016). The implementation of the WC/WDM targets in the mining industry were developed to "contribute to the protection of water resources by reducing the unnecessary abstraction of water and thereby promoting better management by users". To this end, commodity-based national water-use benchmarks were developed by the DWS. Of the mines evaluated, only coal, gold and platinum had more than three mines with usable data. Benchmarks have therefore been calculated for these three commodities, whilst all the other commodities have been grouped under "other", and includes diamonds, chrome, iron ore, manganese, copper, phosphate, heavy mineral sands, dolomite quarries and others (DWS, 2016).

These benchmark values are based on the top three mines that have valid water balances in the respective commodity. The water-use for these top three mines is lower than the water-use values for all the mines with valid water balances, except for platinum. This is because all the platinum mines considered had valid water balances (DWS, 2016).

It is understood that the group "other" contains a very diverse range of commodities that represent a diverse range of mining and processing

methods, which is problematic to include into a single benchmark (DWS, 2016). Due to the many factors that could influence the total specific water use of a mine for a particular commodity, a minimum and maximum value for each benchmark is specified, giving the benchmark

a range based on the minimum and maximum value of the top 3 mines of each commodity. These values for the indicator “total specific water use” are shown in Table 4-2 and compared to the average of all the mines as well as the average of the mines with valid water balances (DWS, 2016).

Table 4-2: Benchmarks for Water Use Per Commodity

Commodity	Total Specific Water Use per ROM ton (m ³ /t)					
	Ave of all mines	Ave of mines with valid water balances	Ave of top 3 mines per commodity	Benchmark total Specific Water Use		
				Min	Ave	Max
Coal	0.79	1.13	0.70	0.20	0.70	1.33
Gold	2.46	2.67	2.09	1.09	2.09	3.47
Platinum	1.68	1.68	1.85	1.75	1.85	1.94
Other	1.23	1.01	0.96	1.10	0.96	1.44

Given the large range of variables that affect water use efficiency on a mine, the approach has been to focus on ensuring that there is a consistent and accurate methodology for measuring and reporting water use and to then use this as a platform for the implementation of methodologies to enable individual mines to set their own internal targets.

It must also be remembered that the better performing mines that were used to develop the benchmarks each represent very specific mining situations and that there will be mines that have a specific combination of the variables described in the variables matrix who will be unable to meet these benchmarks no matter how much effort they put into implementing WC/WDM measures (DWS, 2016).

The output from the exercise was to determine the standard deviation around the water use efficiency indicators for the average mine conditions that could be expected, considering the identified variables. The resulting report provides a set of national water use efficiency benchmarks that are based on an analysis of the latest available data on actual specific water use data within the South African mining industry. It was concluded that the procedures set out in the WC/WDM Guideline (DWA, 2011) should be used in the internal mine water use target setting process, together with these benchmarks and the WC/WDM Implementation Guideline developed as part of this project (DWS, 2016).

The setting of national water use benchmarks is unique and has not been undertaken in other countries where the standard procedure is for mines to develop site-specific internal water use efficiency targets and to report on the implementation thereof in a standardised manner. The results emphasised that the most critical component of a mine’s WC/WDM plan is a computerised water balance model that can be used to monitor existing and simulate proposed WC/WDM measures (DWS, 2016).

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Whilst challenges do exist within the mining industry, great strides have been made though collaborations like the Minerals Council South Africa, Strategic Water Partners (SWPN), Mine Water Coordinating Body (MWCB) and others that have driven a strong agenda towards sustainable development and have played a key role in bringing the sector together. Whilst these bodies do not represent all mines, they demonstrate a strong partnership approach with the DWS, and as a result, there have been tangible results, most notably is the development of the WC/WDM Mining Guidelines produced in 2021, through the MoU in place with the DWS.

Power Generation

The South African energy supply is dominated by coal, which made up 85.7% of the primary energy supply in 2016, followed by nuclear with 5.2% as seen in Figure 4-1. Natural gas contributed 3% while diesel contributed 1.7% to the total primary supply during the same period. The summary excludes municipalities and enterprises that use Liquefied Natural Gas (Statistics South Africa, 2018).

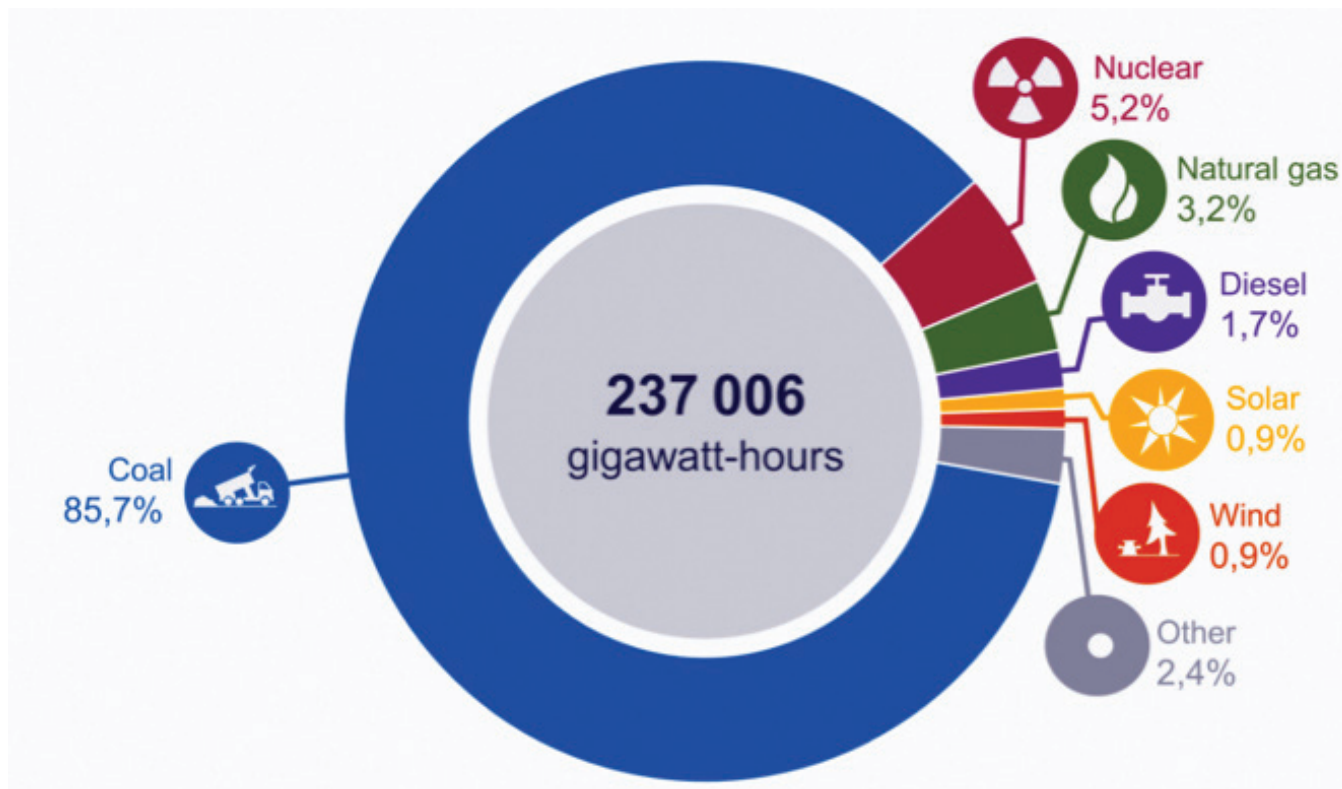


Figure 4-1: Total Energy Generated by Source (Statistics South Africa, 2018)

South Africa imports almost 90% of its crude oil from Saudi Arabia, Nigeria and Angola. During the transformation stage, the country produced approximately 3.2% of its fuel requirements from gas (Gas to Liquids), 42.3% from coal (Coal to Liquids), and 54.4% from crude oil (DMRE, 2021). The majority of petroleum products are refined in the country; however, some petroleum products were imported to supplement the production shortfall.

Power generation is primarily sourced from coal fired power stations. Power generation is therefore the largest water-intensive activity in the IMP sector, because of evaporative losses from cooling towers at wet-cooled power plants. The recycling of water drives water use efficiency at power plants, and the development of dry cooling systems has made it possible to reduce power station water use by up to 15 times when compared to wet-cooled stations (Eskom, 2019).

There are strong links between water use efficiency and water quality impacts in this industry. Incoming water quality drives cooling tower blow down rates, which can influence the water balance at a wet cooled station significantly. Power stations can also impact on both surface waters and groundwater through seepage, discharge and aerial deposition of pollutants. Current water use in the power generation sector in South Africa is of the order of 340 million cubic metres per annum, driven largely by Eskom's coal-fired operations, and including other smaller independent producers.

Water is used and re-used for food, electricity, and fuel production, while energy is required for agriculture and water supply, creating positive feedback loops that can aggravate already existing water shortages or generate new one. The forms of energy societies consume have considerable direct and indirect effects on global freshwater use (Damerau, et al., 2016). Sectors such as energy, electricity and fuel production (which constitute "power" generation) require

increasing amounts of water, mainly for resource extraction and cooling (Damerau, et al., 2016); (Macknick, 2012), (Mielke, 2010). Rising global population numbers and socio-economic development could lead to further increases in water demand in both the power and agriculture sectors over the coming three to four decades. Hence, the source and type of power/energy we choose in the future can either accelerate a rising water demand or offset increasing resource needs, depending on the effects of consumer/user preferences and policy initiatives on consumption patterns in respective sectors (Damerau, et al., 2016).

The water-energy challenges in South Africa are complex. They include:

- aging infrastructure struggling to achieve an ambitious development agenda without compromising natural resources and the environment;
- water scarcity with stressed basins and strict water-allocation regimes, with most of the country's water already allocated;

- pressure to move away from a coal-based economy, which currently accounts for 80% of the primary energy supply;
- ongoing electricity crisis leading to power shortages that impact economic activity; and
- uncertainties caused by climate change.

However, it has been noted that these challenges have an unintended knock-on effect. Loadshedding and increased tariffs relating to ageing Eskom infrastructure has reduced energy consumption in South Africa and is driving a shift towards renewable sources of energy at all levels, including municipal and household level. This is subsequently reducing water use.

A study conducted by (Spang, et al., 2014) compiled an international comparison of the water consumption of

energy production. The global WCEP (WCEP is the water consumption factor and estimates for each energy category were then summed to get an estimate of total water consumption for each country in the study's entire energy production portfolio) was estimated at approximately 52 billion cubic meters of fresh water (Spang, et al., 2014). This global WCEP volume, oil and gas production has the highest proportional WCEP (40%) relative to the additional energy categories of coal, nuclear fuel, biodiesel, ethanol, coal-based electricity (steam turbine ST), nuclear ST electricity, other non-renewable electricity (oil ST, gas ST, combined cycle, and gas turbine), and renewable electricity (biomass ST, waste heat ST, geothermal ST, solar ST, solar PV, and wind), as shown in Figure 4-2.

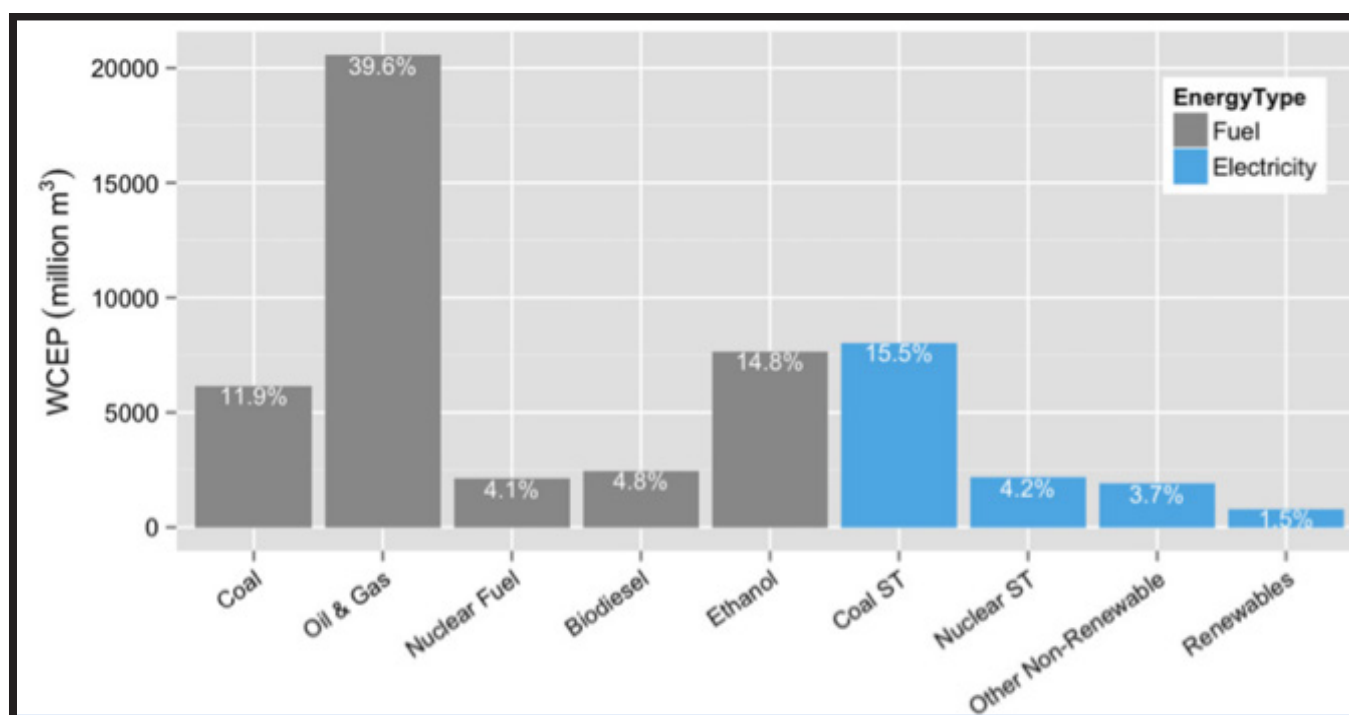


Figure 4-2: Total global WCEP by major energy category, 2008 (Spang, et al., 2014)

This estimate does not assign any water consumption to the production of hydropower. Oil and gas WCEP demonstrate the greatest share of global WCEP, representing more than all (non-hydro) electricity generation combined. It is also worth noting that the amount of water consumed at the global scale for ethanol production is roughly equivalent to global water consumption for coal-fired power plants, even though global ethanol production represents approximately 1/100th the energy content of global coal-fired electricity production.

Finally, in terms of renewable energy, the total WCEP for all renewable electricity production is roughly 1/10th the total WCEP for biofuel production. Hence, while renewable electricity may represent opportunities for reducing both

water consumption and carbon emissions, the water impact of biofuels requires important consideration as the world's regions seek to transition to lower-carbon energy portfolios. In terms of country-by-country WCEP estimates, map 1 provides a global overview. Total energy WCEP is dominated by the United States and the BRIC (Brazil, Russia, India, and China) countries, which reflects the influence of the physical and economic scale of these large countries.

The relationship between energy and water use is beginning to get more attention as policy makers worldwide grapple with measures to transition from heavy dependence on fossil fuels and to aggressively address global climate change by capping carbon emissions. Driven by a global movement towards more sustainable energy production,

the potential of renewable resources to meet energy demands in the future are becoming critical (DME, 2003). In 2003, the Department of Minerals and Energy (DME) published a White Paper on Renewable Energy Policy, which set a target of 10 000 GWh for renewable energy contribution to final energy consumption by 2013. This target is to be produced mainly from biomass, wind, solar, small-scale hydro and non-grid technologies such as biofuels and solar water heating (DME, 2003). As energy shifts away from coal and towards renewal sources of energy, significant shifts in water balances should start to occur. Forward planning and management of newly available water in stressed catchments critical.

The following are activities/ interventions already in place in the IMP sector. These provide a strong foundation on which to further strengthen the sectors approach to WC/WDM.

Knowledge Dissemination:

- The National Cleaner Production Centre South Africa (NCPC-SA) is a national support programme that aims to promote resource efficient and cleaner production in the countries industries and hosts a biennial conference.
- The Strategic Water Partners Network (SWPN), established by the Department of Water and Sanitation has a number of workstreams that look at promoting sustainable water management, water use efficiency and stewardship approaches in support of improved water security. They also co-host an annual Water Stewardship Conference.
- Water Research Commission (WRC) also host several dialogues throughout the year that cover elements of WC/WDM.
- Water Institute of South Africa (WISA) host a biennial conference for the sector, which also has dedicated theme on water use efficiency.

- The CSIR continues to push research into new technologies to support the industry sectors to be more resource efficient and competitive and host several symposiums throughout the year.
- GreenCape supports businesses and investors seeking to become water resilient, mainly in the Western Cape, through a consolidated resource by providing technology providers, case studies and access to industry-related events with relevant stakeholders.
- The National Business Initiative also hosts a range of seminars and webinars to promote innovative approaches in the water sector.

Collective Action Approaches

- Sector bi-lateral agreements. MoUs have been developed between DWS and Eskom, and DWS and Minerals Council South Africa. Whilst the DWS-Eskom MoU may have relapsed, it was highlighted as an important instrument to strengthen cooperative and coordinated approaches.
- Several local/ global companies are signatories to the CEO Water Mandate and Alliance for Water Stewardship
- Partnerships: Strategic Water Partners Network, National Business Initiative, the uMhlathuze Water Stewardship Partnership, amongst others.
- MWCB – initiative between mines and government, initially focussed on the Mpumalanga coalfields to improve mine water treatment and re-use.
- The Stakeholder Accord on Water Conservation is a mechanism through which various stakeholders including;
 - DWS, DTIC, WUA, South African Iron and Steel Institute and the Chemical Allied Industries Association, are working together to achieve quantitative reductions on water intensity

Practice, Tools and Guidelines:

- The DTIC has spearheaded, together with DWS, a Standard Operating Procedures for embedding water stewardship practices at a park level. This SOP has relevance to companies and municipalities alike.
- CEO Water Mandate has published several online tools and guidelines to support various industries e.g., setting Enterprise Water Targets – A guide for companies.
- Implementation of water accounting frameworks and Zero Liquid Effluent Discharge (Eskom, and potentially other industries).
- The Water Witness International released a guideline on Glasgow Declaration for Fair Water Footprints – aimed primarily at the CTFL industries.
- The NCPC-SA has a specific Pillar that looks at Industrial Water Efficiency through the promotion of tools and guidelines, amongst other resources to support industries (<https://www.industrialefficiency.co.za/industrial-water-efficiency-tools/>):
 - Metering and Monitoring guideline for the agri-processing sector in South Africa
 - Best practice guideline for the food processing sub-sector
 - Detailed Water Assessment
- Mining WC/WDM Guidelines developed by DWS and the Minerals Council of South Africa.
- Standardised water balance format (excel-based) for reporting on mine water balances.
- Setting of Water Conservation and Water Demand Management (WC/ WDM) benchmarks and targets for the Mining Sector (Minerals Council South Africa and DWS). It should be noted that these are not for all mining commodities.
- Shift from wet to dry cooling in coal-fired power stations.
- WRC documents on the National Industrial Water and Waste-Water

Surveys (NATSURV) that are available for IMP sectors.

Whilst several interventions are in place, the uptake of much of this knowledge and information is limited. The strategy will look to ensure that these lessons are documents and stored.

4.2 CHALLENGES AND OPPORTUNITIES

In the face of growing global water scarcity, there has been increasing pressure on the IMP sector to reduce their water use and improve their water management. This is particularly true for countries that are recognised as water scarce and have limited freshwater resources to draw upon. With this in mind, industry, mining and power have undertaken a range of initiatives across the world to conserve water and to better manage their wastewater discharge as presented below.

Industry

Growing appreciation of water scarcity and the need to be water use efficient

Industry across the world is aware of the growing water scarcity challenges and its impact on their operations. This has resulted in global industry adopting a range of interventions to reduce their water use and improve efficiency within their operations. While this comes at a cost, industry has realised the long-term benefits such investments will reap. However, smaller businesses are not always able to install water efficient technology due to lack of financial and technical resources. Support from government is often required to aid small-, medium- and micro-enterprises (SMMEs) in adopting WC/WDM initiatives.

An enabling environment and support from government helps promote WC/WDM amongst industry

An enabling environment that provides clear guidance and minimises administrative hurdles is seen as crucial in supporting industries in pursuing WC/WDM measures. In addition, support from regulatory authorities to help industries become compliant was seen as more successful in reducing water consumption rather than applying stringent water restrictions, fines, caps etc.

WC/WDM is most beneficial if implemented as an ongoing activity

The benefits of WC/WDM were most obvious in cases where industries were already implementing some form of water use efficiency programme. In addition, these programmes also helped industries in transitioning toward net zero water targets. These programmes are often holistic and includes “hard” elements such as implementation of new technologies, process improvements etc. and “soft” elements such as training and awareness raising amongst

staff. It should be noted that these types of programmes were more evident in big multinational organisations that have the resources and money to implement such a programme, rather than amongst smaller industries with limited resources.

Benchmarking helps industries to assess themselves against their peers

Benchmarking is very useful for industry as it helps industries to understand what the national/international standards are and where improvements can be made within their factories. This was very successful where there was a good relationship between industry and an independent/unbiased regulator such that industry trusted the regulator with their water use information without fear of losing their competitive advantage or being levied with fines if not compliant. In these instances, support to industries that were non-compliant to help them align with legislature was more effective than application of blanket fines.

Mining

Increasing awareness of water scarcity and mines’ impact on the surrounding environment

Mines across the world are aware of water scarcity, especially as mines are often located in water-scarce areas and are unable to relocate if water resources “dry up”. As such, mines are constantly looking for ways to improve their water use efficiency within their operations. In addition, mines are also cognisant of their long-term impact on the surrounding environment and the community. This has resulted in many mines employing environmentally friendly practices as well as consulting with the local community and authorities to co-develop solutions. This is also in recognition that much of their labour force is from the surrounding community and building good relationships with the community ensures that their operations run smoothly, and social problems are addressed.

Collective action can be employed to address broader water management challenges in the area

Mines, with their significant financial and technical resources, are increasingly partnering with government, academic institutions, civil society, communities and other mines/industry to support broader water resource management. This is especially true in poor areas where local government does not have sufficient financial resources or capacity to undertake local water resource management. The initial capital required for these water stewardship projects is seen as long-term investments by mining companies since these projects will lead to assurance of supply. Furthermore, by implementing activities outside of their operations, mines are able to develop good relationships with the surrounding community and

local government which also helps to improve their corporate social responsibility.

Overarching sustainability plans helps to guide mines towards improved water management

Many major mining companies have some form of an environmental sustainability plan which provides an overarching framework within which the company aims to achieve its environmental goals and targets. By having this vision, all staff and operations within a mining company are aware of what the company is seeking to achieve with regards to environmental/water resource management and how this can be done. These plans often align with the Sustainable Development Goals and helps mines implement initiatives in a structured, coordinated and holistic manner towards long-term sustainable management of the environment and its resources. For those companies that do not have such a plan in place, it is often encouraged, specifically for those mining companies that have operations in multiple locations and countries.

Power

Countries (and power generation companies) are shifting to green and renewable energy sources

Many countries are shifting to green and renewable energy sources due the relative decline in cost of said energy resources and the need to reduce greenhouse gas emissions to meet national and international climate change targets. In addition, financing for renewable energy solutions is more

readily available than those for fossil fuels. Another benefit of renewable energy is that they utilise less water and has a much lower impact on the environment than fossil fuels. As a result, focus in the global power sector is primarily on the uptake of renewable energy and transitioning towards cleaner energy sources that have relatively low impact on the environment.

Power generating companies' water use efficiency is enhanced if given priority by national government

For those countries that use and/or plan to build more coal-fired power stations, water use efficiency was achieved by having national government develop stricter regulations and requirements in terms of volumes of water consumed and quality/volume discharged. The focus is strongly on compliance, monitoring and enforcement of water use and ensuring that water abstraction is not detrimental to the surrounding environment.

Adoption of water use efficiency technology in coal-fired power plants helped to reduce water consumption

Coal-fired, and other turbine driven power plants, which consume significant amounts of water, saw a decline in water use through the installation of water use efficient technology such as improved boilers, turbines, pumps, cylinders, coal drying, recycling and cooling technologies. For plants that are still to be constructed, it is often a legislative requirement for them to install these technologies and ensure that water

use is minimised to acceptable levels.

Integration between the energy and water sectors is recommended to implement holistic solutions to energy and water problems

Water is essential for power generation, while energy is crucial for watertreatmentplantsandreticulation. The two sectors are intrinsically linked, and the water-energy nexus is often used to expound on the linkages and interdependencies. To ensure that future water and energy issues are addressed in a holistic and integrated manner, governments across the world are seeking to understand the water-energy nexus to develop appropriate policies, strategies and legislation

There is a rich diversity of strategic issues and lessons that emerge from the earlier sections of this report. These have been translated into a SWOT analysis as illustrated in Table 4-3 below. In practice, there are always constraints, issues and challenges and these inform what is, and what is not possible in terms of developing implementation plans that will gain traction.

Table 4-3: SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> • WC/WDM is a priority for DWS • DWS has good policies/instruments in place (determined by a recent Departmental GAP analysis (SA-DK work on the Industrial efficiency track) • DWS has strong partnership through forums such as the Danish Embassy, SWPN and Minerals Council South Africa, MWCB, NBI etc. • DWS Training (applicable to mining) is already in place • Available communication platforms can be leveraged • Institutional knowledge is available for education and awareness programmes • MoUs in place with key sectors • Water reduction/ no-water initiatives through renewable energy in the power sector (National Water Programme – reuse) • Strengthening partnerships between sectors and departments improves and promotes WC/WDM initiatives • Establishment of proto-Catchment Management Agencies helps data collection and promotes collective action • WC/WDM conditions are a must for water use licensing 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Lack of WC/WDM Policy and sector and sub-sector policies • No policy direction on treatment, reuse and/or redirection of mine impacted water • There is limited data available to track progress of WC/WDM across IMP • Non-compliance by companies relating to difficulty in enforcement (Acts, Regulations) • There is a focus on water quantity rather than quality • Tools and systems that exist needs implementation, upgrading and alignment • Lack of integrated reporting mechanisms and tools • Limitation of human resources at national and regional levels slows implementation • Intergovernmental coordination could be strengthened to ensure affected departments are unified in their approach to WC/WDM • The Directorate: Water Use Efficiency structure and WC/WDM function is not duplicated at regional level • Limited policy/strategy implementation guidance (mine water policy, WDSCS) • Continuity can be impacted through changes in ministers and shifting priorities (e.g., non-revenue water vs agriculture)
<p>Opportunities</p> <ul style="list-style-type: none"> • Industries starting to comply due to global investor requirements and corporate social responsibility • Strengthening partnerships and knowledge between IMP and agricultural sectors can improve and promote WC/WDM initiatives • Aligning to SDG Indicator 6.4.1. measures change of water use efficiency over time resulting in improved data availability • Drought and climate change drive awareness and promote awareness and collective action. • Corporate social responsibility can be leveraged to drive WC/WDM initiatives with buy in from the IMP sector. • Improved sharing of lessons learned (MWCB, AECL, Nestle, amongst others) helps drive WC/WDM • DTIC green paper on stewardship approaches can be leveraged. • Mining sector implementation of WC/WDM strategies has already shown successes based on Corporate Social Responsibility initiatives. • Industry sub-sectors such as pulp, sugar, beverages have implemented low-cost WC/WDM interventions as part of Corporate Social Responsibility initiatives. • Existing guidelines such as NCPC and Best Practice in Mining can be leveraged. 	<p>Threats</p> <ul style="list-style-type: none"> • Drought and climate change threaten success of ongoing initiatives • Broader economic environment (finance) limit funding for non-critical projects • Sector bodies not always engaged in water discourse, buy in is needed to drive improvements • Companies are reluctant to disclose in case of penalties or impacting competitive advantage • There are limited incentives for improving water use efficiency within the IMP sector. • Financial constraints for Small, Medium and Micro Enterprises. • Reducing water consumption through WC/WDM may reduce municipal revenue – could be seen as swapping one challenge for another. • Small-scale mining/industry – difficult to regulate (fly-by-night). • Uncertainty around new developments such as hydrogen and unconventional oil and gas reduce effectiveness of existing WC/WDM. • There is need to balance the drive for economic development and WC/WDM particularly in developing countries where water usage is typically higher.

4.3 Theory of Change

This strategic analysis various identifies problems and barriers to address while also highlighting opportunities for improvement. These feed into the Theory of Change as the focus areas to address.

- Business risk related to assurance of supply and quality of intake. The business case for water use efficiency illustrates that while upfront costs for WC/WDM interventions may be high, improving performance through operations, performance standards and technology can improve assurance of supply.
- Inability to enforce regulation due to limited data collected or submitted. The lack of an integrated system within the DWS where data can be reported and stored is limiting the efficiency of monitoring, compliance and enforcement. Strengthening the regulatory environment enable implementation, monitoring and enforcement. There is a need to ensure that the Compliance, Monitoring and Enforcement

strategy is aligned with the requirements for implementing WC/WDM in the IMP sector.

- Uneven awareness understanding, and uptake of lesson learning. There is inequitable access to/sharing of resources across the sector. Integrated knowledge sharing platforms allows users to share knowledge more effectively, facilitated by training and awareness to improve uptake of lesson learning.
- The broadness of the IMP sector and its considerable intra-sectoral variability presents both a challenge and an opportunity. Strategic alignment and co-development of solutions and partnerships will improve uptake of new technology and provide technical support.
- Competing mandates such as economic development of the country vs WC/WDM can also be facilitated by strategic alignment and tighter and more effective regulation. This implies better definition of institutional roles and capacity to support these roles.

- Limited strategic guidance and policy implementation around issues such as water re-use and recycling, as well as weak co-operative government links to the requirement for a strengthened regulatory environment and additional human resources to improve implementation of identified measures.
- Identification of appropriate incentives (subsidies, preferential treatment when additional water allocation is required) and reduction in disincentives (paying for allocation vs actual use) to encourage WC/WDM measures.

The Theory of change in Figure 4-3 builds on the learnings, findings and recommendations arising out of the Strategic Analysis, highlighting the key issues, the barriers that require addressing and the focus areas for change in order to make an impact. This identifies problems both specific to the IMP sector but also broader issues that link to the National Strategy.

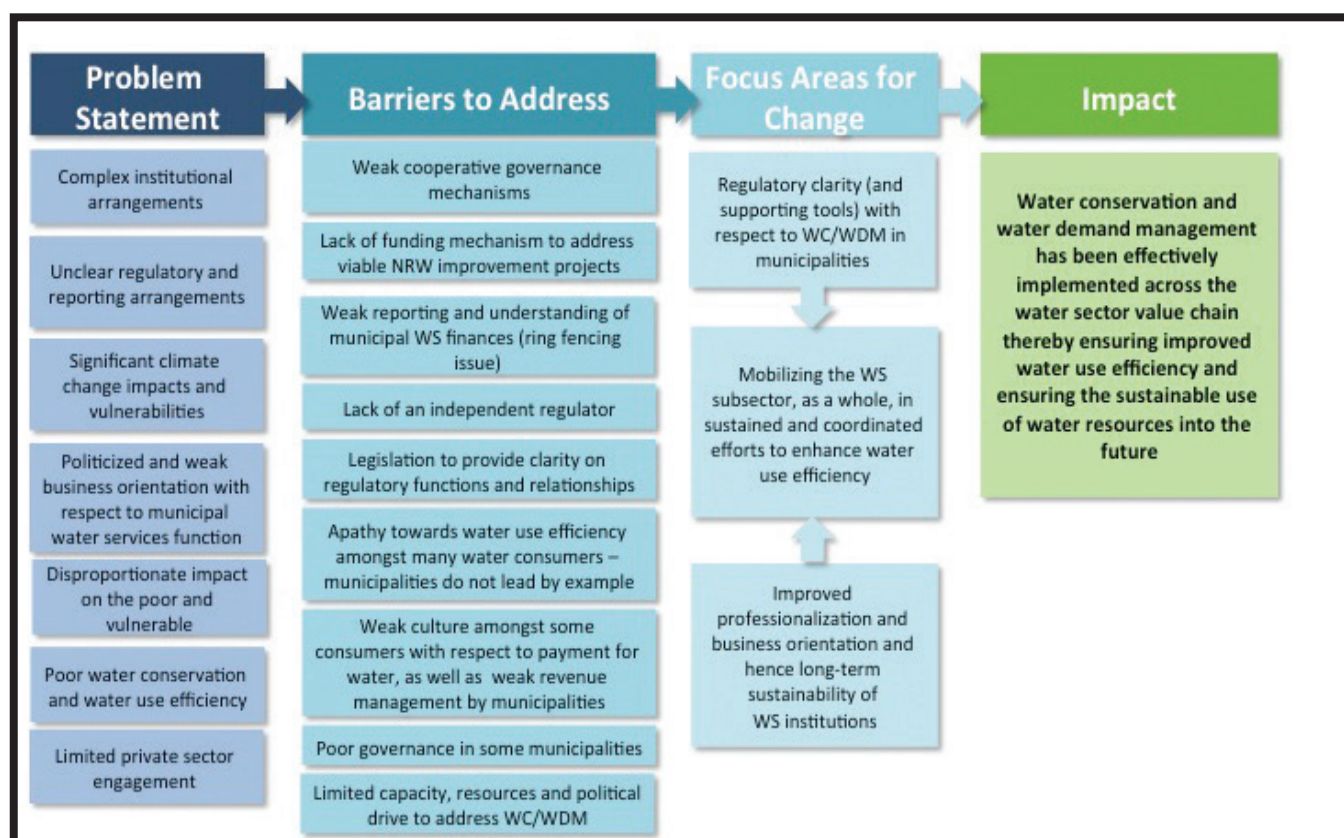


Figure 4-3: Theory of Change for the IMP Sector

5 Strategic Response

5.1 VISION

The NWRS3 Vision provides the framing for the sector: “The protection and management of water resources to enable equitable and sustainable access to water and sanitation services in support of socio-economic growth and development for the well-being of current and future generations.”

In support of the overarching Vision above, the vision for the WC/WDM strategies is:

“Water conservation and water demand management has been effectively implemented across all sector water value chains thereby ensuring improved water use efficiency and ensuring the sustainable use of water resources into the future.”

5.2 STRATEGIC TARGET

Key strategic water sector instruments such as the NWRS and the NWSMP have indicated that with the current water use patterns and developmental trajectory, South Africa will face a 17% water deficit by the year 2030. Indications are that this could indeed be a conservative estimation and as such DWS is undertaking a range of studies to provide an updated assessment of water supply and demand. In the meantime, it is critically important that as a country there is collective effort to improve WUE, thereby driving down water demand. Towards this end:

All water use sectors will undertake technical, social, economic and legislative interventions to ensure a 70% water use efficiency level by 2030.

This target is understood as a minimum requirement and that all sub-sectors must strive for continued improvements and innovations that will support the collective effort to drive down water demands and to set new standards in terms of attainable water use efficiency.

5.3 STRATEGIC PRINCIPLES

Building on the 2004 WC/WDM Strategies, the following Strategic Principles are proposed:

- Water Institutions must supply water in an efficient and effective manner by minimising water losses and promoting WC/WDM to their consumers.
- Consumers must use water efficiently.
- WC/WDM must be considered as part of the planning processes for water resources, water supply (to

Agriculture, Domestic, Industry, Mines and Power) and water and sanitation services.

- Value importance of water as an economic good with vital contribution towards production, i.e., industries and agriculture.
- The public sector will promote the involvement of private sector, pressure groups and citizens to implement WC/WDM including stewardship approaches, the use of Performance Based Contracts and Public Private Partnerships
- WC/WDM requires monitoring and evaluation to ensure tangible impact. The feedback from these processes will be used to recalibrate and adjust the approach, as necessary.
- Additional Guiding Principles are:
- Water is a socio-economic good as well as an environmental good and the management of water resources must consider this in planning processes.
- DWS as sector leader will drive a cooperative government agenda with all sectoral departments and spheres of government to ensure WC/WDM is consistently implemented at all scales and across sectors.
- Stakeholders will participate in the development and subsequent implementation of the WC/WDM strategies.
- Public sector – private sector engagement will be actively supported.
- The Public sector will promote the involvement of private sector, pressure groups and citizens to implement WC/WDM including stewardship approaches, the use of Performance Based Contracts and Public Private Partnership programmes.
- Accountability will be ensured and supported by government across sectors and spheres and will be underpinned by effective cross-sectoral coordination.
- The development of capacity will take time and will be resourced while being cognisant of the specific needs within institutions.
- Relevant data and information will be produced, updated and shared in a timely manner to enable the effective implementation of WC/WDM and to do so adaptively.
- The governance arrangements that are established and developed will support the mobilisation of financial resources and will allocate these in an efficient, transparent and timely manner to support WC/WDM implementation.
- Regulatory instruments will be progressively developed and applied across sectors and spheres of government.
- Integrity and transparency practices across the governance framework for WC/WDM will be applied

to support better accountability and trust in decision making.

- DWS as water sector leader will ensure that monitoring and evaluation processes are undertaken, that results are shared and that adjustments in approach are made based on this data and information.

Noting the cross-cutting nature of the IMP WC/WDM Strategy, the following cross-sectoral linkages are also highlighted:

- Alignment with major national and sector specific strategy, policy or legislation such as NWR53, National Development Plan 2030, the IPAP, and sector-based documents.
- Inter-governmental and departmental linkages to ensure a unified in approach to WC/WDM.
- Link to water services sector to ensure shared accountability to manage their water resources, infrastructure, maintenance and billing.
- Develop and strengthen monitoring and enforcement tools.
- Identify incentives that would facilitate the implementation of WC/WDM measures.
- Engage sector umbrella bodies that have significant

influence and formalise partnership agreements.

- Attract the private sector to participate in public-private partnership.
- Train and capacitate all sectors to embed WC/WDM.
- Build relationships between government, private sector, institutions, and communities.
- Facilitate and encourage research and innovation, technology and training.
- Link with the emerging energy sector as a driver for growth and development in South Africa to ensure balance between the drive for economic development and WC/WDM.

5.4 GOALS AND STRATEGIC OBJECTIVES

Four goals have been identified to effectively implement WC/WDM across the various sector value chains. Supporting these goals are ten objectives, which link the key pillars of WC/WDM (legislative, social, technical and financial) as they cut across multiple goals. The National WC/WDM strategy presents the overarching framework for the strategies as shown in Figure 5-1. The goals and objectives are presented in more detail below with a specific focus on how these apply to the IMP sector.

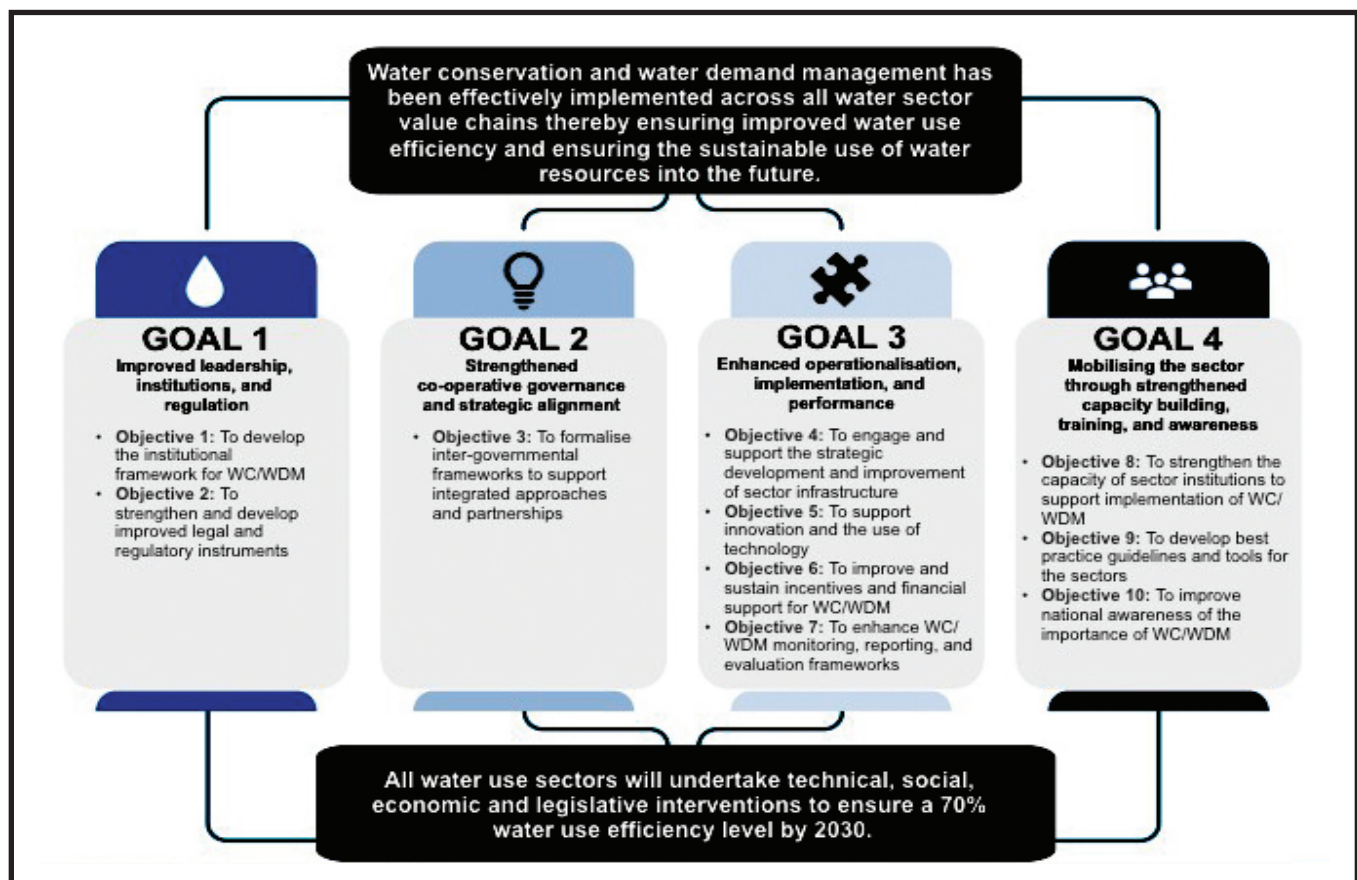


Figure 5-1: WC/WDM Strategy framework

GOAL 1: Improved leadership, institutions, and regulation

- **Objective 1: To develop the institutional framework for WC/WDM.** Improving the governance and institutional aspects of water resource management and development will provide for the foundation for operational response to WC/WDM strategies. The various sub-sectors have varying and complex institutional arrangements and there is a definite need to ensure that WC/WDM is mainstreamed into the business, planning and resourcing to ensure the implementation of actions. This will require in some instances that interventions to strengthen institutional capacity are required, this particularly the case regarding other sectoral institutions. From a water sector perspective, the institutional arrangements as set out in the NWA and National Water Policy have been in flux over a number of years. Clarifying the various institutional roles and responsibilities with regards to WC/WDM is important in ensuring effectiveness in the implementation of the various strategies. Ensuring that the necessary powers and duties are delegated to institutions is essential in enabling these institutions to take up these functions. Ensuring that these institutions have sufficient capacity, the appropriate skills as well as the necessary tools and systems will be imperative to support implementation. In addressing these institutional arrangements, it will be critical to also clarify the role of the DWS and ensure that it is equally capacitated.
- In the IMP sector, it is critical that WC/WDM is institutionalised in the water resources value chain by formalising the WC/WDM organisational structure, agreeing on the implementation plan, and defining roles and responsibilities through a Memorandum of Understanding (MoU).
- **Objective 2: To strengthen and develop improved legal and regulatory instruments.** The law and supporting regulations codify policy and provides clear articulation of what is required to ensure WC/WDM is affected. The NWA does provide guidance in this regard, but it is important to strengthen both law and its supporting regulations from time to time based on improved knowledge and developments in practice. It is equally essential to review those legal instruments from other sectors to ensure that WC/WDM is effectively mainstreamed into these sectoral instruments. The review and amendment of these instruments can be lengthy and require significant engagements, however, this can have profound impact upon the water sector. It will be important to consider a range of approaches that look to incentivise behavioural changes rather than using purely “command and control” approaches, and these can be introduced in a phased and progressive manner. The role of the various water sector institutions

in supporting and regulating will need to be clarified and developed accordingly. Linked to Objective 1, as these instruments are developed it will be essential to ensure that institutions have the capacity and systems to perform these regulatory roles.

- For the IMP sector, the strategic objectives focus on the strengthening of regulatory tools and implementation of key strategies, ensuring that WC/WDM conditions are included in Water Use Authorisations, ensuring that compliance monitoring is undertaken regularly, and promoting self-regulation and reporting.

GOAL 2: Strengthened co-operative governance and strategic alignment

- **Objective 3: To formalise inter-governmental frameworks to support integrated approaches and partnerships.** There is recognition in the NWRS that the management of the national water resource requires the support of a range of public sector institutions and cannot only be the responsibility of the DWS. With the developmental imperative of the country being based upon scarce water and environmental resources, the ability to ensure sustainable and resilient growth will require an integrated approach. The linkages between water and other sectors are inextricable and this, therefore, requires cooperative government support horizontally between sector departments and vertically between the spheres of government. The nature of the approaches used to formalise these relationships will be variable, according to context and may include a number of aspects along the water sector value chain.
- In the IMP sector, this will entail agreeing on roles and responsibilities for sector Departments as well as targets for implementing WC/WDM measures. Sector stakeholders will also be engaged through existing platforms in order to embed and encourage coalitions and Private-Public Partnerships (PPP).

GOAL 3: Enhanced operationalisation, implementation, and performance

- **Objective 4: To engage and support the strategic development and improvement of sector infrastructure.** There are a range of infrastructural solutions that will need to be considered in improving the approach to WC/WDM and that will result in improved WUE within sectors. Infrastructure takes time to plan, develop and finance and requires coordinated effort between sector partners. This process to unlock these solutions will need to start sooner, to realise impact later and will require engagements with key stakeholders such as Municipal Infrastructure Support Agent (MISA), Infrastructure South Africa, DBSA amongst others. The role of the National Water Partnerships Office in supporting and facilitating these solutions is important

and will act as a hub in pulling together these various partners.

- This objective is not applicable to the IMP sector and thus no strategic actions have been developed.
- **Objective 5: To support innovation and the use of technology.** The research and development agenda plays a critical role in gathering knowledge and assimilating best practice and using this to drive innovation. There are a number of key stakeholders in this space that, as a collective, will play a key role in assisting the country to develop game-changing approaches and technologies. Providing opportunities to share knowledge and build competencies will be critical to ensure uptake and replication of the new approaches and best practice.
- In the IMP sector, the sharing of WC/WDM tools, instruments, and technologies should be encouraged and promoted. Research and the uptake of new technology in water use efficiency should be promoted and should include the transition from coal to renewable power and providing guidance to SMMEs.
- **Objective 6: To improve and sustain incentives and financial support for WC/WDM.** Limited financial resources have been a challenge to the water sector for many years, and this has also been the case for WC/WDM. Putting in place a process to develop a financial investment framework that will support ongoing WC/WDM interventions will be imperative. This will need to consider the economic value of water and the implications on regional economies through cost-benefit analyses. It will be important to ensure that approaches are financially sustainable, and projects need to be bankable. The development of diverse and innovative financing mechanisms as well as mechanisms to reduce financial risk will be important and the National Water Partnerships Office, working with various partners, can be valuable conduit for realising these approaches. WC/WDM incentives such as the WC/WDM sector awards and innovation recognition awards should be reinstated to encourage the adoption of WC/WDM initiatives.
- In the IMP sector, DWS should work with institutions such as the DTIC, banks, and other institutions to promote water stewardship when businesses in the IMP sector apply for funding and grants.
- **Objective 7: To enhance WC/WDM monitoring, reporting, and evaluation frameworks.** The ability to manage processes adaptively is underpinned by data and information, as well as regular reporting. This will require the support of differing government role players and the development of agreed-upon reporting protocols. These approaches need to be relatively easy and pragmatic in order to support regular reporting. Clarification of institutional roles and responsibilities will be imperative with regards to reporting, data collation and information management.

- In the IMP sector, the establishment of Water Use Efficiency baselines for all IMP sectors and sub-sectors is critical for developing performance standards. To enable effective reporting, existing data collection and reporting systems should be harmonised and expanded to all water users in the sector. A simplistic monitoring and reporting tool should be developed to enable a consistent approach across the sector.

GOAL 4: Mobilising the sector through strengthened capacity building, training, and awareness

- **Objective 8: To strengthen the capacity of sector institutions to support implementation of WC/WDM.** The revised WC/WDM strategies will require staff with capacity and resources to manage and oversee the range of interventions outlined in the various strategies – this will include staff both within DWS and in the supporting sector institutions to understand how to translate these strategic actions into implementation. Typically, this staff would be required within the DWS, the DWS Regional Offices and possibly the CMAs. However, noting the importance of other sub-sector institutions and partners, it will be important to look at the needs more holistically. This undertaking would need to look at the various roles and responsibilities and then to develop the capacity needed within line functions to service these functional needs.
- An awareness and training campaign should be implemented for the IMP sector to improve understanding of WC/WDM and facilitate the operationalisation of WC/WDM support tools. This campaign can also provide a platform for participants to share their experiences and lessons learnt with regards to WC/WDM.
- **Objective 9: To develop best practice guidelines and tools for the sectors.** The DWS has over the years developed various guidelines, performance standards and benchmarking tools for WC/WDM within key sectors. Likewise, other sector focused institutions have also produced such tools. While there is a need to access these various materials and collate these into a broader WC/WDM toolkit, there will be the need to develop newer and up-to-date tools that consider the various innovative approaches that have been, and are being, developed.
- In the IMP sector, benchmarks should be developed or updated for the various sub-sectors which will then be used to set performance standards and guidelines for improving operational efficiency. Additionally, Best Practice Guidelines for the reuse of industrial-impacted water and acid mine drainage water should be developed in order to reduce water demand.
- **Objective 10: Improve national awareness of the importance of WC/WDM.** The development and implementation of a national awareness campaign will be critical in supporting the drive to change behaviours

and practices. This will require longer-term programming and the support of senior government role players. The development of supporting materials and knowledge products will be imperative, ensuring that these are accessible through knowledge sharing platforms.

- To improve national awareness in the IMP sector of the importance of WC/WDM knowledge products should be developed and showcased through an easily accessible integrated platform. The DWS should engage more

actively on existing platforms such as Water Stewardship Platforms, Partnership Platforms, WRC dialogue, WISA, etc. An annual report should be developed on the WC/WDM status quo and published.

5.5 STRATEGIC ACTIONS

A summary of the Strategic Actions for the IMP sector in response to the ten objectives are presented below:

Table 5-1: IMP WC/WDM Strategic Goals, Objectives, and Actions

GOALS	OBJECTIVES	STRATEGIC ACTIONS	RESPONSIBLE*
GOAL 1 Improved leadership, institutions, and regulation	Objective 1: To develop the institutional framework for WC/WDM	1.1 Institutionalise WC/WDM in the water resource management value chain	DWS, Regional Offices, CMAs
	Objective 2: To strengthen and develop improved legal and regulatory instruments	2.1 Strengthen WC/WDM Regulatory tools and implement key strategies 2.2 Ensure that WC/WDM conditions are included in Water Use Authorisations 2.3 Ensure that compliance monitoring and enforcement is undertaken regularly 2.4 Promote self-regulation and reporting	DWS, Regional Offices, legal support
GOAL 2 Strengthened co-operative governance and strategic alignment	Objective 3: To formalise inter-governmental frameworks to support integrated approaches and partnerships	3.1 Engage sector Departments to discuss and agree on roles, responsibilities, and targets for implementing WC/WDM measures 3.2 Create alignment of the institutional frameworks, industrial programmes and principles of the relevant government departments and stakeholders in support of WC/WDM 3.3 Continue to engage sector stakeholders through existing platforms (e.g., Water Sector Leadership Group, CMAs, Water Forums, MWCB, SWPN, amongst others) to embed and encourage Private-Public Partnerships (PPP)/ Coalitions	DWS, DMRE, DTIC, WRC, government departments, CMAs, NT

GOALS	OBJECTIVES	STRATEGIC ACTIONS	RESPONSIBLE*
GOAL 3 Enhanced operationalisation, implementation, and performance	Objective 4: To engage and support the strategic development and improvement of sector infrastructure	Not applicable	Not applicable
	Objective 5: To support innovation and the use of technology	5.1 Promote and encourage the sharing of WC/WDM instruments/tools/technology, research, and the uptake of new technology in WUE	DWS, WRC, DMRE, DTIC
	Objective 6: To improve and sustain incentives and financial support for WC/WDM	6.1 Reinstate WC/WDM incentives, such as the WC/WDM sector awards, innovation recognition awards 6.2 Ensure that WC/WDM is entrenched as part of the sustainable financial solutions provided by the banking sector	DWS, DMRE, DTIC, DBSA, etc.
	Objective 7: To enhance WC/WDM monitoring, reporting, and evaluation frameworks	7.1 Harmonise existing data collection and reporting systems, where appropriate, and expand to all water users 7.2 Establish Water Use Efficiency baselines for all IMP sectors and sub-sectors 7.3 Develop a simplistic, consistent, easy to access, and easy to integrate monitoring and reporting tool for all sectors and sub-sectors	DWS, WRC, Regional Offices, WRC, DTIC
GOAL 4 Mobilising the sector through strengthened capacity building, training, and awareness	Objective 8: To strengthen the capacity of sector institutions to support implementation of WC/WDM	8.1 Expand and implement an awareness and training campaign to improve understanding and operationalisation of WC/WDM support tools for the IMP sector and uptake of lesson learning/ sharing	DWS, Regional Offices, CMAs, DMRE, DTIC, DALRRD, WRC
	Objective 9: To develop best practice guidelines and tools for the sectors	9.1 Develop, update and extend benchmarks, and set performance standards and guidelines to improve operational efficiency	DWS, WRC, DMRE, DTIC, DALRRD, DFFE
	Objective 10: Improve national awareness of the importance of WC/WDM	10.1 Develop and collate knowledge products to be shared widely through an easily accessible integrated platform 10.2 Engage more actively on existing platforms for shared learning and engagements (Water Stewardship Platforms, Partnership Platforms, WRC dialogue, WISA, etc.) 10.3 Develop and publish annual reports on status quo of WC/WDM	DWS, WRC, Regional Offices, academia

*The parties listed as responsible for these actions may not comprise an exhaustive list.

6 Implementation Considerations

6.1 MONITORING AND EVALUATION

Successful implementation of this strategy will also be based on the ability of the state, particularly at the catchment level and local-levels, to implement a deliberate, systems-based, adaptive management approach. This approach must be inclusive, bringing together state, private sector and civil society players on a regular basis to review and adapt plans and actions. This adaptive management enables the refinement of strategies and plans and the refocusing of financial and human resource allocation once certain actions have been implemented or certain milestones achieved, when the expected results from implemented actions are not achieved or when new information becomes available that informs improved approaches.

The main focus of Monitoring and Evaluation (M& E) is on assessing the contributions of various role players

and factors to a given activity outcome, with such factors including outputs, partnerships, policy advice and dialogue, advocacy and coordination within the sector. The success of the WC/WDM strategy shall hinge on the effective monitoring of the implementation of the actions that emanate from this strategy. The DWS, as a custodian of this strategy shall put in place a results-monitoring framework that shall guide the implementation of this strategy. The monitoring framework shall among other things provide the stakeholders within the sector with specific indicators and targets. As the strategy is being implemented, it will be crucial for the stakeholders and the DWS within the sector to take stock of the gains or indeed losses that have been made over a given period through a structured evaluation process. This should be done through regular reporting on the set targets and indicators. The Figure 6-1 below presents a typical M&E process from which the M&E framework can be developed.

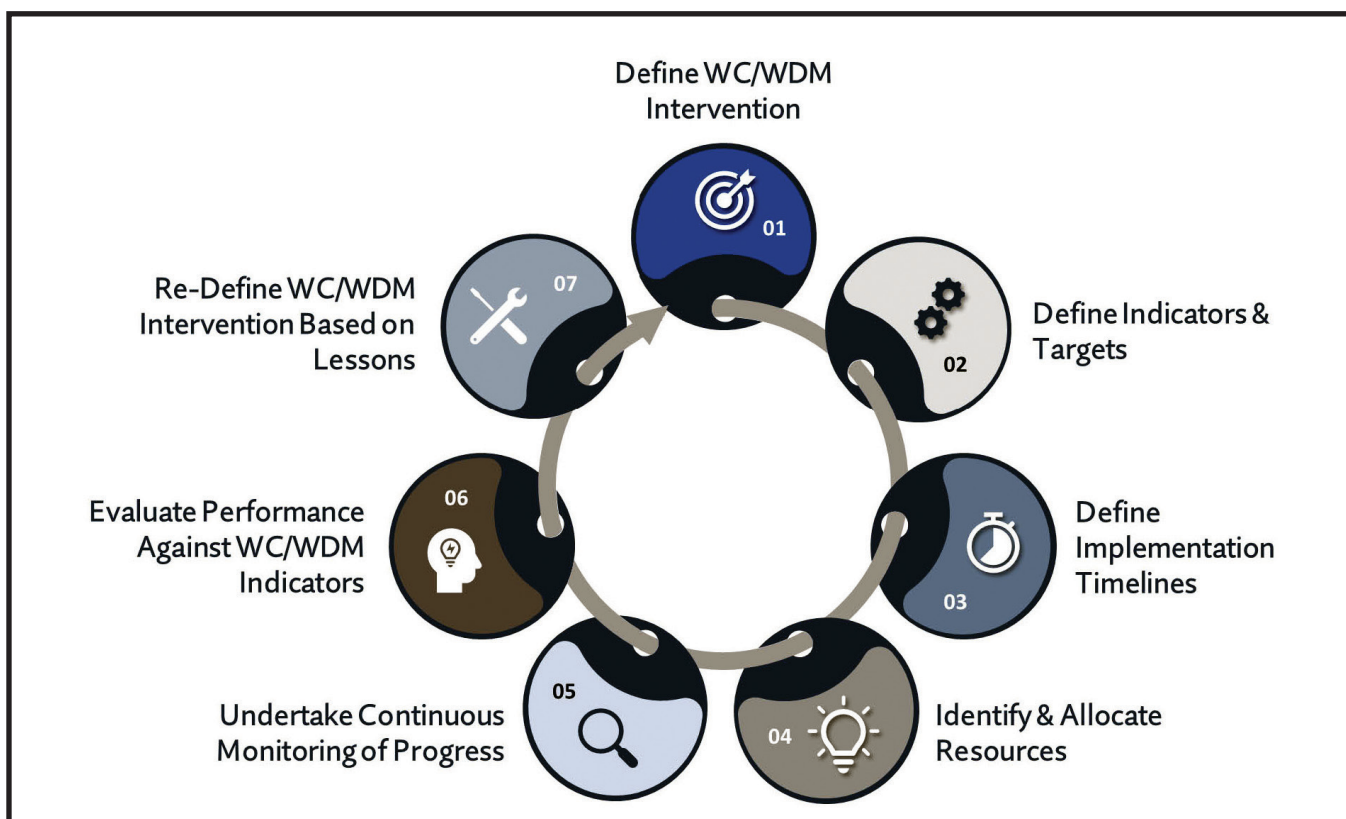


Figure 6-1: Monitoring and Evaluation Framework for Implementation

To guide the implementation of the sub-sector strategies, implementation plans have been developed for each and provides for interventions that will require the active engagement and participation of multiple national and provincial government departments, municipalities, the private sector and civil society. Due to the complexity

of this, and the fact that it is essential that nothing gets left behind, an effective M&E system is required. This system needs to be structured around a broader programmatic M&E that would include a reflection of impact upon water resources themselves. The DWS Head and Regional offices should be capacitated and equipped to

support this M&E approach and plan. This M&E system will be progressively developed, and support could include the following:

- Co-ordinate forums that will track the planning and implementation of WC/WDM in the Region.
- Collect and collate data and information.
- Analyse data and compile reports to report on the progress made with the implementation of WC/WDM in the IMP sectors and sub-sectors.
- Provide or arrange training on the various aspects of WC/WDM including the water balance calculation, metering, sectorisation, pressure management, funding, auditing, No Drop, leak detection, etc.
- Advise on the development of a WC/WDM strategy and business plan.
- Influence the allocations of funds for WSIG, RBIG, etc., based on informed decision making.
- Continuously monitor and evaluate the performance of the IMP sectors and sub-sectors towards improvement.

WC/WDM staff in the Head and Regional offices should be suitably qualified and skilled to perform audits on a biannual basis.

6.2 SECTOR WIDE-APPROACHES

Sector wide approaches or SWAP are widely regarded as good or best practice when it comes to coordinating major national initiatives or drives. As the name implies, their focus is sector wide however one can apply the same philosophy to a narrower initiative such as WC/WDM. The strength of SWAPs lies in the ability to address aspects such as the following:

- High levels of complexity
- The need to align a multitude of government institutions and hence the need for strong cooperative governance

- The need to involve a multitude of other institutions and partners such as the private sector, civil society and International Cooperating Partners (ICPs)
- A requirement for high levels of communication in order to enhance alignment, cooperation and alignment
- Initiatives involving a wide range of strategies, actions and projects

The typical design of effective SWAPs includes elements such as the following:

- A sound strategy or master plan that guides implementation
- A big emphasis on collaborative structures, involving all the key stakeholders
- Active participation of decision makers on the structures
- A commitment to high levels of communication, discussion and consensus decision making
- A strong technical secretariat that supports and facilitates the workings of the various collaborative structures
- Strong outreach processes
- A commitment to knowledge sharing and management to facilitate adaptive management
- A strong emphasis on action orientation to ensure that the structures remain vital and energised
- Strong M&E processes to support implementation and also contribute to adaptive management
- Dedicated resources (budgets) to ensure rollout

As is noted above, the need for an effective collaborative structure(s) is key. This is a critical enabler for SWAP. This may require the adaptation of existing structures, as opposed to the creation of new structures. An example of this could be the Water Sector Leadership Group (WSLG). This was originally established as a SWAP mechanism under the Masibambane initiative and was very effective for many years. It has fallen into disuse in

recent years however, it is understood that the DWS are keen to revive it. A subcommittee or task team of the WSLG could potentially be established that is dedicated to driving WC/WDM.

It is important also to emphasise that the SWAP mechanism(s) at national level will have to be mirrored at the provincial level if the WC/WDM strategy is to be implemented effectively. South Africa is far too big and complex to expect that national mechanisms alone will be successful. Again, the same principles apply with respect to the scope, modus operandi and the potential to utilise existing collaborative structures at the provincial level.

In conclusion on this aspect, it is worth emphasizing again that WC/WDM for IMP in South Africa is a complex undertaking, involving a multitude of players. In many respects therefore SWAP, or something similar is almost compulsory if there is to be a reasonable chance of success. It will also require strong, participative and mature leadership that is able to galvanise the support of a wide range of players.

6.3 ENABLING FACTORS

The National Water Act (Act 36 of 1998) recognises the pivotal role that WC/WDM plays in water resource management with the objective of reconciling water supply and demand. An enabling environment is required to implement WC/WDM strategies and legislation. Although local government is ultimately responsible for implementing WC/WDM in the water services sector, other government departments, institutions and citizens all have an important role to play by influencing, through co-operative governance, and implementing WC/WDM in all spheres of government and at home. The following aspects are critical to create an enabling environment.

Factor	Background	Action
Political will and leadership	Whilst WC/WDM appears in all national strategic instruments, it falls short in its implementation. This is not an activity that sits solely under the DWS, but it is a country-wide imperative.	<p>There is a need for strong political will and support to facilitate implementation of this strategy. There should be a high-level champion for WC/WDM in the sector (e.g., DDG or above) whose voice should lead the sector's efforts and direction at a higher level.</p> <p>Create awareness and water use efficiency in Government. Government institutions must lead by example and fix all visible leaks and internal plumbing leaks with 48 hours as stipulated in the Regulations.</p>
Financing	A conducive environment is needed to attract funding for WC/WDM interventions, which is linked to the bankability of the municipality but also innovative financing mechanism and incentives.	<p>Improved cooperative governance and SWAP provide opportunities for stakeholders and departments to pool their resources to fund WC/WDM interventions, in a more coordinated manner.</p> <p>Tapping into global climate financing mechanisms are also a potential way in which to fund a few the interventions required.</p>
Institutionalisation	WC/WDM is included as a key strategic objective in the NDP, NWSMP, NWRS3, and the DWS Strategic Plan. WC/WDM is cross cutting in the Department of Water and Sanitation, let alone other Sector Departments like DMRE, DTIC, DARLRRD amongst others. It requires strong and focussed engagement with various other directorates and Ministries.	<p>Elevate Directorate Water Use Efficiency to a Chief Directorate to give it the prominence it requires to make a meaningful impact.</p> <p>Establish defined champions in the regional offices that can plan and co-ordinate WC/WDM regionally.</p> <p>Encourage WC/WDM institutional ownership whereby sector-wide stakeholders bring in extra capacity and technologies to the lead institution in the implementation of the interventions.</p>
Coordination	Lack of coordination can lead to fragmented WC/WDM efforts within the sector. The implementation of WC/WDM is complex and thus there is an important need for key lessons to be shared with the entire sector. There are 13 key government departments actively involved with various aspects of WC/WDM. The roles and responsibilities of each Department must be clearly defined, and Departments must work together to achieve National objectives.	<p>Strengthen and clarify roles and responsibilities (team effort).</p> <p>Establish coordination meetings¹, with DWS taking the lead, to define roles and responsibilities, understand processes, procedures and programmes to avoid duplication and bureaucracy.</p>
Public support	<p>There are 60 million water users in South Africa. A concerted effort by each water user to fix leaks and use water sparingly could significantly contribute to achieving the national target.</p> <p>Government has an obligation to supply water services to end users. End users have an equal obligation to conserve water and become responsible citizens.</p>	In addition to the Sector WC/WDM, promote water use efficiency in the home, at work and in public spaces. This will require a major outreach programme to be designed using the latest behavioural science and professional marketing techniques.

Factor	Background	Action
Enforcement	Clause 82 (1) of The Water Services Act (Act No. 108, 1997) states no person may continue the wasteful use of water after being called upon to stop by the Minister, a Province or any water services authority. Any person who contravenes subsection (1) is guilty of an offence and liable, on conviction, to a fine or to imprisonment or to both such fine and imprisonment.	Government must enforce All Legislation, Regulations and by-laws ² .
Monitoring and Reporting	Monitoring and reporting is currently very inconsistent in some areas, and piece-meal. Without consistent and up-to-date information, it becomes difficult to make any evidence-based decision making.	A consistent and coordinated monitoring and reporting framework for WC/WDM interventions is needed for the sector to measure its progress. Better quality information, together with widespread publication by the sector lead, will provide impetus for better accountability throughout the sector.

¹It makes sense that these are closely linked with, or part of, the sector SWAP structures.

²Noting that good practice regulation strategies nearly always combine application of both “the carrot and the stick.”

5.6 IMPLEMENTATION PLAN

The implementation plan for the IMP sector is presented in Table 6-1. The implementation plan will be key to putting the strategy into action and achieving the WC/WDM target. The implementation plan should be a living document that the various stakeholders engage with and adapt to their needs in order to bring the actions to fruition. The plan also provides an indication of the responsible parties and those that can be enablers of the various actions. The lists of parties provided in these areas is not exhaustive, and additional parties may need to be included.

Table 6-1: Implementation Plan for the IMP Sector

Strategic Action	Sub-activities	Priority	Deliverables	Timeframe (years)			Responsible	Enablers
				1-3	3-5	5+		
GOAL 1: Improved leadership, institutions, and regulation								
Objective 1: To develop the institutional framework for WC/WDM								
1.1 Institutionalise WC/WDM in the water resource management value chain	1.1.1 Formalise a WC/WDM process/workflow diagram structure that includes all impacted line-functions, including the Regional Offices	High	Detailed IMP process/workflow diagram				DWS, Regional Offices, CMAs	DDG Support
	1.1.2 Affected line-functions to agree to combined WC/WDM implementation plan	High	Implementation plan				DWS, Regional Offices, CMAs	DDG Support
	1.1.3 Develop process/workflow diagram and MoU describing roles and responsibilities for implementation	High	Process/workflow diagram and MoU				DWS, Regional Offices, CMAs	DDG Support
Objective 2: To strengthen and develop improved legal and regulatory instruments								
2.1 Strengthen WC/WDM Regulatory tools and implement key strategies	2.1.1 Assess current regulatory tools and strategies for improvement and develop new tools where required	High	Report on regulatory tools and strategies – including reg tools and strategies.				DWS	
	2.1.2 Capacitate compliance and enforcement staff on regulations and regulatory tools for implementation	Medium	Capacity building plan				DWS	DDG Support
	2.1.3 Implement strategies and roll out tools	Medium	Regulatory tools and strategies				DWS	

Strategic Action	Sub-activities	Priority	Deliverables	Timeframe (years)			Responsible	Enablers
				1-3	3-5	5+		
2.2 Ensure that WC/WDM conditions are included in Water Use Authorisations	2.2.1 Review existing WULAs and develop a plan for incorporating WC/WDM conditions as these expire	Medium	Plan for updating licences				DWS, Regional Offices	
	2.2.2 Develop a set of WC/WDM conditions for inclusion in WULAs	Medium	WC/WDM conditions				DWS, legal support, Regional Offices	
2.3 Ensure that compliance monitoring and enforcement is undertaken regularly	2.3.1 Align with the CME strategy	Medium	Updated CME strategy				DWS, Regional Offices	Support from Regional Offices is critical
2.4 Promote self-regulation and reporting	2.4.1 Develop WC/WDM self-regulatory tools and conduct training for the IMP Sector	Medium	Training plan and workshop material				DWS	Industry bodies, Partnership/Stewardship organisations
GOAL 2: Strengthened co-operative governance and strategic alignment								
Objective 3: To formalise inter-governmental frameworks to support integrated approaches and partnerships								
3.1 Engage sector Departments to discuss and agree on roles, responsibilities, and targets for implementing WC/WDM measures	3.1.1 Develop MoA describing roles and responsibilities for implementation	Medium	MoA				DWS, DMRE, DTIC	High-level support for cooperation in all Ministries
	3.1.2 Develop targets and KPIs	Medium	Targets and KPIs				DWS, DMRE, DTIC	High-level support for cooperation in all Ministries

Strategic Action	Sub-activities	Priority	Deliverables	Timeframe (years)			Responsible	Enablers
				1-3	3-5	5+		
3.2 Create alignment of the institutional frameworks, industrial programmes and principles of the relevant government departments and stakeholders in support of WC/WDM	3.2.1 Review and align the institutional framework works between DWS, DMRE, and DTIC	Medium	Review Report				DWS, WRC, government departments, CMAs	SWPN
	3.2.2. Align the WC/WDM interventions with the priorities of the DWS, DMRE, and DTIC	Medium	WC/WDM Interventions Alignment Report				DWS, WRC, government departments, CMAs	SWPN
	3.2.3 Review the Water & Sanitation Masterplan, NWR53, NWSF 2020 to identify areas of alignment	Medium	Review Report				DWS, WRC, government departments, CMAs	SWPN
	3.2.4 Engage with DWS SDG6 Task Team	Medium	Engagement Report				DWS, WRC, government departments, CMAs	SWPN
3.3 Continue to engage sector stakeholders through existing platforms (e.g., Water Sector Leadership Group, CMAs, Water Forums, MWCB, SWPN, amongst others) to embed and encourage Private-Public Partnerships (PPP)/ Coalitions	3.3.1 Continue engagement through WC/WDM seminars and workshops for the Private Sector	High	Presentations/ documents				DWS, WRC, NT	Private sector, sector bodies (SWPN, MWCB, Minerals Council SA, NBI, etc.)

Strategic Action	Sub-activities	Priority	Deliverables	Timeframe (years)			Responsible	Enablers
				1-3	3-5	5+		
	3.3.2 Strengthen relationship with Private Sector through trust building initiatives, sharing of information and seeking to build transparency through full disclosure	Medium	Data sharing portal				DWS, WRC	Private sector, sector bodies (SWPN, MWCB, Minerals Council SA, NBI, etc.)
	3.3.3 Clarify and capacitate sector on the role that PPPs can play in WC/WDM	Medium	Presentations/ documents				DWS, WRC, NT	Private sector, sector bodies (SWPN, MWCB, Minerals Council SA, NBI, etc.)
	3.3.4 Develop and implement a plan for partnership development	Medium	Partnership development plan				DWS	Private sector, WSSLG, partnership platforms, capacity in DWS
GOAL 3: Enhanced operationalisation, implementation, and performance								
Objective 5: To support innovation and the use of technology								
5.1 Promote and encourage the sharing of WC/WDM instruments/ tools/technology, research, and the uptake of new technology in WUE	5.1.1 Identify WC/WDM sector leaders and engage with them to identify key instruments/tools/technology for promotion	Medium	Key instruments/ tools/technology				WRC, DWS, DMRE, DTIC	Sector bodies, private sector, Coaltech, NCPC, Mintech, etc.

Strategic Action	Sub-activities	Priority	Deliverables	Timeframe (years)			Responsible	Enablers
				1-3	3-5	5+		
	5.1.2 Develop a forum for sharing of innovative technologies	Medium	Electronic database of Best Application Technologies (in WRC, CSIR, Innovation Hub)				WRC, DMRE, DTIC	Sector bodies, private sector, Coaltech, NCPC, Mintech, etc.; create a safe environment for sectors to engage in success and challenges in this space
	5.1.3 Provide guidance to SMMEs for technology upgrades/shifts	Medium					DWS, DMRE, DTIC	Sector bodies, private sector, Coaltech, NCPC, Mintech, etc.; high-level guidance from DWS
Objective 6: To improve and sustain incentives and financial support for WC/WDM								
6.1 Reinstate WC/WDM incentives, such as the WC/WDM Sector awards, innovation recognition awards	6.1.1 Develop incentives programme	Medium	Incentives programme				DWS, DMRE, DTIC	Sector bodies; requires DWS high-level support
	6.1.2 Host awards ceremony to recognise leaders in the implementation of WC/WDM	Medium	Awards ceremony				DWS, DMRE, DTIC, etc.	Sector bodies; requires DWS high-level support
6.2 Ensure that WC/WDM is entrenched as part of the sustainable financial solutions provided by the banking sector	6.2.1 Identify water stewardship-focused criteria that would be most beneficial for furthering the WC/WDM agenda	Medium	Key water stewardship-focused criteria				DWS, DMRE, DTIC, DBSA, etc.	Sector bodies, DWS capacity
	6.2.2 Develop knowledge products for the chosen criteria and deliver these as part of the training and awareness campaigns (Objective 8)	Medium	Knowledge products				DWS, DMRE, DTIC, DBSA, etc.	Sector bodies, DWS capacity

Strategic Action	Sub-activities	Priority	Deliverables	Timeframe (years)			Responsible	Enablers
				1-3	3-5	5+		
Objective 7: To enhance WC/WDM monitoring, reporting, and evaluation frameworks								
7.1 Harmonise existing data collection and reporting systems, where appropriate, and expand to all water users	7.1.1 Develop data collection and reporting framework to assess existing data collection system and identify gaps	High	Data collection and reporting framework				DWS, WRC, Regional Offices	High-level support from DWS
	7.1.2 Expand data collection and reporting system as appropriate	High					DWS	High-level support from DWS
	7.2.1 Establish baselines based on existing usage data and information from literature	High	IMP sector baselines				DWS, WRC, DMRE, DTIC	Sector Bodies; support from IMP Stakeholders and Regional and Offices
7.2 Establish Water Use Efficiency baselines for all IMP sectors and sub-sectors	7.2.2 Based on baselines/benchmarks, agree on performance standards	Medium	Performance standards				DWS, WRC, DMRE, DTIC	Sector Bodies; support from IMP Stakeholders and Regional and Offices
	7.2.3 Track and report on progress against performance standards by developing M&E framework and reports/reporting tool	Medium	M&E framework, reports /reporting tool				DWS, WRC, DMRE, DTIC	Sector Bodies; support from IMP Stakeholders and Regional and Offices
	7.3.1 Develop reporting tool	High	Reporting tool				DWS	Sector bodies
7.3 Develop a simplistic, consistent, easy to access, and easy to integrate monitoring and reporting tool for all sectors and sub-sectors	7.3.2 Provide training and development on the newly developed reporting tool	High	Training material				DWS, WRC	Sector bodies

Strategic Action	Sub-activities	Priority	Deliverables	Timeframe (years)			Responsible	Enablers
				1-3	3-5	5+		
GOAL 4: Mobilising the sector through strengthened capacity building, training, and awareness								
Objective 8: To strengthen the capacity of sector institutions to support implementation of WC/WDM								
8.1 Expand and implement an awareness and training campaign to improve understanding and operationalisation of WC/WDM support tools for the IMP sector and uptake of lesson learning/ sharing	8.1.1 Develop and implement an awareness and training campaign, including WC/WDM regulations and regulatory tools	Medium	Awareness and Training materials, Campaign Implementation Report				DWS, Regional Offices, CMAs	Sector bodies (WISA, Minerals Council, NCPC, etc.), partnership platforms; DWS building and maintaining networks and relationships with key stakeholders
	8.1.2 Ensure capacitation of key WC/WDM managers within the Department and cross-sectorally	High	Capacity Building Plan				DWS, DMRE, DTIC, DALRRD, WRC	Minerals Council SA, SWPN; engaged and interested people to uptake to lessons and knowledge shared
Objective 9: To develop best practice guidelines and tools for the sectors								
9.1 Develop, update and extend benchmarks, and set performance standards and guidelines to improve operational efficiency	9.1.1 Develop, update and expand benchmarks to all IMP sectors and sub-sectors, where relevant	High	IMP sector benchmarks				DWS, WRC, DMRE, DTIC	Sector bodies (WISA, Minerals Council, NCPC, etc.); requires support from IMP Stakeholders and Regional and Offices

Strategic Action	Sub-activities	Priority	Deliverables	Timeframe (years)			Responsible	Enablers
				1-3	3-5	5+		
	9.1.2 Develop Best Practice Guidelines	High	Best Practice Guidelines				DWS, WRC, DMRE	Industry bodies, ESKOM, support from DDGs in DWS, DALRRD, DMRE, CMAs, and LMs
	9.1.3 Develop a guideline to reduce water demand through the reuse and redirect (and/or beneficiation) of industrial-impacted water to support the water mix (such as industrial parks and reuse of acid mine drainage water)	High	Re-use guideline				DWS, WRC, DMRE, DALRRD, DFFE	Minerals Council SA, ESKOM, support from DDGs in DWS, DALRRD and DMRE, CMAs, impacted LMs
Objective 10: Improve national awareness of the importance of WC/WDM								
10.1 Develop and collate knowledge products to be shared widely through an easily accessible integrated platform	10.1.1 Develop these products and the necessary platforms to enable dissemination	Medium	Documents/website				DWS, WRC	Minerals Council SA, SWPN, WISA, Partnership Platforms, capacity within DWS, Intellectual Property considerations
	10.1.2 Spread awareness of the information platform	Medium	Documents/website				DWS, Regional Offices, academia	Sector partners (WISA, Minerals Council SA, NCPC, etc.), capacity within DWS to engage frequently

Strategic Action	Sub-activities	Priority	Deliverables	Timeframe (years)			Responsible	Enablers
				1-3	3-5	5+		
10.2 Engage more actively on existing platforms for shared learning and engagements (Water Stewardship Platforms, Partnership Platforms, WRC Platforms, WISA, dialogue, WISA, etc.)	10.2.1 Increase engagement level on existing platforms	Medium	Lessons learning brief				DWS, WRC	Minerals Council SA, SWPN, WISA, Partnership Platforms, capacity within DWS to engage frequently
10.3 Develop and publish annual reports on status quo of WC/WDM	10.3.1 Develop report structure and data requirements	Medium	Finalise annual Report structure and data requirements				DWS, Regional Office	Understanding data gaps and needs
	10.3.2 Publish annual reports	Medium	Annual Report				DWS, Regional Office	Availability and quality of data, and capacity within DWS

7 Conclusions



There is an uneven distribution of water resources across South Africa, with parts of the country having more abundant water resources than others. However, many of the country's key economic areas are not necessarily located close to these water resources. As a result, the country has developed a significant number of dams and bulk water transfer schemes to ensure that water reaches these hubs. Nevertheless, the growth and development trajectory for South Africa will place increasing pressures on these limited supplies, to the extent that there will be a projected 17% deficit by 2030 (DWS, 2018). Climate change will also have significant impacts upon this. There is increasing realisation that infrastructural options for water resource development are declining and hence, WC/WDM interventions that will aim to reduce water demands and improve water use efficiency will become increasingly imperative if we are to avoid water constraining the developmental agenda.

While there are a range of strategic interventions that the DWS must lead and undertake, it is important to understand that this will require the combined efforts of all sectors of government, of the private sector and business as well as civil society and all

South Africans. It is imperative that as a nation there is a change in the relationship that we all have with water and that we recognise that this scarce natural resource requires the active control, management, conservation, protection, use and development by each and every citizen.

To strengthen the approach to WC/WDM the DWS has led the development of a National Water Conservation and Water Demand Management Strategy, and this provides the framework for sub-sector strategies for Agriculture, for Industry, Mining and Power, and for Water Services. Each of these sub-sector strategies provides an implementation plan that guides the array of interventions needed to give effect to these sub-sector strategies. This will require the active support and participation of all key sub-sector partners and stakeholders, as emphasised above. Each sub-sector is inherently complex and as such there is a need for considerable innovation and the development of bespoke approaches to ensure the minimum target of 70% water use efficiency is reached. However, the expectation is that all sub-sectors should strive for continual improvements. These implementation plans have outlined priority interventions and have

indicated some of the key stakeholders that are important to support these, however, it is not possible for that to be a fully comprehensive list of role players. These interventions will require all stakeholders to "put up their hands" and step forward to engage with these interventions.

To this end, the DWS as water sector lead, will continue to provide the guidance and support required to unlock processes and facilitate successful outcomes, as well as put in place the tools and systems to enable adaptive management approaches towards achieving the goals and strategic objectives that these strategies outline.

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