Implementation of Non-Consumptive Water Use Charges in the Pricing Strategy for Raw Water Use Charges

by

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Executive Summary

This document is the final report on the implementation of Non-Consumptive Water Use Charges (NCC) in the pricing strategy for raw water use charges in South Africa. It addresses the need to recover costs associated with water resource management, operation, and maintenance of infrastructure for non-consumptive water uses such as aquaculture, energy generation (notably hydropower and floating solar), and recreational activities. The report provides a comprehensive literature review, methodology, sector-specific frameworks, and recommendations for charge principles and structures, alongside considerations for implementation readiness.

INTRODUCTION

Context

Water availability and quality are vital to South Africa's economy, supporting multiple sectors and contributing to GDP and employment. Investment in water infrastructure yields significant economic benefits, but South Africa faces a substantial investment gap requiring R256 billion annually from 2023 to 2050 for water security. Non-consumptive water uses, including hydropower, aquaculture, and recreation, currently do not contribute adequately to resource management costs despite their economic importance.

The 2024 Pricing Strategy for Raw Water Use Charges incorporates non-consumptive water use charges (NCC) to recover costs related to water resource management and infrastructure operation for non-consumptive uses. It aims to ensure cost recovery, environmental protection, legal alignment, and equitable pricing. The strategy identifies aquaculture, renewable energy generation, and recreation as priority sectors for NCC development. It also highlights the need for transparent administration, stakeholder engagement, and policy support, including draft regulations and bills relevant to these sectors

Scope and Objectives

The project scope focuses on NCC methodologies for aquaculture, renewable energy generation, and recreation. It aims to develop calculation methods aligned with national legislation and sector-specific policies, ensuring charges reflect the costs and impacts of non-consumptive water uses. The study emphasizes the importance of sustainable, efficient, and equitable water resource management principles to guide pricing policy development.

METHODOLOGY

The approach included a literature review, data collation and review (notably from the DWS Water use Authorisation and Registration Management System - WARMS), and stakeholder engagement through key informant sessions and sector working groups. The methodology considered sector maturity, principles for charging, and various pricing mechanisms such as volumetric, fixed, and market-based charges. The process involved identifying charge options per sector and evaluating them for simplicity, social acceptance, and administrative feasibility.

LITERATURE REVIEW

National Frameworks

South Africa's water management is governed by constitutional rights, the National Water Act (NWA) 1998, and related legislation addressing environmental protection and sector governance. Key strategies include the National Water Resources Strategy (NWRS-3) and sector-specific frameworks promoting sustainable water use and climate resilience.
The Pricing Strategy aims for full cost recovery, user-pays, polluter-pays, ecological sustainability, differentiated charges, equity, and transparent governance. It distinguishes between abstraction, waste discharge, and non-consumptive water use charges across user categories such as agriculture, municipalities, and industry.

Review of Pricing Strategy Mechanisms

Four pricing strategies were reviewed: cost-plus, value-based, competitive/market, and dynamic pricing. Competitive/market pricing is preferred for NCC sectors due to emerging markets and the need for fairness and growth, while cost-plus suits established government infrastructure, and value-based or dynamic pricing approaches are less appropriate.

International Assessment of NCC Financial Instruments

Internationally, various non-consumptive water use charges exist, including tariffs, licenses, taxes, voluntary payments, and tradable rights. Examples include hydropower royalties in Sweden and Tajikistan, abstraction charges in Georgia and the United Kingdom, and aquaculture permits in Norway. Market-based pricing and cost contribution approaches prevail, balancing sustainability and economic incentives.

NCC FRAMEWORK FOR AQUACULTURE

Sector Overview

The aquaculture sector in South Africa is a young developing industry consisting of both freshwater and marine aquaculture across all nine provinces, each with distinct aquatic species, water use requirements, and regional focuses. A total of 195 operational farms were recorded in 2021 for marine and freshwater aquaculture. This included 151 freshwater farms and 44 marine farms. The total market value for aquaculture products and services in 2021 was estimated at R2.24 billion. The freshwater component was estimated at R136 million (R135 543 500), representing a 13.29% contribution to the overall aquaculture sector value in 2016.

For this study, only freshwater aquaculture was considered as this falls under the ambit of the DWS. The total freshwater aquaculture production in South Africa for 2021 was 1 482,30 tons (19% of total aquaculture yield). The freshwater aquaculture subsector is distributed across all inland provinces, with main production in Limpopo, Gauteng, Mpumalanga, North West, and Free State. Common freshwater species include trout (*Oncorhynchus mykiss* and *Salmo trutta*), tilapia (*Oreochromis mossambicus* and *O. niloticus*), African Sharptooth catfish (*Clarias gariepinus*), common carp (*Cyprinus carpio*),

koi carp, and ornamental fish. Freshwater aquaculture contributes modestly to GDP and faces challenges such as limited capital and regulatory complexity.

Water use varies by farming intensity and species, with freshwater aquaculture depending heavily on a sustainable water supply of adequate quality. Aspects of freshwater aquaculture water use fall within the scope of non-consumptive water use and is governed by a set of legal frameworks described below.

Legal and Institutional Context

Aquaculture is regulated under multiple laws, including the NWA, Marine Living Resources Act, and the Draft Aquaculture Development Bill (2023), which seeks to unify marine and freshwater regulation. Licensing varies provincially, with the Department of Forestry, Fisheries and the Environment (DFFE) leading governance and provinces supporting freshwater aquaculture development zones. The current aquaculture legislation does not adequately cater to the freshwater subsector.

The DFFE serves as the primary custodian of aquaculture at the national level in South Africa. It is responsible for developing policies, strategic planning, promoting investment, coordinating research, and providing regulatory oversight for both marine and freshwater aquaculture. The activity of aquaculture can take the form of different categories of aquaculture. There are two broad categories which are relevant for NCC as follows:

1. Open-Water Systems – e.g. cage culture in dams, reservoirs, or rivers
2. Land-Based Systems – any system where water is extracted and discharged separately (ponds, recirculating aquaculture systems, raceways, aquaponics)

There is no direct reference to aquaculture as a water use in the NWA and thus no requirement to license the aquaculture water use *per se*. Aquaculture is thus dealt with as a subsector of agriculture. Aquaculture activities at times include different water uses that require authorisation and licensing under the NWA.

NCC Charge Principles and Options

The recommended charge principles for the NCC for aquaculture are:

- Rental of exclusive space in government works and rivers;
- The space is calculated on the basis of cubic metres;
- Market-related pricing is used;
- Tariff Blocks to be used to simplify administration and categorisation of the activity; and
- Where there is also a relevant land lease the charge is to be included in the lease.

Due to the sector's limited size and jurisdictional constraints, NCC for aquaculture is recommended cautiously. Charges should be based on rental of exclusive water space in government works or rivers, using market-related pricing and block categories for simplicity. Land-based aquaculture is excluded from NCC, as consumptive uses (abstraction and discharge) are regulated separately.

Charge Calculation and Structure

Basis for the tariff block

Noting the lack of data for current sizes and costs of commercial aquaculture in open-water systems, an alternative method was used as the foundation to structure the tariff blocks and charges. The DFFE bioeconomic feasibility studies for Nile tilapia, Mozambique tilapia, and rainbow trout were selected as the most definitive sources of information to inform tariff block structuring, using reported production levels and stocking densities of 53 kg/m³ for tilapia and 25 kg/m³ for trout.

Cage volumes were estimated by dividing production by the maximum stocking density. As the feasibility studies did not explicitly define cage volumes, these values represent an upper-bound estimate. In practice, cage volumes may be lower depending on production strategy. The tariff blocks proposed in this study were then based on the calculated cage volumes, considering the minimum profitable levels and optimal profit levels in these studies.

The recommended NCC for aquaculture was calculated as a percentage of operating costs. This was done to ascertain what portion of operating costs should be attributed to the NCC charge. In reality, as a new charge, this would also change the cost structure and change the outcome of the feasibility studies to a degree. By introducing the NCC for aquaculture, the increase in operating cost should not be more than 5%. The sensitivity of the feasibility studies is such that introducing a cost of greater than 5% of total operating cost would significantly change the feasibility points. The table below compares the recommended NCC charge as a percentage of total operating cost, which ranges between 0,6 and the maximum of 5%.

Table A: Evaluation of pricing structure against operating costs

Farm scenario	Production (tons/yr)	Stocking density (kg/m³)	Cage volume (m³)	Total operating cost (R)	5% of operating cost (R)	Annual charge (R)	Charge as % of operating cost
Nile tilapia, minimum profitable	75	53	1,415	3,340,763	167,038	80,000	2.4%
Nile tilapia, optimal profit	786	53	14,830	33,457,890	1,672,895	200,000	0.6%
Mozambique tilapia, minimum profitable	34	53	642	1,750,103	87,505	80,000	4.6%
Mozambique tilapia, optimal profit	774	53	14,604	27,175,834	1,358,792	200,000	0.7%
Rainbow trout, minimum profitable	38	25	1,520	1,607,176	80,359	80,000	5.0%
Rainbow trout, optimal profit	923	25	36,920	23,141,594	1,157,080	360,000	1.6%

Reference pricing

There are no current market activities for freshwater aquaculture and, therefore, determining a direct market price was not possible. Whilst acknowledging the significant difference between marine aquaculture and freshwater aquaculture, there are examples of 'water-use lease / water rental' in the marine sector which provided a good reference point.

Basis for escalation

There is a case to base future escalation on either Producer Price Index (PPI) or Consumer Price Index (CPI). PPI measures inflation at the factory gate (input costs), whilst the CPI measures inflation at the retail level (cost of living). As the non-consumptive charge for aquaculture is effectively an input cost for aquaculture farming, PPI could be selected. Headline PPI components emphasise the final cost of the key final goods such as food and manufactured goods, which is not directly correlated to the value or market value of the exclusive water space on which the NCC is based.

Headline CPI's largest component is housing and utilities, which could relate more closely to exclusive water use. In reality, both PPI and CPI could be used as an indicative basis for escalation, but do not have a strong correlation to the exclusive water use nature of the NCC for aquaculture. In general, DWS has proposed the use of CPI in the revised Pricing Strategy. For simplicity and standardisation, escalation for the NCC for aquaculture should be based on CPI.

NCC Tariff Blocks for Aquaculture

DWS has the option to choose between two different tariff blocks, either a 4-level tariff block that allows for increased simplicity, as presented in Table B,Table 4-7 or a six-level tariff block that allows for greater differentiation in the size of the operation, as presented in Table C.

Table B : Proposed 4-level tariff block

No	Block in cubic metres	Annual Charge (excl. VAT)	Billing Cycle	Comment
1.	**0 -100**	Exempt	Exempt	Reasonable domestic use
2.	**101-500**	R8 000	Annual	Small-scale operations; primarily cost recovery for administration and monitoring
3.	**501-5000**	R80 000	Annual	Medium-scale commercial operations
4.	**5001-20000**	R200 000	Monthly	Large-scale operations
5.	**>20 000**	R200,000 + R10,000 per additional 1,000 m³ (or part thereof)	Monthly	Very large operations; incremental charge applied in bands
	Cubic metres are calculated based on exclusive use area. Walkways and areas without cages are deemed to be 1 metre deep. Cages and other related equipment are calculated on their actual depth.			
	Escalation: These amounts escalate annually on 1st April by CPI			
	Base Charge Review Period: Base charges are to be reviewed and reset in line with market pricing every 10 years			

	A three-year allowance period is proposed for new entrants, during which no charge is applied to support early-stage business viability.
	It is recommended that this mechanism be communicated as a water-use lease rather than a non-consumptive charge, as this framing is likely to be more intuitive and acceptable to operators

Table C : Proposed six-level tariff block

No	Block in cubic metres	Annual Charge (excl. VAT)	Billing Cycle	Comment
1.	**0 -100**	Exempt	Exempt	Reasonable domestic use
2.	**101-500**	8 000	Annual	Small-scale operations; primarily cost recovery for administration and monitoring
3.	**501-2500**	R36 000	Annual	Medium-scale commercial operations
4.	**2501-5000**	R80 000	Annual	Medium-scale commercial operations
5.	**5001-10 000**	R140 000	Monthly	Large-scale operations
6.	**10 001-20 000**	R200 000	Monthly	Large-scale operations
7.	**>20 000**	R200,000 + R10,000 per additional 1,000 m^3 (or part thereof)	Monthly	Very large operations; incremental charge applied in bands
	Cubic metres are calculated based on the exclusive use area. Walkways and areas without cages are deemed to be 1 metre deep. Cages and other related equipment are calculated based on their actual depth.			
	Escalation: These amounts escalate annually on 1st April by CPI			
	Base Charge Review Period: Base charges are to be reviewed and reset in line with market pricing every 10 years			
	A three-year allowance period is proposed for new entrants, during which no charge is applied to support early-stage business viability.			
	It is recommended that this mechanism be communicated as a water-use lease rather than a non-consumptive charge, as this framing is likely to be more intuitive and acceptable to operators			

Administration and Revenue Collection

Administration and revenue collection will depend on the location of aquaculture activity. These fall into two categories, viz. aquaculture in government works (land lease), and aquaculture in rivers. Aquaculture charges in government works would be integrated with land leases, while river-based activities would be managed by Catchment Management Agencies (CMAs). Current data limitations prevent reliable revenue projections.

NCC FRAMEWORK FOR ENERGY GENERATION

Sector Overview

Energy generation in South Africa has for many years been dominated by the power plants of Eskom, the government-owned national electric utility. While in recent years there has been some private sector investment in renewable energy resulting from government-sponsored procurement programs, Eskom continues to account for the major share of generation. Recently, South Africa has taken policy initiatives aimed at incorporating renewable energy sources, such as wind, solar and hydroelectric power, into its energy mix.

Hydropower, also known as hydroelectric power, is a renewable energy source that generates electricity by using a dam or diversion structure to modify the natural flow of a river or other water body. Eskom operates two hydropower stations and four non-dispatchable mini-hydropower stations.

Pumped storage hydropower is a type of hydroelectric energy storage that consists of a configuration of two water reservoirs at different elevations which generate electricity from the movement of water from one to the other by passing through turbines. Eskom operates three pumped storage schemes.

Floating solar photovoltaic systems consist of solar modules mounted on anchored structures that rest on water surfaces. This design offers significant advantages, including reducing evaporation from water bodies, optimising space by avoiding the use of arable land, and potentially improving panel efficiency due to the cooling effect of the water. Such systems provide for sustainable energy generation where land availability is limited or water conservation is a priority. Floating solar generation is still a very small and emerging sector in South Africa, with installations mostly on private farms such as the Boplaas Marlenique farm located near Franschhoek.

Legal and Institutional Context

Energy generation is governed by the NWA, Electricity Regulation Act, National Energy Act, and policies promoting energy security and sustainability. The Department of Electricity and Energy (DEE) leads energy policy, with Eskom as the primary operator and NERSA as regulator.

The DEE is the lead national authority responsible for legal frameworks formulation and oversight, while state-owned enterprises and regulatory bodies, such as Eskom, the National Energy Regulator of South Africa (NERSA), the Central Energy Fund (CEF), and Eskom operationalize and enforce specific mandates across the energy value chain.

DWS and CMAs regulate water use for e.g., hydropower under the National Water Act, ensuring sustainable resource management. There is cooperation among national departments (DEE and DWS), CMAs, local governments in managing water resources infrastructure, and the NERSA, which licenses and regulates electricity generation, including hydropower, floating solar panels projects. This collaborative governance ensures legal compliance, environmental protection, and optimisation of South Africa's energy resources toward sustainability and increased private sector participation.

NCC Charge Principles and Options

The recommended charge principles for the NCC for energy generation are:

- kW/h is used as the basis of the non-consumptive charge for energy generation.
- A fixed charge is included and will be based on installed capacity.
- A variable charge is included and will be based on the amount of electricity generated.
- There will not be changes in charges based on seasons.
- Market related pricing is used based on the value of energy produced using kW/h.
- Micro run-in-river energy generation with the energy used locally and not sold to the grid will be exempt, in line with NWA Schedule 1 use of water for reasonable domestic use.
- New large-scale hydropower or pumped storage schemes (i.e. >20 MW) may be negotiated between the Department and the owner/operator of such plant on the same charge principles.
- Multi-purpose schemes should have transparency in the charges that are netted against one another in determining the final charge.
- Floating solar uses the same basis of charge, for consistency.

The following charge options are proposed in Table D.

Table D: Proposed charge options or energy generation

Number	Type	Preferred Option	Alternate Option(s)
1.	Hydro Electricity	Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced	
2.	Pumped Storage	Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced. Multi-use plants to show separate revenue for Eskom vs DWS before nett effect	Water abstracted & Stored Sec 21 charges (as water is taken out and not returned, it is not an NCC)
3.	Pumped Storage: Mines	N/a but to be same as standard pumped storage	
4.	Mini: Non dispatchable hydro	Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced	Annual license fee based on flow into the facility (in categories
5.	Micro: Run-in River	Annual license fee covering license monitoring costs. Likely to be same fee for all	kW/h based if selling electricity
6.	Floating Solar	Exclusive space Rental: Square metres as a percentage of surface area, recovering O&M	R per Kilowatt-hour. Same as hydro for there to be consistency in charges

Charge Calculation and Structure

Water used in energy generation, which is non-consumptive in nature (has not been abstracted and paid for as such), attracts a non-consumptive charge for the benefit from the water and associated infrastructure. The charge is based on the market value created by using the water for energy generation and is based on the amount of energy produced and the capacity for energy production. The installed capacity will be charged based on R/MW (Rands per megawatt(MW)) of installed capacity. The variable charge will be based on c/kWh (cent per kilowatt hour) of energy generated.

There is a differentiation in the non-consumptive use charge between energy generation that makes use of or is integrated into government works infrastructure directly versus that which makes use of water flows outside of the government works (Table E).

Table E: Categorisation of energy-related NCC charges

No	Category of Energy Generation for NCC	Fixed Charge	Variable Charge	Comment
1.	**Hydro Electricity:** Scheme specific fixed and variable charge	Negotiated per Megawatt (MW) installed	Negotiated per Kilowatt hour (kWh) generated	Rand value calculated scheme-specifically. DWS to negotiate with owner/operator. When multipurpose transparency in net charges required
2.	**Pumped Storage:** Scheme specific fixed and variable charge	Negotiated per Megawatt (MW) installed	Negotiated per Kilowatt hour (kWh) generated	Rand value calculated scheme-specifically. DWS to negotiate with owner/operator. When multipurpose (inter-basin transfer and energy generation) transparency in net charges required
3.	**Mini – Non dispatchable hydro:** Standard fixed and variable charge	R505,82 per Megawatt (MW) installed	R0,026088975 per Kilowatt hour (kWh) generated	All year-round same charge, with no separate summer and winter. Eskom and IPP to pay same charge. Negotiation and phase in on existing contracts
4.	**Micro: Run-in-river:** Exempt if for own use and below 2MW installed capacity	Exempt	Exempt	Exempt as deemed with Schedule 1 reasonable domestic use

No	Category of Energy Generation for NCC	Fixed Charge	Variable Charge	Comment
5.	**Micro: Run-in-river:** If selling to grid or above 2MW installed capacity	R505,82 per Megawatt (MW) installed	R0,026088975 per Kilowatt hour (kWh) generated	
6.	**Floating Solar:** Standard fixed and variable charge	R505,82 per Megawatt (MW) installed	R0,026088975 per Kilowatt hour (kWh) generated	The charge is the same whether in government works or rivers or alternate relevant locations
	Billed Monthly by DWS/NWRIA if in Government Works or by CMA if river-based			
	Future Escalation: These amounts escalate annually on 1st April by NERSA-approved average electricity increase			
	Base Charge Review Period: Base charges are to be reviewed and reset in line with market pricing every 10 years			

Basis for escalation

In South Africa, headline PPI increases are common and appropriate for cost-based pricing strategies, as prices rise with associated cost increases. However, NCC are based on market-related value-added pricing strategy and not cost. It logically follows that price increases should be on the same basis of the market-related value-added pricing increase. The method selected for pricing the NCC in energy generated, measured in kW, therefore increases should be based on the increase in kW value. The main determination of this in South Africa is the NERSA average annual increase. Therefore, the NERSA average annual increase is the proposed basis of annual increase.

Determination of recommended Rand Value of Charge

The recommended Rand value of charges is based on the 2012 negotiations and memoranda of price determination for non-dispatchable hydro charges. These agreed-upon charges were then implemented. The charges have been escalated based on headline PPI as the escalation method referred to in the memorandum and draft versions of the revised pricing strategy. Aligned with the recommended NCC charge principles, a set annual charge is calculated rather than separate summer and winter charges. This is done on a straight calculation of average charge methodology. The summaries and outcome are included in Table F below.

NCC Tariff Blocks for Energy Generation

It is recommended that DWS use the current Rand value charged to Eskom for the non-dispatchable hydro's when the NCC are implemented. (The 2025/2026 Rand values were not available at the time of writing this report, resulting in the latest charges supplied (2012) being used as the basis of the Rand value.) The separate summer and winter charges would be averaged to determine the all-year-round charge in the same manner as displayed in the table below.

Table F: Summary of proposed charges

Mini-non dispatchable Hydro 2010/2011 Charge			
Charge	**Approved Summer**	**Approved Winter**	**Proposed**
Fixed Charge	R186,96	R344, 08	R265,52
Variable Charge	R0,0087	R0,01869	R0,013695
Mini – non dispatchable Hydro 2025/2026 Proposed Charge			
Charge	**Summer Escalated**	**Winter Escalated**	**Proposed**
Fixed Charge	R356,16	R655,47	R505,82
Variable Charge	R0,016574	R0,035604	R0,026089

Table G: Headline PPI Increase

2011-2010	2021	2022	2023	2024	2025	Total
57,7%	7,1%	14,4%	6,7%	3,1%	1,5%	90,5%

Existing contracts, some predating current legislation, require review for transparency and alignment with NCC principles. New pumped storage projects and mine-based storage are emerging areas needing licensing and charge considerations. Small-scale independent power producers should follow similar charging principles.

Administration and Revenue Collection

Energy generation in government works will be charged and collected by DWS/NWRIA. In certain cases, there may be a land portion to this arrangement and/or access to various areas within the government works. As the charge principle is on the proxy of electricity generated, it is unlikely that this would have a separate charge or agreement. If appropriate, DWS/NWRIA may charge a separate rental for adjacent land use.

Energy generation in or from rivers will be charged and collected by the CMA responsible for the geographical region where the energy generation occurs.

NCC FRAMEWORK FOR RECREATION

Sector Overview

Recreational water use encompasses a diverse range of activities that contribute to tourism and local economies. It relies on water quality and resource sustainability and is a recognised water use under the NWA with distinctions between reasonable domestic use (Schedule 1) and commercial use requiring licensing (section 21k). There are a range of activities for recreation, and not all are applicable for the NCC. The table below provides this distinction.

Table H: Types of activities for recreation

No.	Use	Type	Excl.	Cost	Current Charge	Potential Charge Basis
1.	**Individuals swimming in rivers for recreation**	River	Y Sch 1	Authorisation & Catchment Management	N	N
2.	**Group organised swimming (not for profit)**	River	Y Sch 1	Authorisation & Catchment Management	N	P
3.	**Group organised kayak commercial e.g. *Dusi Canoe Marathon**	River	N	Authorisation & Catchment Management	N	Y
4.	**Individuals swimming in dam- government works**	DWS Dam	N	Authorisation & O&M	Y	Y
5.	**Group organised swim in dam – government works- Midmar Mile**	DWS Dam	N	Authorisation & O&M	Y	Y
6.	**Private boating or fishing on dam- government works**	DWS Dam	N	Authorisation & O&M	P	Y
7.	**Private boating or fishing on river**	River	Y Sch 1	Authorisation & Catchment Management	N	N
8.	**Recreation club not for profit activities on river – e.g. rowing clubs**	River	Y Sch 1	Authorisation & Catchment Management	N	N
9.	**Group organised boating or fishing on river – Commercial e.g. barges**	River	N	Authorisation & Catchment Management	N	Y
10.	**Individual swimming, boating or fishing in private dam**	Private Dam	Y Sch 1	Authorisation	N	N
11.	**Commercial recreation activities on private dam.**	Private Dam	N	Authorisation	N	N
12.	**Private boating, wind-surfing, or fishing**	Estuary		Treat same as river activity	N	N
13.	**Utilising of land surrounding government works: braai, picnic, hiking, accessing boats etc**	DWS Land	N	Authorisation & O&M	Y	Y

Legal and Institutional Context

Recreation is governed by NWA section 21(k), Schedule 1 exemptions, and regulations including the recent regulations on government waterworks. It is important to recognise that recreational water use falls under both section 21(k) as well as Schedule 1 of the NWA, with there being uncertainty linked to the nature of activities and associated thresholds which may

differentiate between what is considered a permissible use (Schedule 1) and a licenced use (Section 21(k)). This will prove critical in determining when a "user" is liable for a water use charge.

In effect, a non-consumptive water use charge for recreation would need to cover the ability to have access to that recreational site as well as to recover the costs associated with the management and maintenance of that site in a clean, safe and environmentally sustainable state. This would be underpinned by ongoing monitoring to assess current resource status and guide ongoing operations and maintenance, ensuring the resource adheres to standards and regulatory requirements, including Resource Quality Objectives. Where recreational activities take place on government-owned infrastructure, particularly large dams, these are often linked to concessionary arrangements. Noting that section 56 2(b) and 111 of the NWA provide for the recovery of costs related to the acquisition, construction, alteration, repair, operations and control of government waterworks, the pricing strategy considers the full lifecycle of the infrastructure and makes provision for the recovery of costs associated with the operations and maintenance (O&M), amongst others.

The 2003 RWU GP4 Recreational Water Use Manual outlines the institutional arrangements for the recreational water use sector. However, it does not provide guidance on coordination between institutions. The DWS is the leading governing authority and consists of various directorates and branches. Recreational water use falls under the Infrastructure Management Branch, within which the Chief Directorate: Water Resources Infrastructure Operations and Maintenance is responsible for the operation and maintenance of national water resources infrastructure through four Operational Clusters (Northern, Eastern, Central, and Southern). Each cluster manages infrastructure within its geographic boundaries and is responsible for operations and maintenance, technical support services, corporate support services, and financial support services. These clusters enter into Memoranda of Agreement (MoAs) with government organisations or implementing agents for the management of recreational activities on state dams and surrounding state land. The issuance of authorisations for recreational water use, such as water use licenses or permits, is the responsibility of the Chief Directorate: Water Use Authorisation Management of DWS, through its regional offices or CMAs. Under the guidance of the Chief Directorate: Economic and Social Regulation, CMAs are further mandated to ensure compliance with legislation, policies, and standards, including those related to raw-water pricing and tariffs. At the local level, water service providers such as municipalities manage recreational water use within their jurisdictions, enforce local by-laws, and ensure water access. In certain cases, local authorities, conservation agencies, and non-governmental organisations may be appointed by DWS, CMAs, and/or operate under concession agreements, to manage recreational water use activities in specific areas.

NCC Charge Principles and Options

The recommended charge principles for the NCC for recreation are as follows:

- Recreation water use (sec 21k), with the exception of Schedule 1 uses, requires a registration.
- The commercial use of government works water surface or surrounding land and rivers will be charged.
- Schedule 1, reasonable domestic use, is exempt.
- Commercial use charges will be based on the number of visitors each year.
- Market-related pricing is used (cost-contribution).
- Blocks to be used to simplify administration and categorisation of the activity.
- Where there is also a relevant land lease, the license requirements and charge are to be included in the lease.

- Events are handled in the same way based on the number of people attending the event in each year (participating, organising and/or supporting).

Charges are proposed for commercial recreational use of government works and surrounding land, based on visitor numbers and market-related pricing with block categories. Personal and small-scale domestic use are exempt. Events exceeding 50 people are chargeable. Charges for recreational use in rivers would be managed by CMAs. Various collection options include per-person fees, land-lease percentages, and possible collaboration with SAMSA for craft licensing. Options for the structuring of NCC charges for recreational water use are tabulated below.

Table I: Proposed Charges for Recreation

No	Category	Potential Category	Potential Charge
1.	**Government Works**	a) Events – 50 or more people b) Land-Lease c) Concessions and Intermediaries	a) Per person charge b) Percentage of Market land lease value for NCC c) To charge and collect a per person or per car fee
2.	**Non-Government Waterworks: Rivers, estuaries etc**	a) Commercial use of rivers etc b) Event 50 of more people	a) Approach SAMSA for per craft charge b) Register and charge by CMA

Charge Calculation and Revenue Projections

The non-consumptive charge for recreation will be based on the number of visitors to government works, water surface and surrounding land as well as rivers. Individuals visiting in their personal capacities, with activities arranged by themselves, for themselves, will be exempt in line with Schedule 1 reasonable domestic use.

Intermediaries, those arranging activities or supplying facilities will be required to register a section 21k water use following the appropriate process. The charge will be triggered by the section 21K water use. Blocks will be used to categorise into different levels of use and charge accordingly. The charge will be billed in advance annually based on the registered recreation use. (Consideration was given to billing in arrears based on actual figures provided by intermediaries but this would be an increased administration burden likely to delay billing).

Intermediaries are required to keep records of the number of people/ visitors. This is on a per person per visit basis on entry and exit (if multiple exits and entries in a single day this is counted as 1). In the case of events, event organisers (the intermediaries) must count the total number of people attending per day. In the case of clubs like fishing, boating or sailing, the number people visiting (members or non-members) are counted each day.

The guideline base charge for the license combined with a R10 per person per visit contribution. This is the NCC element which would form part of the overall amount charged by intermediaries. This guides the charges per block. An example of how these charges would be calculated is outlined below.

Table J: Example calculations of NCC charge

No.	Activity Description	Visitors per Day	No. Days per year	Total Visits per Year	NCC	Comments
1	Smaller: Picnic and Boating Area	30	104	3120	R42 500	Expected weekends mainly
2	Larger: Picnic and Boating Area	75	120	9000	R80 000	Weekends and holidays
3	Barges and Cruises	40	78	3120	R42 500	Expected Fri-Sun half the year
4	Clubs: Fishing and Sailing	100	26	2600	R42 500	Majority members every weekend in warmer months
5	Major Event (Midmar Mile, Dusi)	12000	2	24000	R220 000	12000 entries over 2 days and estimated 12000 supporters
6	Accommodation	40	257	10280	R90 000	12 accommodation units, with average of 3.3 people with 70% occupancy
7	Small Traditional Ceremony	60	1	60	R0	

NCC Tariff Blocks for Recreation

Revenue blocks for the recreational NCC charge are proposed in the table below:

Table K: Potential recreational water use charge

No	Number of Visitors per year	Annual Charge (excl. VAT)	Billing Cycle	Comment
1.	**0 -500**	Exempt	Annual in advance	Small scale, cost mainly for annual monitoring
2.	**500-1000**	R12 500	Annual in advance	
3.	**1000-2500**	R22 500	Annual in advance	
4.	**2500 - 5000**	R42 500	Annual in advance	
5.	**5000 – 10 000**	R80 000	Annual in advance	
6.	**For each 1000 or part thereof above 10 000**	R10 000	Annual in advance	
	A year is from 1st April each year to 31st of March			
	Escalation: These amounts escalate annually on 1st April by PPI			
	Base Charge Review Period: Base charges are to be reviewed and reset in line with market pricing every 10 years			
	In the case of overnight accommodation, the number of people per night is counted			
	Multiple visits by the same person in a single day are counted as one visit			

Limited Revenue Projection

Without appropriate recreation registrations available in the WARMS database or elsewhere, appropriate revenue projections cannot be done. A limited projection can be done based on the 140 large dams noted in the 2004 DWS policy. Based on the R10 NCC charge and the 140 large dams, the conservative projected revenue is included in the table below.

Table L: Initial revenue projection

No.	Activity Description	NCC	No. of Dams	Projection	Comments
1	Smaller: Picnic and Boating Area	R42 500	48	R2 040 000	50% of Dams having picnic and boating with 60% smaller and 40% larger
2	Larger: Picnic and Boating Area	R80 000	32	R2 560 000	
3	Barges and Cruises	R42 500	50	R2 125 000	Expected on only 20% more popular dams but some to have more than one operator
4	Clubs: Fishing and Sailing	R42 500	100	R4 250 000	Expected at less than half the dams but those are likely to have more than one club
5	Major Event (Midmar Mile, Dusi)	R200 000	2	R440 000	12000 entries over 2 days, estimated 12000 supporters
6	Standard Event	R22 500	70	R1 575 000	One standard event at half of the dams each year
7	Accommodation on Works or Rivers	R90 000	50	R4 500 000	50 accommodation establishment on dams and rivers combined
Total Potential Revenue				**R17 490 000**	**Per Annum**
***based on 140 large dams noted in the 2004 policy**					

Administration and Revenue Collection

Recreation activities in government works will require Section 21(k) registration which will include an estimated number of visitors each year. In some cases, there will be concession agreements and land-leases, which will include a portion of the land adjacent to the works. In future agreements, these should include reference to the NCC and licence requirements of the NCC. DWS will invoice the relevant registered entities annually in April at the determined charge rate.

Recreation activities in rivers will be invoiced by the relevant CMA for the area each year in April, based on the relevant registered entities at the determined charge rate.

IMPLEMENTATION READINESS CONSIDERATIONS

Data and System Readiness

Current WARMS data is incomplete or inaccurate for NCC sectors, necessitating clear definitions, data cleaning, and improved licensing information. Integration across DWS directorates and alignment with billing systems is essential for effective NCC administration.

Sector and Stakeholder Readiness

Further engagement with impacted sectors is recommended to build understanding and buy-in. Initial consultations were preliminary due to data and sector maturity limitations.

Institutional Readiness

Clarifying roles, building capacity, and aligning billing and licensing processes within DWS and CMAs are critical. Differentiation between NCC and existing charges must be clear to avoid duplication.

Implementation Activities

Determining implementation costs, integrating NCC into water resource planning, and adopting a phased roll-out with charge ramp-up are advised to facilitate smooth adoption and allow for learning and adjustment.

Future Research

Additional studies on socio-economic impacts, expansion of NCC to other sectors, data improvements, pilot projects, and charge reviews aligned with market maturity are suggested to strengthen NCC implementation.

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List of Acronyms

Acronym	Definition
AC	Aquaculture
ADEP	Aquaculture Development and Enhancement Programme
ADZ	Aquaculture Development Zones
AIF	Aquaculture Intergovernmental Forum
CEF	Central Energy Fund
CFO	Chief Financial Officer
CMA	Catchment Management Agencies
CMC	Catchment Management Committees
CMF	Catchment Management Forums
CPI	Consumer Price Index
CSIR	Council for Scientific and Industrial Research
CSP	Concentrating Solar Power
DAFF	Department of Agriculture, Forestry and Fisheries
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DEE	Department of Electricity and Energy
DFFE	Department of Forestry, Fisheries and the Environment
DFI	Development Finance Institutions
DG	Director General
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
DSI	Department of Science and Innovation
DTIC	Department of Trade, Industry and Competition
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EEA	European Environment Agency
EG	Energy Generation
EIA	Environmental Impact Assessment
EIM	Environmental Impact Monitoring
EPP	Electricity Pricing Policy
ERA	Electricity Regulation Act
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GGA	Good Governance Africa
GHG	Greenhouse Gas
IAM	Infrastructure Asset Management
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
INMACOM	Incomati and Maputo Watercourse Commission
IPP	Independent Power Producers
IRP	Integrated Resource Plan
IWQM	Integrated Water Quality Management Policy
JET IP	Just Energy Transition Investment Plan
KHEP	Kakamas Hydroelectric Power

KZN	KwaZulu-Natal
LEDET	Limpopo Department of Economic Development, Environment and Tourism
LIMCOM	Limpopo Watercourse Commission
LM	Local Municipality
MENRP	Ministry of Environment and Natural Resource Protection
MLRA	Marine Living Resources Act
MoA	Memoranda of Agreement
NASF	National Aquaculture Strategic Framework
NCC	Non-Consumptive Use Charge
NCCRP	National Climate Change Response Policy
NCW	Non-Consumptive Water
NDC	Nationally Defined Contributions
NDP	National Development Plan
NECSA	South African Nuclear Energy Corporation
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NERSA	National Energy Regulator of South Africa
NGO	Non-Governmental Organizations
NNR	National Nuclear Regulator
NPO	Non-profit Organisation
NTCSA	National Transmission Company South Africa
NWA	National Water Act
NWRIA	National Water Resources Infrastructure Agency
NWRS-3	National Water Resource Strategy, Third Edition
OECD	Organisation for Economic Co-operation and Development
O&M	Operations and Maintenance
ORASECOM	Orange-Senqu River Commission
PFMA	Public Finance Management Act
PMC	Project Management Committee
PPI	Producer Price Index
PPP	Public Private Partnership
PSH	Pumped Storage Hydro
PV	Photovoltaic
R&D	Research and Development
RAS	Recirculating Aquaculture Systems
RBO	River Basin Organisations
RDI	Research, Development and Innovation
REC	Recreation
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RFA	Request for Applications
RG	Reference Group
RMP	Resource Management Plan
ROI	Return on Investment
RQO	Resource Quality Objective
RWU	Recreational Water Use
SA	South Africa
SABS	South African Bureau of Standards
SADC	Southern African Development Community
SAMSA	South African Maritime Safety Authority
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks

SASACC	South African Sport Anglers and Casting Confederation
SAWS	South African Weather Service
SDG	Sustainable Development Goals
SOC	State-Owned Company
TCTA	Trans-Caledon Tunnel Authority
TOP	Threatened or Protected
TOPS	Threatened or Protected Species
ToR	Terms of Reference
TSO	Transmission System Operator
UCT	University of Cape Town
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
VAT	Value-Added Tax
VRE	Variable Renewable Energy
WARMS	Water use Authorisation and Registration Management System
WC/WDM	Water Conservation and Water Demand Management
WDCS	Waste Discharge Charge System
WMA	Water Management Area
WRC	Water Research Commission
WRM	Water Resource Management
WRMC	Water Resource Management Charge
WRMP	Water Resource Management Plan
WSA	Water Service Authorities
WSP	Water Service Providers
WTE	Water Trading Entity
WUA	Water User Association
WUL	Water Use Licensing

Glossary and Concepts

- **Aquaculture:** The farming of aquatic organisms, including crocodiles, in a controlled aquatic environment including marine, brackish or freshwater involving— (a) a degree of human intervention in the rearing process to enhance production which include propagation, breeding, regular stocking, feeding, protection from predators and harvesting of cultured aquatic organisms; and (b) individual or corporate ownership of the stock being farmed, and includes ranching and stock enhancement (Aquaculture Development Bill, 2023).
- **Commercial Aquaculture (as defined for implementation of non-consumptive use charges):** Any aquaculture activity for financial profit.
- **Commercial Recreation:** Commercial recreation activity is the provision of leisure and recreational services, activities, or experiences for profit.
- **Commercial Recreation Activities:** Activities utilising the water stored or land upon which the government waterworks are situated for revenue generation, including organised sporting and tourism activities as well as events.
- **Event:** These are organised exhibitions, competitions, sporting, entertainment, educational, recreational, religious, cultural, or similar activities hosted at a government waterwork that exceeds more than 50 persons (participants and or spectators). Also includes commercial photography, film production and advertising activities.
- **Floating Solar:** The use of the water surfaces of lakes, ponds and reservoirs to float solar panels.
- **Hydropower:** The use of flowing water to generate electricity. This typically involves some diversion of natural water channels and can involve storage of water.
- **Micro: Run-in River hydropower:** Very small (typically less than 1 MW) hydropower facilities that typically operate similar to mini hydropower but often are used to generate power for private use and typically do not involve the sale of the power generated to a third party.
- **Mini: Non-dispatchable hydropower:** Small hydropower facilities that typically have very little or no water storage capacity (often referred to as run-of-river) and thus generate power based on water flow rather than being based on a specific need for the power. Definitions vary as to the size limits (1-20 MW sometimes used).
- **Non-consumptive use Charge (NCC):** Charges applied to water uses that do not significantly reduce water quantity but utilise water infrastructure and resources for commercial or recreational purposes. Linked to Section 21:
    - (c) impeding or diverting the flow in a watercourse
    - (e) engaging in a controlled activity identified as such in section 37(1) or declared in section 38(c)(1)
    - (i) altering the bed, banks, course or characteristics of a watercourse;
    - (k) using water for recreational purposes.
- **Operation and Maintenance (O&M) Costs:** The direct operation and maintenance costs include fixed and variable costs, which can be attributed directly to administrating, operating and maintaining schemes (e.g. pumping cost, pump maintenance, flood gate maintenance). Direct costs will be allocated directly to sectors where this is possible.
- **Pumped Storage hydropower:** A variation of standard hydropower where there is a capability to pump water used to generate electricity back to the upper level and at a later time use some or all of the water to again generate electricity.
- **Pumped Storage: Mines:** The use of abandoned mining facilities to establish upper and lower reservoirs which when water is sourced can then be operated as pumped storage hydropower facilities. These are typically close looped systems with no flow of water downstream as with standard hydropower.

- **Recreation Services:** Recreation Services means services or activities designed to provide or assist [persons] to take advantage of individual or group activities directed towards promoting physical, cultural, and/or social development.
- **Renewable Energy**: Electricity that is produced by energy that comes from natural replenishable sources such as water, wind, solar, geothermal and biomass.

1 Introduction

1.1 WATER IN SUPPORT OF NATIONAL ECONOMIC DEVELOPMENT

Water availability and quality are essential to the South African economy. These factors directly and indirectly support multiple economic sectors, contributing to Gross Domestic Product (GDP) and employment. Water disruptions, therefore, affect productivity and competitiveness at a national scale (DWAF, 2009). This makes it essential to prioritise strategic investments and allocate resources to support long-term economic growth.

Investment in water infrastructure yields high economic multipliers, boosting GDP growth and supporting job creation across multiple skill levels (Ruiters & Amadi-Echendu, 2022) . This, in turn, supports poverty reduction and promotes regional development. Initiatives like the uMkhomazi Water Project show how major water projects can achieve significant economic growth, stabilise future income, and ultimately link pricing reforms to real-world growth (Pieterse & Badenhorst, 2015). However, despite evidence of water's contribution to GDP, a significant investment gap persists. South Africa requires R256 billion annually between 2023 and 2050 (totalling R7.2 trillion) to achieve water security (National Treasury, South Africa, 2025) and finding new mechanisms to close this gap is critically important.

Non-consumptive water uses such as hydropower operations that regulate flow, recreational reservoirs that demand fixed levels, and aquaculture that require good water quality all benefit from the resources they use, with currently no contribution to the cost to manage the resource itself. Hydropower provides about 2% of South Africa's electricity and, with the wider energy-water sector, supported 3.1% of national GDP growth in the second quarter of 2024 (StatsSA, 2025) (Dikgang, et al., 2020). In 2021, aquaculture contributed R0.7 billion (0.2%) to South Africa's GDP, with the government targeting it for further expansion due to the potential it offers to diversify fishing production markets (AgriSETA, 2021). The draft Aquaculture Development Bill (2023) aims to promote and substantially increase aquaculture production by 2030 (Parliamentary Monitoring Group, 2023). Water-based recreation activities include boating and fishing. These form part of South Africa's biodiversity tourism, which contributed R27.7 billion to GDP and made up 13.3% of tourism's economic value in 2019 (Jiwulane, 2024) (StatsSA, 2024). Although these sectors do not directly extract water, they still generate environmental externalities and incur associated infrastructure costs. Charging users within these sectors, therefore, aligns their contributions with the true costs of ecosystem and infrastructure maintenance, helping to fill the revenue gap that is not addressed by traditional abstraction charges. In addition to addressing the revenue gap, non-consumptive charges will support legal compliance, ecological stewardship, and fairness across all sectors that use water resources (DWS, 2024)

Multiple interconnected water challenges constrain economic development. DWS estimates that R90 billion annually is required over the next decade to address infrastructure backlogs and maintain adequate supply systems, yet actual expenditure sits at an average of R17 billion annually between 2018 and 2022 (Jacobs, 2023) . These challenges are intensified under climate change. The country's inherent water scarcity is characterised by an average annual rainfall that is almost 50% below the global average. Water scarcity is being exacerbated by shifting precipitation patterns and increased climatic variability (South African Government , 2015). These climatic pressures are intensified by severe infrastructure shortfalls,

with non-revenue water losses averaging 47.4% nationally, of which 40.8% represents physical losses through leakage (Odendaal, 2023), creating an annual economic loss valued at approximately R7 billion (World Bank, 2017).

While the economic and strategic significance of non-consumptive water uses has been established, these sectors are not yet subject to a dedicated, transparent charging framework, despite their real environmental and management costs. As South Africa starts to introduce pricing reforms to ensure all user impacts are reflected in water pricing, it is essential to develop a methodology that addresses the unique challenges of non-consumptive uses and aligns with national legislation and the revised pricing strategy (DWS, 2022) (DWS, 2024) (Laolang, et al., 2025).

1.2 THE REVISED PRICING STRATEGY - 2024

The Pricing Strategy for Raw Water Use Charges (Pricing Strategy), which is informed by the National Water Act, provides a framework to economically value the use of water from the country's freshwater resources. It aims to promote the effective and efficient management of water resources, ultimately supporting equitable and sustainable development through a transparent approach to managing the pricing of water (DWS, 2024). The initial Pricing Strategy was developed in November 1999 and revised in April 2007 to refine the methodologies for calculating water charges and improve financial sustainability in water resource management. In 2024, the Department of Water and Sanitation (DWS) introduced a revised Pricing Strategy, which came into effect in April 2026. The Pricing Strategy introduced a new use category, namely Non-Consumptive Use, along with associated charges (NCC), for activities that do not directly consume water but affect water quality, flow regimes, and ecosystems linked to energy generation, recreation, and aquaculture that fall under the mandate of DWS.

This additional charge mechanism was driven by the need to:

- **Ensure Cost Recovery for Water Resource Management:** Non-consumptive water use charges help recover the costs of managing, operating, and maintaining water infrastructure used by industries like energy generation and recreation, ensuring that all users contribute fairly to the sustainability of the water resources.
- **Address the Environmental and Infrastructure Impact of Non-Consumptive Uses**: Revenue from these charges support the protection and restoration of ecosystems, helping to maintain essential environmental services such as water filtration, biodiversity, and climate regulation.
- **Align with Legal and Regulatory Frameworks**: Including non-consumptive use charges into water pricing schemes ensures compliance with the National Water Act and other regulations. It also promotes transparency, and funds adaptive measures to address regional and seasonal water challenges, especially under growing climate change uncertainty.
- **Provide a Transparent and Equitable Pricing Mechanism**: A fair and transparent pricing system recognises the true value of water, supports economic development, encourages efficient water use, and drives innovation in water-saving technologies across all sectors. Critically, the introduction of these charges will contribute to improving equity across water users by correcting a historical gap and extending water charges beyond just abstraction.

Leading up to the adoption and gazetting of the Pricing Strategy, DWS undertook a broad range of stakeholder engagements as well as developing additional policies in support of the new type of charges under non-consumptive water use:

- DWS released a **Policy for the Utilisation of DWS Infrastructure and Water Resources for Renewable Energy** (February 2023) that provided guidance on the establishment and development of renewable energy projects using DWS-owned infrastructure and the use of water resources that sit under DWS.
- DWS published a **Request for Water Use Licence Applications for Hydropower Generation** (April 2023) that looked at both hydropower and floating solar panels that required access to DWS infrastructure.
- DWS supported the Department of Forestry, Fisheries and the Environment (DFFE) with the development of a draft **Aquaculture Development Bill** (November 2023), which recognised that should certain aquaculture activities fall under section 21 of the NWA, this activity will require authorisation by DWS, and subsequently also make the water user liable for charges under the Pricing Strategy.
- DWS proposed **Regulations for the management and control of government waterworks and surrounding state-owned land** for recreational purposes that will extend the NCC to commercial and other recreational activities. Reasonable recreational water use currently falls under Schedule 1 of the NWA.

South Africa has faced numerous water resource management challenges, which continue to have negative impacts on adequate water supply for both human and environmental needs (DWS, 2023) (GGA, 2024) (DWS, 2023). Challenges include infrastructure deterioration and water quality degradation affecting nearly half of supply systems (DWS, 2023), climate-induced variability, and a projected 17% supply deficit by 2030 (Polity, 2025). The inclusion of non-consumptive use charges in the revised Pricing Strategy is a crucial step in ensuring a more sustainable, equitable, and economically viable water management system in its entirety (Simatele & Adom, 2023). These charges are especially important as they reflect the growing recognition that water, even when not directly consumed, plays a critical role in various economic sectors. International experience demonstrates that well-designed pricing mechanisms can effectively address these challenges (OECD, 2024; European Environment Agency, 2013). Studies on international best practices have informed the shift towards a transparent and equitable fee structure for non-consumptive water users, ensuring that charges reflect actual costs incurred by water resource management authorities. This project aimed to draw on these lessons and experiences to ensure it is fit for purpose in the local South African context.

1.3 SCOPE AND OBJECTIVES

The Pricing Strategy makes provision for non-consumptive water use charges to contribute to water resource management costs as well as the operation and maintenance costs of water resource infrastructure used in the course of non-consumptive activities. The functions of water resource management and infrastructure management are, however, undertaken by different entities. The primary objective of this project was to provide guidance on how the new non-consumptive charges should be administered and integrated with the administration of other charges under the Pricing Strategy. This project looked to ascertain the extent to which the activities in the areas of interest align with the NWA, link to non-consumptive use of water, and how relevant they are to future trends in water use. This was foundational to developing the approach to the charges for non-consumptive use. This required consideration to be given to technical

considerations for the charge determination as well as the institutional and financial arrangements to implement the non-consumptive water use charge in the priority areas for DWS, viz., aquaculture, energy generation (linked to renewable energy) and recreation.

1.4 REPORT STRUCTURE

1. **Introduction:** Provides background and context of the project and the purpose of this report.
2. **Methodology:** Describes the technical approach adopted in the research undertaken to reach the charge rate methodologies.
3. **Literature Review:** provides an evidence-based approach to the development of NCC methodologies and aligns them to national and sector-specific policy requirements. It examines policies, regulatory instruments, and international best practices to inform the design, rationale, and potential impact of non-consumptive water use charges within the South African context. The analysis was limited to aquaculture, energy generation (notably hydropower and renewable installations) and recreation.
4. **Aquaculture Framework for NCC:** Presents the framing and charge rate for the non-consumptive charge options for aquaculture activity based on the relevant water use.
5. **Recreation Framework for NCC**: Presents the framing and charge rate for the non-consumptive charge options for recreation activity based on the relevant water use.
6. **Energy Generation Framework for NCC:** Presents the framing and charge rate for the non-consumptive charge options for energy generation activity based on the relevant water use.
7. **Implementation Readiness Considerations**: Outlines the critical next steps necessary for the Department and the sectors to prepare themselves for the roll-out of the NCC charges.

2 Methodology

2.1 APPROACH TO THE PROJECT

The methodology consisted of the following elements that resulted in the finalisation of the NCC approach:

A. **Literature Review**: A review of specific literature linked to key questions that arose during the study was undertaken to inform the approaches to be used per category and sub-category in each of the sectors of interest. The literature review provided a foundation for understanding pricing mechanisms applicable to non-consumptive water use charges as well as a look into how other countries were considering non-consumptive water use charges.

B. **Data collation and review:** The primary data source for the study was the DWS Water Use Authorisation and Registration Management System (WARMS). It was important, as part of the study, to assess the quality of the data the team had access to. This existing data was crucial to determine current trends and charges as well as to project future scenarios from a sound basis, where the data quality was good. Contractual and lease information was also reviewed as part of the study to gain a better understanding of how the recreation and energy generation NCC could be informed.

C. Stakeholder Engagement: The path-finding nature of this study did not lend itself to a broad stakeholder engagement process at this time. The most critical engagements were centred around the Department and critical stakeholders in each of the sub-sectors:

- **Key Informant Sessions:** ***DWS Water Resource Infrastructure Operation and Maintenance, DWS Water Use Authorisations, DWS Water Trading Entity***
  - Semi-structured sessions were conducted with selected key informants who possessed specialised knowledge or experience relevant to the pricing methodology, and most critically, data and information relevant to this study. These interviews combined guided questions with open-ended discussion to elicit both factual information and nuanced insights.
- **Sector Working Groups**
  - Aquaculture, Energy Generation and Recreation Working Groups were convened for each sub-sector to introduce the aims of the project and to solicit input and guidance from these stakeholders on the principles and approach to the charges, as well as the charge options and discuss the relevance and pragmatism of the charge options.

D. **Project Governance:** The Reference Group was established at the start of the project and included the Project team, together with DWS and the WRC. The Reference Group was consulted on key findings and guided the strategic direction of the project.

2.2 APPROACH TO DEVELOPING THE NCC CHARGE RATE

Physical, economic, environmental and social characteristics are important considerations when determining the price of water and add significant complexity. In many cases, water and water-related infrastructure have multiple uses, ruling out traditional costing and ring-fencing approaches linked to consumption. Non-consumptive usage of water does not lend itself to the application of normal consumption techniques. The policy, legal and regulatory review undertaken as part of the comprehensive literature review (Chapter 3) guided the approach taken.

Since the inception of the project, data had been collected for the different priority areas of NCC: aquaculture, energy generation and recreation. The data demonstrated that the maturity levels of these three areas differ significantly. The standard industry life cycle models illustrated the progression of an industry through four pivotal stages: introduction, growth, maturity, and decline. Each phase of the life cycle had distinct business characteristics and required different focuses in this methodology. The maturity of the sector for each category and sub-category informed the level of information available and consequently, impacted the approach and progression of the charge development.

A seven-step process was followed to determine the charge rate methodology for the NCC, which is presented in **Figure 2-1** below. This seven-step process was adapted throughout the project based on new data, information, stakeholder inputs and in consultation with the DWS.

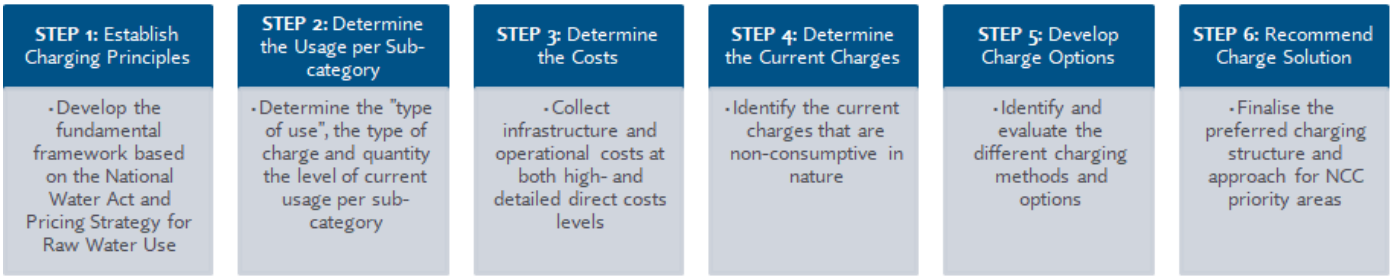


Figure 2-1: 7 Step Methodology for Developing Non-Consumptive Water Use Charges

STEP 1 – Establish Charging Principles

The principles that apply to NCC were determined and documented for aquaculture, energy generation and recreation. The National Water Act and the Pricing Strategy informed the basis of these principles to determine 'who' was to pay the NCC, 'who' would be exempt and why, and on what basis the 'cost of the NCC' would be determined.

STEP 2 - Determine Usage per Sub-category

The Pricing Strategy allows mainly for charges based on the authorised usage or activity that is occurring. Each sub-category was defined based on the type of activity and water use. Then the scale of the usage was defined in two parts:

- For mature or growing sub-categories the level of current activity will form the basis.
- In all cases growth assumptions will need to be determined. The planned forecasting window will be 10 years. Three growth scenarios will then be determined for each: low, medium and high.

STEP 3 - Determine the Costs

The cost and ownership of water infrastructure used by each of the three categories were collected. The information used by DWS in determining raw water charges was also used. This included both capital and operations and maintenance (O&M) costs. The direct cost associated with infrastructure and O&M related to non-consumptive usage for aquaculture, energy generation and recreation was determined. In the absence of direct costing, defendable assumptions of percentage allocation of costs were proposed.

STEP 4 - Determine the Current Charges

This step allowed for the identification and, where the data was available, the quantity of the non-consumptive charge. Examples included the current capital contribution charges for hydroelectric activities and 'water management' related charges in the recreation category that are currently charged through incorporation into land leases. It was also critical in this step to distinguish those water use activities that were non-consumptive in nature from existing charges to ensure that there is no double-charging of any water user.

STEP 5 - Develop Charge Options

This was the most critical and core step in the process. During this step, charge and tariff options were identified and then considered for each category. There were many standard methods of charges in the industry, as indicated by Grafton et al. (2020) for water pricing options, as described below:

- **Volumetric Pricing** serves as the primary pricing mechanism, directly linking charges to water consumption. This can be implemented either through a straightforward uniform rate for all users, or through more sophisticated differential rates. The differential approach accounts for factors like consumption levels using block rates (where rates change as usage increases), seasonal variations to manage peak demands, and location-based factors that reflect different service delivery costs.
- **Fixed or Flat Charges** provide a stable revenue base and can be applied uniformly across the customer base, potentially varying by season, or differentiated based on customer location or other characteristics to reflect varying service costs.
- **Miscellaneous Charges and Incentive Programs** support the core mechanisms listed above and can serve specific policy objectives. Connection charges help recover infrastructure expansion costs, while targeted rebates can be used to support specific customer groups or encourage desired behaviours like water conservation.

Each method was considered to ensure all relevant are options are considered. For each of the three NCC areas, different charge methods were identified and linked to the charge principles identified in Step 1 above.

Using the information gathered in steps 2, 3 and 4 of the process, values were assigned to the various combinations of charging options. These values were used in the modelling in a reiteration process to meet the set revenue objectives.

For the hydropower charge, the charges developed in the draft revised Pricing Strategy published for comment in 2022 were used as a baseline. Shortlisted charge options were evaluated for their simplicity, ease of collection and understanding, and likelihood of social acceptance.

STEP 6: Recommend Charge Solution

The outcomes from Steps 1-5 were consolidated and informed the recommended charge rate approach for the non-consumptive use charges for aquaculture, energy generation and recreation.

3 Literature Review

The introduction of non-consumptive use charges is supported by internationally recognised financing principles that promote sustainable, efficient, and equitable water resource management. These financing principles guide the development and implementation of pricing policies and mechanisms for raising adequate revenues (OECD, 2016). By embedding these principles into the 2024 Pricing Strategy for Raw Water Use Charges, a transparent and equitable framework for selecting appropriate pricing mechanisms can be established to ensure the sustainable financing of water resource management, services, infrastructure, and ecosystem and biodiversity conservation. This integration strengthens the strategy's ability to meet evolving water demands, manage environmental impacts, and uphold regulatory mandates in a fiscally responsible manner (OECD, 2012) (DWS, 2024).

Therefore, this literature review aimed to provide an evidence-based approach to the development of NCC methodologies and align them to national and sector-specific policy requirements. It examined policies, regulatory instruments, and international best practices to inform the design, rationale, and potential impact of non-consumptive water use charges within the South African context.

3.1 NATIONAL FRAMEWORK FOR WATER RESOURCE MANAGEMENT AND DEVELOPMENT

3.1.1 Legal and Policy

The right to water and sanitation is enshrined in the country's Constitution, which forms the foundation for the country's legislation and policy framework. Law and policy developed for the sector are premised on the Constitution. The management of non-consumptive water use in South Africa is governed through a combination of legal frameworks, regulatory institutions, and authorisation processes. The legislation and policies relevant to the water and sanitation sector are presented in the table below.

Table 3-1: Relevant national legislation and policies for water and sanitation in South Africa

Legislation / Policy	Description
Climate Change Act (2024)	• The act provides for a coordinated and integrated response by the economy and society to climate change and its impacts in accordance with the principles of cooperative governance. • It aims to provide for the effective management of inevitable climate change impacts by enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic and environmental resilience and an adequate national adaptation response in the context of the global climate change response. • The act also seeks to protect and preserve the planet for the benefit of present and future generations of humankind.
National Water Amendment Bill (B-2023)	• The amendments will prohibit the undesirable consequence of private water trading', provide for the 'further protection of water source areas' and support the 'reallocation of water'.

Legislation / Policy	Description
	• The bill seeks to 'repeal the right to declare an existing lawful water use' while also providing further regulations for the governance of water use associations and their membership. • It provides for periodic reviews in respect of the national reserve, the national strategy, water use classification determinations and water resource quality objectives (SA Legal Acadamy, 2023).
National Water Services Amendment Bill (B-2023)	• The bill seeks to address gaps in existing regulations on 'safely managed sanitation' and improve the quality of potable / drinking water. • It also aims to improve 'the accountability of water services providers' by way of operating licence requirements as well as making registration mandatory for persons installing and operating water service works. • Lastly, the bill looks to strengthen water board governance (SA Legal Acadamy, 2023).
National Water Act 36 of 1998	• The act is the main legislation governing all water uses in South Africa and recognises that water is a scarce and unevenly distributed national resource which belongs to all people. • The act acknowledges national government's overall responsibility for and authority over the nation's water resources and their use. • The aim promotes water resource management that achieves the sustainable use of water for the benefit of all, noting that protection of the quality of water resources is necessary to ensure sustainability. • It defines water use which is applicable to non-consumptive uses such as recreational use, aquaculture and energy (e.g., hydropower). It also introduces the concept of water use licensing (WUL) and general authorisations. • An entitlement for legal water use is required for aquaculture activities.
Water Services Act 108 of 1997	• The act provides for the right of access to basic water supply and sanitation as well as the setting of national standards and norms around tariffs. • The act also provides a regulatory framework for water services in the country including the establishment of water services institutions and their roles and responsibilities
Water Research Act 34 of 1971	• To provide for the promotion of research in connection with water affairs; • For that purpose to establish a Water Research Commission and Water Research Fund; and • To provide for matters incidental thereto. • The Water Research Act thus promotes water related research and the use of water for agricultural purposes, industrial purposes, or urban purposes. • The Minister appoints members of the WRC, and thus exercises executive oversight over the Commission.
National Water and Sanitation Sector Policy on Climate Change (2017)	• The development of the country's National Climate Change Response Policy (NCCRP) informed this policy which represents the water and sanitation sector's ongoing efforts to adapt to climate change and contribute to the implementation of the NCCRP. The policy positions, as outlined in the policy, include adaptation, the role of water and sanitation in mitigation, mainstreaming of climate change into the sector and incorporating factors associated with climate change resilience into water pricing (costs and subsidies).
National Climate Change Response Policy White Paper (NCCRP) (2011)	• The NCCRP comprehensively outlines South Africa's strategies in both adaptation and mitigation up to 2050 in the following areas: carbon pricing, water, agriculture and commercial forestry, health, biodiversity and ecosystems, human settlements and disaster risk reduction and disaster risk management.
White Paper on Water Supply and Sanitation (1994)	• The paper aimed to ensure that all South Africans had access to essential basic water supply and sanitation services at a cost which was affordable to households and the country. • The document put forward basic policy principle, outlined the proposed institutional framework for water supply and sanitation services; provided standards and guidelines for basic service delivery; and set out a policy for the financing of services (Wilkinson, et al., 2018).
White Paper on National Water Policy for South Africa (1997)	• The document emphasised the fact that everyone had the right to access sufficient water. • Principles were put forward regarding alignment with the Constitution, water as a common resource, the state's ownership of water, abolishment of riparian principles, and water resource management approaches and priorities. , • It also set forth an institutional framework for water management as well as guiding regulation and provision of water services (Wilkinson, et al., 2018).

Legislation / Policy	Description
White Paper on Basic Household Sanitation (2001)	• The paper focused on the provision of a basic household sanitation to rural communities and informal settlements. • It also dealt with the need for an environmentally sound approach to providing sanitation services as well as protecting surface water and groundwater resources from sanitation pollution through integrated environmental management practices (Wilkinson, et al., 2018).
Strategic Framework for Water Services (2003)	• The framework outlines the approach for the provision of water services to all water users and/or consumers, from small schemes for rural communities to large supply schemes for peoples and industries in urban areas. • Provides for free basic water and sanitation services but also highlights the use of water and sanitation programmes to support sustainable livelihoods and local economic development.
National Water Policy Review (2013)	• The document is a review and refinement of the water policy and is aimed at addressing new and current developments in the sector. • The amendments include proposed policy positions which outline additional, new or updated courses of actions that the government wishes to adopt in pursuit of national water objectives in the future. • The policy review considers developmental water management and integrating the water value chain (from resource to consumptive and productive use to resource) into planning and development in a seamless fashion. • It also recognises the need to address policy issues regarding free basic sanitation, mechanisms for partnerships, recognition of historical entitlement to water under customary law, and climate change.
National Sanitation Policy (2016)	• The document provides policy positions to address the identified policy gaps and challenges, as well as addressing the country's new national and international development imperatives. • It considers sanitation policy positions across the entire sanitation value chain i.e. collection, removal, disposal or treatment of human excreta and domestic wastewater, and the collection, treatment and disposal of industrial wastewater. • It adopts many of the strategic policy positions outlined by the Strategic Framework for Water Services (2003) which must be sustained to ensure a sustainable sanitation sector in the country. • The policy also endorses the national sanitation targets, as outlined in the NDP and Mid-Term Strategic Framework (DWS, 2016).
Draft Integrated Water Quality Management (IWQM) Policy (2025)	• The policy provides an initial framework that aims to connect with wider national policies, provides the opportunity to align approaches towards managing water quality, and ensures that water quality management becomes a national imperative (beyond just the responsibility of the DWS). • The policy also guides further development of legislative and regulatory instruments as well as establishing appropriate measures for managing water quality. • It is aligned with the National Water Resource Strategy Third Edition (NWRS-3) as a high-level strategic document that operationalises the National Water Act (Act 36 of 1998). • The IWQM highlights the importance of water quality management at all levels - from source, to-tap, and back to source.
Public Finance Management Act 1 of 1999	• The Act aims to ensure transparency, accountability, and effective management of revenue, expenditure, assets, and liabilities within specified public institutions. • The Act applies to government departments, public entities listed in Schedules 2 and 3, constitutional institutions, and Parliament, with specific provisions for parliamentary oversight. • The Act applies to Parliament, the Speaker of the National Assembly and the Chairperson of the National Council of Provinces jointly perform the oversight roles typically assigned to the National Treasury. • The WRC is subject to the PFMA and classified as a Schedule 3A National Public Entity. • Water boards are categorized as Schedule 3B National Government Business Enterprises under the PFMA.

Legislation / Policy	Description
Promotion of Administrative Justice Act 3 of 2000	• The Act gives effect to the right to lawful, reasonable and procedurally fair administrative action and to the right to written reasons for administrative action as contemplated in section 33 of the Constitution of the Republic of South Africa (1996).

3.1.2 Strategy and Planning

To support the implementation of the various water-related legislation and policies, the government of South Africa put forward several planning instruments and strategies (Table 3-2).

Table 3-2: Relevant strategies and plans for water and sanitation in South Africa

Strategy / Plan	Description
Pricing Strategy for Raw Water Use Charges (2024)	• The strategy calculates water charges and is aimed at improving financial sustainability in water resource management. • It emphasises cost recovery and financial sustainability. Recognizing the need for further alignment with evolving water management and encompasses non-consumptive use by incorporating charges and management principles that ensure such uses contribute to the sustainable and equitable management of water resources, accounting for their impact.
National Water Resources Strategy Third Edition (2023)	• The strategy sets out how South Africa will achieve its goals related to the protection, use, development, conservation and management of water resources in a controlled, sustainable and equitable manner. • The achievement of South Africa's climate change response objectives in the water and sanitation sector are guided by the following principles: o Integration of potential climate change impacts into water resources and water and sanitation services planning and supply at all levels. o Appropriate strategic responses to minimise the impacts of climate change. o Aligning existing initiatives and institutions to improve the effectiveness of the national response (SDG: 13 - SAWS: climate and forecasting / early warning systems, DFFE: emissions and green programmes). o Climate and water is elevated onto appropriate agendas to ensure that it is incorporated into the national agenda adequately. o Critical ecological infrastructure and water and sanitation infrastructure must be protected, maintained and enhanced. o Riparian vegetation and buffer zones must be rehabilitated and restored (SDGs 6, 13 and 15). o Water and sanitation infrastructure is planned for a changing future using no regrets and low regrets approaches.
Water Conservation and Water Demand Management (WC/WDM) Strategy for the Water Services Sector (2023)	• The strategy's vision is WC/WDM to be 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 • The document seeks to provide strategic guidance to WC/WDM in the water services sector by improving leadership, institutions, and regulation; strengthening cooperative governance and strategic alignment; enhancing operationalisation, implementation and performance; and mobilising the sector through strengthened capacity building, training and awareness.
Water Services Infrastructure Asset Management (IAM) Strategy (2011)	• Puts forth a vision for the sector regarding infrastructure asset management, namely that proper life cycle management of water services assets are fully integrated into the water services business of all Water Services Institutions in South Africa. • It seek to create a platform for coordination of principal role players to support water services IAM as a matter of national priority; address water services infrastructure failures in targeted Water Services Institutions in the short term, and effect improvements that can be publicised in order to demonstrate the benefits of IAM; and develop a culture of

Strategy / Plan	Description
	sustained improvement in the management of infrastructure within the water services sector in the longer term.
National WC/WDM Strategy (1999)	• The strategy provides the overarching framework for the sector strategies related to WC/WDM. • Its core purposes include: providing a framework against which the more practically focused sub-sector strategies can be structured; unlocking more strategic aspects that enable the sub-sector strategies to be implemented; and creating an improved enabling environment that will facilitate the implementation of WC/WDM nationally and locally
National Water Security Framework for South Africa (2020)	• The document seeks to guide the thinking in the water sector for the medium to long-term horizon (2030 and beyond) and ensure that current actions are always aligned with desired outcomes and impacts. • Its principles include source to sea across the water value chain; long-term view based on scenario planning and associated risks, policy and legislation as starting point, nexus approach to planning, implementation and management, decision support from credible information and research results, mass balance approach to assessment and implementation, accountability and clear roles and responsibility, and total value chain ownership concept in context of the trusteeship doctrine
National Water and Sanitation Master Plan (2019)	• The plan indicates the most important challenges confronting the water and sanitation sector and seeks to facilitate the collaboration of water sector stakeholders in South Africa to address these challenges. • Climate change and the need to implement coordinated and integrated adaptation responses are some of the challenges noted in the plan.
National Groundwater Strategy (2016)	• The groundwater strategy builds on the previous groundwater strategy of 2010 by improving the recognition of the resources strategic value and its use and protection in the country. • Some of the major themes in the strategy include a responsive groundwater regulatory framework, protection, sustainable utilisation, and local action, amongst others.
Water for Growth and Development Framework (2009)	• The framework guides water resource management and use to ensure water security in terms of "quantity and of quality to support South Africa's requirements for economic growth and social development". • The framework establishes the need to provide potable water to all South Africans while also ensuring sufficient supply to sustain and promote economic growth without compromising the sustainability of water resources.
Catchment Management Strategies	• These strategies are statutory documents which provides the vision, and the strategic actions to address integrated water resources management in its water management area. • The documents should be based on the best available information and must be aligned with the NWRS. • The strategy should include a water allocation plan and must set forth principles for allocating water to existing and prospective users as well as the protection, use, development, conservation, management and control of water resources.

3.1.3 Institutional Arrangements

The institutional landscape for the water sector in South Africa is complex and multi-layered, with the principle of decentralisation being one of the core drivers for the division of responsibilities and mandates between national-, regional- / provincial- and local-level institutions.

National

The **Department of Water and Sanitation (DWS)** is the custodian of water resources and is the primary entity responsible for the water sector, specifically the development of policy and regulations as well as being the regulator for the sector.

DWS is legislatively mandated to ensure that water resources are protected, managed, used, developed, conserved, and controlled by regulating and supporting the delivery of effective water supply and sanitation (South African Government, n.d.). The Department, acting through the Minister for Water and Sanitation, is responsible for water sector policy, support, and regulation (DWS, 2024). The Department of Water and Sanitation (DWS) is the national authority responsible for the execution of the goals pf the National Water Act by regulation, allocation, and protection of water resources, including the assessment and approval of water use licence applications and enforcing dam safety regulations (DWS, 2017).

Further to the above, the **Trans-Caledon Tunnel Authority (TCTA)** – an agency of DWS - is responsible for financing and implementing bulk raw water infrastructure projects. TCTA assists the government in its pursuit of water security for South Africa and in realising its constitutional obligation of ensuring universal access to this essential resource for all citizens (TCTA, n.d.).

Lastly, there is the **National Water Resources Infrastructure Agency (NWRIA)** which is set to be established in 2026 and will replace the TCTA. The agency is seen as a critical entity that will be responsible for ensuring effective development and maintenance of the country's water infrastructure. The agency will be established through an act of Parliament with the purpose of ensuring a reliable supply of water from water resources infrastructure, with acceptable risk, to meet sustainable national, regional, social, economic and environmental objectives. The agency will solicit and source funds on its balance sheet to increase investment in water infrastructure (Molepo, 2025).

Transboundary

Many of South Africa's water resources are shared across national boundaries, including the Incomati, Limpopo, Maputo and Orange rivers. The National Water Act recognises the obligations of the country with regard to transboundary water resource management, specifically for the Ministry of Water and Sanitation to establish relevant bodies to implement international agreements related to the management, planning and development of transboundary water resources (Helen Suzman Foundation, n.d.). In this regard, South Africa is part of several transboundary institutions **(i.e. River Basin Organisations (RBOs)** that are responsible for equitable and sustainable management and development of shared water resources, namely:

1. **Incomati and Maputo Watercourse Commission (INMACOM):** Ensures the equitable, fair and sustainable sharing of water within the Incomati and Maputo Basins. Includes Eswatini, Mozambique and South Africa (INMACOM, n.d.).
2. **Limpopo Watercourse Commission (LIMCOM):** Was established between Botswana, Mozambique, South Africa and Zimbabwe with the objective of advising the Member States and providing recommendations on the uses of the Limpopo, its tributaries and its waters for purposes and measures of protection, preservation and management of the Limpopo (LIMCOM, n.d.)
3. **Orange-Senqu River Commission (ORASECOM):** Promotes the equitable and sustainable development of the resources of the Orange-Senqu River and provides a forum for consultation and coordination between the riparian states to promote integrated water resources management and development within the basin. Includes Botswana, Namibia, Lesotho and South Africa (ORASECOM, n.d.).

Provincial / Regional

Catchment Management Agencies (CMAs) are provided for in the National Water Act and are responsible for water resource management at a catchment level, specifically designated water management areas (WMAs). CMAs represent the

government's efforts towards decentralised water resource management (DWS, n.d.). Six CMAs have been proposed in the NWRS-3, namely:

1. Limpopo-Olifants;
2. Inkomati- Usuthu;
3. Pongola- Umzimkhulu;
4. Vaal-Orange;
5. Mzimvubu- Tsitsikama; and
6. Breede-Olifants (DWS, 2023).

Typically, within CMAs, there exist catchment management forums (CMFs) and catchment management committees (CMCs) that provide for engagement and/or collaboration between government i.e., CMAs, DWS etc. and different water users and stakeholders in a catchment. CMCs can also perform certain functions of the CMA within a specified area (as mandated by the CMA) while CMFs are primarily used for the raising of concerns amongst water users, awareness raising and exchanging of lessons.

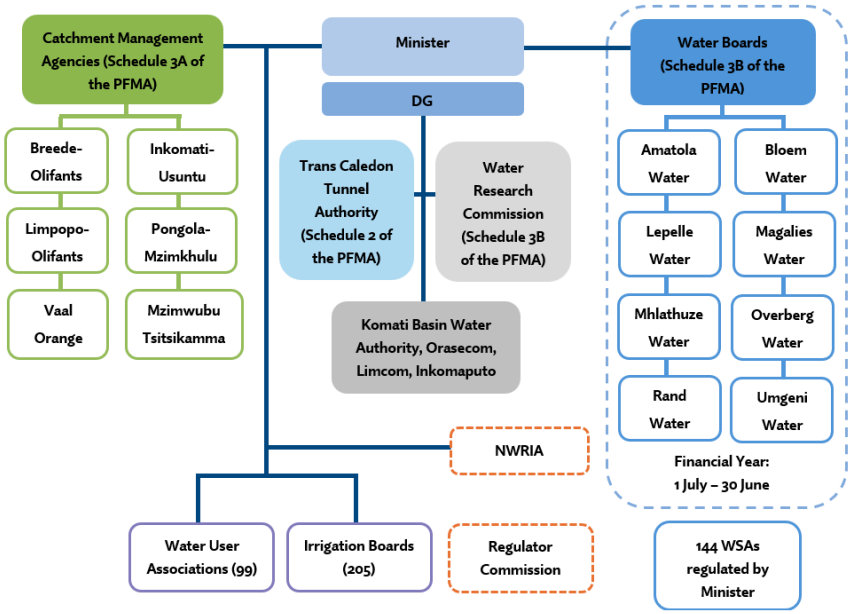
Water Boards are provided for in the Water Services Act and are mandated to provide bulk industrial and potable water services and other related services such as drought interventions for the public benefit to municipalities and industries within their gazetted areas of operation (DWS, 2023).

It is important to note that the Vision 2030 for building a capable state in the NWRS-3 highlights the need to develop regional water utilities to deliver local government services where local or district municipalities lack capacity, specifically focusing on transforming existing water boards into regional water utilities. These regional water utilities will manage bulk water service infrastructure as well as supply bulk water to water service authorities (WSAs), water service providers (WSPs) and bulk water consumers (South African Government, n.d.). In addition, it is envisioned that RWUs will operate existing regional water resource infrastructure, manage bulk sanitation infrastructure for wastewater treatment, provide support to CMAs and WSAs, and develop new regional water resources infrastructure (Department of Water Affairs, 2013).

Local

At a local level, there are several institutions that play an important role in water services. **Water Service Authorities (WSAs)** refer to "any municipality that has executive authority for water services within its area of jurisdiction in terms of the Municipal Structures Act or the ministerial authorisations made in terms of the Municipal Structures Act" (Department of Water Affairs and Forestry, 2005) and can include metropolitan, district and local municipalities. As such, WSAs have the responsibility of regulating, planning, and ensuring access to water services (supply and sanitation) within their areas of jurisdiction (Department of Water Affairs, 2013). WSAs are supported by **Water Service Providers (WSPs)** which can include private, public, or mixed entities contracted by the WSA to provide water and/or sanitation services (Beck, et al., 2016).

Furthermore, **Water User Associations (WUAs) / Irrigation Boards** operate at local level. According to the National Water Act, WUAs are "co-operative associations of individual water users who wish to undertake water-related activities for their mutual benefit" (Republic of South Africa, 1998). WUAs can only perform functions that have been assigned or delegated to them with the Minister being responsible for the establishment or disestablishment of WUAs.



Source: (DWS, 2023)

Figure 3-1: Institutional landscape for the water sector

3.1.4 Financing Arrangements

The NWRS-3 notes that "without sufficient, properly managed financial resources and effective financial oversight of the water and sanitation sector:

- The NWRS-3 will not be successfully implemented.
- Works will not be constructed, refurbished or properly operated.
- Water institutions will not be financially sustainable and bad debt will rise.
- No sustainable water resource and water and sanitation services management, meaning that the environment will not be protected, the constitutional and social obligations will not be met and there will not be economic growth.
- Water and sanitation services will not be available where required at the required level of assurance.
- Every sector dependant on water and sanitation, including domestic, agricultural, business, and industrial and energy will be unable to grow." **(DWS, 2023)**

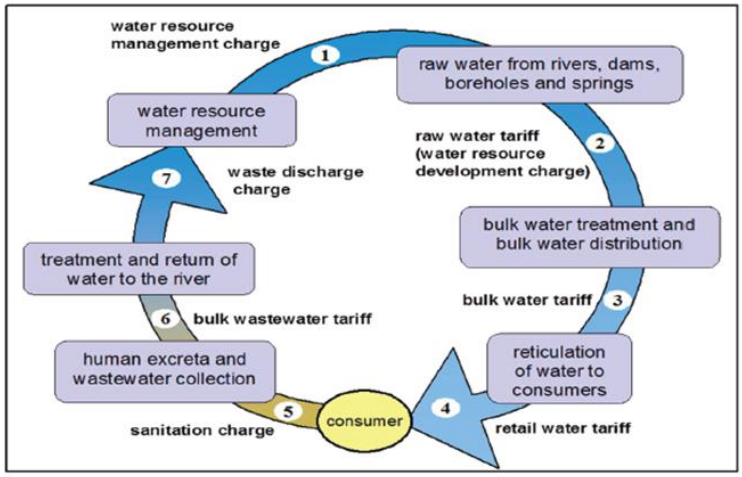
To support this National Water Investment Framework **(DWS, 2017)**, outlined how the investment and resourcing required in the NWRS will be planned, funded, resourced and implemented.

Much of the core business of managing water resources is funded from the national fiscus due to the strategic nature of water resources and the fact that this is of a broader public interest. As water resources are exhaustible, it is relevant to have this management function funded from parliamentary appropriations. In the water resource management context, it is more appropriate for the fiscus to cover functions that are non-apportionable and non-exclusive. Where water resources are allocated for use, then charges are levied to recover some of the costs of providing quasi-collective services, while consumer tariffs are charged for particular services and cover the entire cost of providing the service, as they are at municipal levels.

The Pricing Strategy for Raw Water Use Charges provides a framework for implementing the charge system for water use, with the objective of the Pricing Strategy being provided as "to promote the effective and efficient management of water to support equitable and sustainable economic growth and social development in line with the overarching goals of the National Water Resources" **(DWS, 2024)**. Importantly, this is further broken down into a suite of primary objectives:

- Ensure that the costs of achieving and maintaining the Resource Quality Objectives are sufficiently recovered through the water use charges.
- Ensure that the water resource management systems implemented are cost effective and do not become an unnecessary financial burden on the water users.
- Ensure that there is adequate funding for the effective operation, maintenance and development of waterworks by the Department and other water management institutions.
- Provide an enabling framework for the transformation and equity objectives of the NWRS as it relates to the racial and gender imbalances in the access to water.
- Facilitate financial sustainability of water management institutions.
- Promote/facilitate water use efficiency. In the context of water scarcity, it is critical to ensure an efficient allocation, which requires that the price of water reflects its scarcity value, to ensure firstly that water is conserved and secondly that some water is redirected for optimal economic benefits while not harming social benefits.
- Establish a pricing regime for the use of raw water.

It is important to recognise that the various water sector institutions undertake a range of functions across the water sector value chain. Bearing in mind that these institutions undertake functions that support the sustainability of the resource and ensure its effective management, as well as underpin and support the use and development of the resource, then they are funded through a mix of grant funds from the fiscus as well as revenue generated from the provision of services. User charges for quasi-collective services should cover the operating costs of providing the service to users, while the fixed capital cost should be financed through taxation. The Pricing Strategy notes the importance of these various services across the water value chain with focused charges and tariffs being provided to finance the operating costs linked to those services.



Source: (DWS, 2024)

Figure 3-2: Various tariffs across the water value chain as outlined in the Pricing Strategy

The Water Resource Management Charge (WRMC) funds the water resource management activities related to the protection, allocation, conservation, management, and control of all the nation's water resources. It consists of two components: the abstraction water use charge and the waste discharge-related water use charge. The WRMC includes financial support for activities like water quality management plans, waste discharge control, and pollution incident planning and response. In addition, the Pricing Strategy for Raw water Use charges provides for non-consumptive use which includes impeding or diverting the flow in a watercourse; engaging in a controlled activity; altering the bed, banks, course or characteristics of a watercourse and recreational uses **(DWS, 2024)**.

3.1.5 Sector Development Priorities

Within the NWRS-3, various priority areas have been put forward for the water sector. Key to the development of the NCC are:

1. **Regulating the water and sanitation sector:** The objective is to improve the DWS's regulatory capacity to protect the resource and the consumer, ensure compliance with standards and license conditions, and safeguard the sustainability of water institutions. Regulation covers the entire water chain, including water use authorization, water resource protection, drinking water quality, wastewater discharge, infrastructure regulation (including dam safety), and economic and social regulation. This relies on incentive-based programs like the Blue Drop (drinking water quality), Green Drop (wastewater discharge), and No Drop (water use efficiency) certification programmes. Additionally, strengthening the department's compliance and enforcement capacity is viewed as an important element in actions against illegal water use and pollution.

2. **Protecting and restoring ecological infrastructure for the green economy:** The strategy prioritises maintaining and restoring ecosystems that deliver essential services like streamflow regulation and water quality improvement, which are vital for water security. This is achieved through implementing resource directed measures (setting goals like the Reserve and RQOs) and source directed controls (regulating polluting activities). The need to invest in the restoration, maintenance of ecosystems and expansion of ecological infrastructure aligns with the goal of the NDP (National Development Plan) regarding the Transition to a low carbon economy, which focuses on environmental sustainability as well as the UN Decade of Ecosystem Restoration (2021–2030). The strategy further highlights alignment to the 2030 vision of transition to a low carbon economy renewable energy, retrofit buildings and focus on environ-mental sustainability.

3. **Creating effective water sector institutions:** Establishment and transforming of institutions to enable efficient, equitable, and sustainable protection, use, development, management, and control of water resources and services. This includes key institutions such as Catchment Management Agencies (CMAs), transforming Water User Associations (WUAs), establishing the National Water Resources Infrastructure Agency (NWRIA), and determining the optimal configuration of Water Boards to manage bulk water supply. The goal is to rationalize the number of institutions, clarify roles and responsibilities, and ensure separation of regulatory and operational functions to improve delivery and financial viability.

4. **Ensuring financial sustainability:** Focusses on mobilizing financial resources, systems, structures, and processes to fund all aspects of the NWRS-3. Key actions include developing a comprehensive National Water and Sanitation Investment Framework and a funding model. The strategy mandates the DWS to deal with debt, by implement mechanisms to collect outstanding charges, and revise the Pricing Strategy to ensure costs are recovered, while still maintaining pro-poor tariffs. It further mandates them to provide financial assistance to historically disadvantaged farmers and other water-based rural livelihoods.

5. **Enhancing and deploying research, development and innovation (RDI):** RDI is recognized as a key contributor to sustainability, aimed at developing and deploying effective and efficient management solutions for water security, resource protection, and sanitation. RDI efforts are aligned with key challenges, focusing on producing knowledge that transitions the sector to improved practices. This requires close collaboration among DWS, the Water Research Commission (WRC), the Department of Science and Innovation (DSI), and other partners. RDI focuses on solutions for alternative water sources (reuse, desalination), improving governance and accountability, enhancing infrastructure adequacy (including ecological infrastructure restoration), and applying 4IR technologies to financial models and operational performance (DWS, 2023).
6. **Addressing legislative and policy gaps:** The primary objective is ensuring that proposed legislation deals with issues impacting redress and achieving equity, particularly regarding the duration of licenses and the revision of authorizations where water rights have not been exercised (to enable re-allocation). Legislative changes have been a key tool in the formalization of institutional frameworks for CMAs, Regional Water Utilities, and Water User Associations (DWS, 2023).

3.2 AQUACULTURE

According to the National Aquaculture Policy Framework for South Africa (2013), aquaculture refers to "*the farming of aquatic (marine or freshwater) organisms including fish, molluscs, crustaceans and plants in controlled or selected aquatic environments, with some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators etc.*" (DAFF, 2013). This also includes individual or corporate ownership of the stock being cultivated as well as ranching and stock enhancement (DAFF, 2013). With regards to freshwater aquaculture, this refers to a branch of aquaculture that involves farming of freshwater plants and animals conducted in ponds, open water cages or tanks (DAFF, 2013).

Aquaculture cuts across various departments / sectors, hence it is governed by several laws, policies and regulations. These are described in more detail below.

3.2.1 Sector Overview

The aquaculture sector in South Africa is a young developing industry consisting of both freshwater and marine aquaculture across all nine provinces, each with distinct aquatic species, water use requirements, and regional focuses. Freshwater production is prevalent in inland provinces, while marine production is practised predominantly from four coastal provinces. A total of 195 operational farms were recorded in 2021 for marine and freshwater aquaculture. This included 151 freshwater farms and 44 marine farms. The industry's growth can be observed through the lens of annual status reports, such as the aquaculture yearbook (DFFE, 2017); (DFFE, 2022).

The 2022 aquaculture yearbook edition is the 14th version, compiled by the DFFE. Initially, the publication focused exclusively on marine aquaculture and was released under the Department of Environmental Affairs and Tourism (DEAT) as South Africa's Marine Aquaculture Industry Annual Report in 2009. In 2010, following the government's restructuring that created the Department of Agriculture, Forestry and Fisheries (DAFF), the yearbook was renamed the Marine Aquaculture Annual Report 2010 and expanded to include developmental aspects of aquaculture. The 2011 edition marked the inclusion of freshwater aquaculture, prompting another name change to South Africa's Aquaculture Annual Report. In 2012, the

publication adopted its current title, South Africa's Aquaculture Yearbook, published under DAFF. Further government restructuring in 2019 reallocated aquaculture functions to the Department of Forestry, Fisheries and the Environment (DFFE). Since then, the DFFE has produced and published status updates on the sector's development, reflecting its leading role as the agent responsible for the development and management of the aquaculture sector in South Africa (DFFE, 2022).

The total market value for aquaculture products and services in 2021 was estimated at approximately R2.24 billion, with abalone (86%) as the largest contributor followed by oysters (6%), tilapia (3%), and mussels (2%) (DFFE, 2022). The freshwater component was estimated at R136 million (R135 543 500), representing a 13.29% contribution to the overall aquaculture sector value in 2016 (AgriSETA, 2021).

The total aquaculture production in South Africa for 2021 was 7 769.96 tons, of which 1 482,30 tons (19%) was from freshwater production and 6 287,66 tons (81%) was from marine production. This is a 28% increase from the previous year's production of 6 045,97 tons. The freshwater aquaculture subsector is distributed across all inland provinces, with the main production in Limpopo, Gauteng, Mpumalanga, North West, and Free State. Common freshwater species include trout (*Oncorhynchus mykiss* and *Salmo trutta*), tilapia (*Oreochromis mossambicus* and *O. niloticus*), African Sharptooth catfish (*Clarias gariepinus*), common carp (*Cyprinus carpio*), koi carp, and ornamental fish. Trout is a leading freshwater production species concentrated in mountainous regions with colder water availability, such as the Drakensberg. Freshwater farming technologies include recirculating aquaculture systems (RAS), earthen ponds, aquaponics, and raceways. While on the other hand, the marine aquaculture subsector is situated mainly along the Western Cape, Eastern Cape, Northern Cape, and KwaZulu-Natal coastline. Main species for farming include abalone (*Haliotis midae*), mediterranean mussels (*Mytilus galloprovincialis*), indigenous black mussels (*Choromytilus meridionalis*), pacific oysters (*Crassostrea gigas*), dusky kob (*Argyrosomus japonicas*), east coast rock lobster (*Panulirus homarus*), and seaweed (e.g., *Ulva* spp. and *Gracilaria* spp.). Mussel farming is the largest sub-sector by biomass, with 20 operational farms mainly in the Western Cape. Abalone production rose significantly to 2 463 tons in 2021, supported by well-established infrastructure and research developments. Marine systems generally employ longline, raft culture, flow-through, and ranching production methods (DFFE, 2017); (DFFE, 2022); (AgriSETA, 2021); (CSRI, 2019).

Aquaculture in South Africa is still in its infancy and small-scale aquaculture farmers dominate the freshwater sector. The current aquaculture legislation does not adequately cater to the freshwater subsector, which makes the submission of sector-related information from farmers challenging. Information presented in the status report (the Aquaculture Yearbook 2021-2022) is limited by data availability and does not represent the full picture of the entire freshwater aquaculture subsector. Nonetheless, available data demonstrates a decline in the number of freshwater farms from the 163 farms recorded in 2020 to 151 in 2021. This can be attributed to the number of farms that closed due to challenges associated with the Covid-19 pandemic and other long-standing constraints such as limited skills, access to water, and inadequate technology development (DFFE, 2022).

Despite multiple production challenges, the South African aquaculture industry's growth and development are hindered by a lack of capital investment. Aquaculture operations are capital intensive and, therefore, require finance for several activities, including operating activities, the purchase of buildings, machinery and marketing arrangements and other relevant technologies. Timely access to financing sources is critical for improving farmer profitability and the sustainability of operations. The South African government established the Aquaculture Development and Enhancement Programme, an

incentive programme that contributes up to 50% (capped at R20 million) of qualifying costs for all South African registered entities engaged in aquaculture activities (DFFE, 2022).

South Africa's Development Finance Institutions (DFIs) provide a range of financial solutions to farmers at various stages of aquatic species farming. Commercial banks and other private institutions also offer various financing models for investing in aquaculture operations. Aquaculture Technical Services publishes a comprehensive annual report containing information on the various programs and products offered by South African financing institutions. The report outlines the funding criteria, application process, and contact information for each financing institution. The Aquaculture Development and Enhancement Programme continues to play an important role in the industry's investment growth. In 2020, the incentive invested approximately R111,2 million, representing a twofold increase in overall spending from 2020 (DFFE, 2022); (DFFE, 2021). The DFFE aims to grow the aquaculture sector to play a major role in supplying fish products, increase job creation, and contribute to national income and rural livelihoods. The targets over 2019-2024 aimed to grow the sector's revenue from R0,67 billion to R3billion; production by 27 020 additional tons; create 6 560 direct jobs and increase participation to support transformation in the sector (DFFE, 2022). These ambitions have an impact on water resources.

Water use varies by farming intensity and species, with freshwater aquaculture depending heavily on sustainable water supply of adequate quality. Extensive systems use natural water bodies or simple farm dams with low stocking densities, relying on natural food, while intensive systems require carefully managed water flows or recirculating systems that have higher water quality standards and sometimes use potable water. Aspects of freshwater aquaculture water use fall within the scope of non-consumptive water use and are governed by a set of legal frameworks described below. Marine aquaculture, on the other hand, uses seawater often pumped from natural sources, which is beyond the DWS water resources management mandate. However sustainable environmental practices are enforceable by the DFFE. Marine aquaculture operations already pay a range of licensing and concession fees through DFFE.

3.2.2 Legal and Policy

The legislation and policies relevant to the aquaculture sector are presented in Table 3-3 below.

Table 3-3: Relevant national legislation and policies for aquaculture in South Africa

Legislation / Regulation / Policy	Description
	Legislation
Animal Diseases Act (35 of 1984)	• Requires permitting for the importing of live specimens or eggs. • Aims to control animal diseases and parasites towards the promotion of animal health. • Applicable to fish and other aquatic fauna.
Genetically Modified Organisms Act (15 of 1997)	• Applicable to genetic modification of organisms and the development, production, release, use and application of genetically modified organisms. Also applies to both spat and feeds. • Requires a permit to undertake any activity in relation to genetically modified organisms. Includes undertaking an assessment of the potential adverse effects to the environment as well as human and animal health and safety. An assessment of the socioeconomic impact, cultural traditions and security is also required. Lastly, an environmental impact assessment may also be required.
National Environmental Management Act 107 of 1998 (NEMA)	• The act provides for cooperative and environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state.

Legislation / Regulation / Policy	Description
	• Environmental Impacts Assessment Regulations and Listing Notices have been published under NEMA to regulate development activities
National Heritage Resources Act (25 of 1999)	• Requires a notice of development to be filed by an aquaculture applicant if an aquaculture-related development is deemed to have a detrimental effect on heritage resources. In this regard, a heritage impact assessment must be conducted.
Animal Health Act (7 of 2002)	• Seeks to promote animal health and to control animal diseases; to assign executive authority; to regulate the importation and exportation of animals and things; and to establish animal health schemes. • Requires permitting for the importing of live specimens or eggs.
The National Environmental Management: Protected Areas Act 57 of 2003 (Amended in 2004 and 2009) (NEMPAA)	• The act provides for the protection and conservation of ecologically viable areas, the establishment of a national register of protected areas, as well as the proclamation and management of these areas. • It provides for a national system of protected areas in South Africa as part of a strategy to manage and conserve the country's biodiversity. • The act also provides for the assignment of national parks, special parks and heritage sites to South African National Parks (SANParks).
National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)	• The NEMBA provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998. • It provides for 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; and the establishment and functions of South African National Biodiversity Institute (SANBI).
Marine Living Resources Act (MLRA), Act 18 of 1998	• The principal law governing marine aquaculture and capture fisheries. • Provides for allocation of rights, permits, and licences for aquaculture-related activities in marine waters and for certain land-based facilities producing marine species. • Sets out conservation, sustainable use, and management provisions for marine living resources. • Currently being complemented by the Draft Aquaculture Development Bill (2023) to integrate freshwater aquaculture regulation
National Water Act (Act 36 of 1998)	• Regulates the use of water resources, including abstraction, storage, and discharge for aquaculture operations. • Aquaculture facilities require water use licences under section 21 for activities such as abstraction, impoundment, or waste discharge. • Links directly to the "Use of Water for Aquaculture Purposes Operational Policy". already listed.
Regulations	
Environmental Impact Assessment Regulations, 2014 as amended	• Environmental Impact Assessment Regulations regulates environmental impact assessments which need to be undertaken to obtain an environmental authorisation. • Aquaculture facilities designed to produce more than 20 tons per annum require a environmental impact assessment.
Environmental Impact Assessment Regulations - Listing Notice 1	• Listing Notice 1 sets out activities that require a basic assessment before an environmental authorisation may be granted.
Environmental Impact Assessment Regulations - Listing Notice 2	• Listing Notice 2 sets out activities that require a scoping and environmental impact reporting process before an environmental authorisation may be granted.
Environmental Impact Assessment Regulations - Listing Notice 3	• Listing Notice 3 sets out activities which, in certain geographical areas, require a basic assessment before an environmental authorisation may be granted.
Threatened or Protected Species	• Refers to the regulations pertaining to threatened or protected (TOP) terrestrial species and freshwater species.

Legislation / Regulation / Policy	Description
(TOPS) Regulations (2023)	• Provides for a permit system for restricted activities involving TOPS including the registration and regulation of captive breeding facilities; rehabilitation facilities; sanctuaries; temporary holding facilities; scientific institutions; commercial exhibition facilities; nurseries; game farms and wildlife translocators.
Ordinances	
Orange Free State Nature Conservation Ordinance (8 of 1969)	• Applicable across the Free State province. • Requires permitting for importing live fish across provincial borders.
KwaZulu-Natal Nature Conservation Ordinance (15 of 1974)	• Applicable across the KwaZulu-Natal province. • Requires permitting for importing live fish across provincial borders.
Cape Nature and Environmental Conservation Ordinance (14 of 1974)	• Applicable in the Eastern, Northern and Western Cape provinces as well as parts of the North West province. • Requires permitting for the sale or purchase of specific species of fish including endangered wild fish, live carp, bluegill, sunfish, trout, black bass, banded tilapia and exotic invertebrate freshwater fauna. • Requires permitting for importing live fish across provincial borders.
Transvaal Nature Conservation Ordinance (12 of 1983)	• Appliable in Gauteng, Mpumalanga and parts of the North West province. • Requires permitting with regards to trout and the building of trout dams. • Requires permitting for importing live fish across provincial borders.
Ciskei Nature Conservation (10 of 1987)	• Applicable to certain parts of the Eastern Cape province. • Requires permitting for importing live fish across provincial borders.
Permits	
Threatened or Protected Species (TOPS) Permits	• Allows for the declaration of TOPS and the restriction of activities involving those species (including breeding, keeping, killing, importing or exporting) through a permit system. In this regard, an aquaculture project that involves any TOPS of fish or shellfish would require a permit.
Alien and Invasive Species Permit	• Allows for the protection of biodiversity from alien and invasive species by restricting importing, exporting, growing, breeding, transporting and selling of alien or invasive species. Risk assessments may be required prior to issuing an alien and invasive species permit.
Abalone Regulations in terms of the National Regulator for Compulsory Specifications (5 of 2008)	• Requires permitting for the importing of live specimens or eggs. • Includes Compulsory Specification for Live Aquacultured Abalone (2012) which applies to the harvesting, preparation, packing, conveyance and quality of live aquacultured abalone. • Also includes the Compulsory Specification for Dried Abalone (2024) which introduces mandatory compliance measures for all dried abalone products intended for export, with the primary goal of safeguarding the sustainability of South Africa's legal abalone industry.
Policy	
National Aquaculture Policy Framework (2013)	• Sets forth the policy principles, objectives and focus areas for aquaculture – namely legal and regulatory framework; environmental integrity; aquaculture research, technology development and transfer; aquaculture authorisations, aquaculture development support; transformation and broadening of participation; monitoring and enforcement of authorisations conditions.
Draft Aquaculture Development Bill (2023)	• Not yet enacted but relevant. Proposes a unified legal framework for marine and freshwater aquaculture, intergovernmental coordination structures, and integrated authorisations.
Use of Water for Aquaculture Purposes Operational Policy (2006)	• Seeks to lay the foundation and clarify the approach for DWS to regulate and facilitate the use of water and associated water related infrastructure for aquaculture within its mandate as the custodian of water resources and the National Water Act. • Sets forth the principles to be applied in DWS' authorisation procedures for the use of water in aquaculture, resource allocations and pricing, access to water related infrastructure, the establishment of institutional arrangements, internal and external coordination

Legislation / Regulation / Policy	Description
	mechanisms, implementation responsibilities, and the development of best practice around this use.

3.2.3 Strategy and Planning

Further to the above, several strategies and planning instruments have been developed to support the aquaculture sector in South Africa. These are presented in Table 3-4 below.

Table 3-4: Relevant strategies and plans for aquaculture in South Africa

Strategy / Plan	Description
Guidelines for Authorising the Use of Water for Aquaculture Purposes (2007)	• Outlines the procedures, which are to be followed in the authorisation of water use for aquaculture purposes. • Intended for use by all stakeholders in the sector, including DWS officials with the aim of simplifying the authorisation process and contributing to the lawful and sustainable water usage.
A Manual for Rural Freshwater Aquaculture (2010)	• Seeks to address several issues such as developing provincial aquaculture strategic plans, revitalising state hatcheries, training of extension officers, and the development of a manual to complement the training. • It is intended for the training of extension officers as well as providing resource material to be used in the field when extension officers are interacting with farmers.
Legal Guide for the Aquaculture Sector in South Africa (2013)	• Targets existing aquaculture enterprises, potential investors, government officials, extension officers, NGOs and new entrants to the aquaculture sector. • Seeks to assist people who are interested in pursuing aquaculture (either marine or freshwater aquaculture) as an enterprise and who need to know what the legal requirements affecting their project are.
National Aquaculture Strategic Framework (Draft) (2018)	• Details the vision of the sector, namely developing and growing a sustainable and competitive aquaculture sector that meaningfully contributes to transformation, wealth creation and employment through a diversity of production systems that produces safe, nutritious and affordable food while ensuring the environmental services required for securing its future.
Guide to authorisation requirements for aquaculture in South Africa (2022)	• Seeks to assist new entrants and existing operators, wishing to expand their operations by providing user-friendly information on permit and authorisation requirements to undertake marine and freshwater aquaculture activities. • Also provides new entrants and existing operators with relevant contact details and information sources.
Aquaculture Development and Enhancement Programme (ADEP)	• An incentive programme by the Department of Trade, Industry and Competition that is available to South African registered entities engaged in primary, secondary and ancillary aquaculture activities in both marine and freshwater classified under Standard Industrial Classification 132 (fish hatcheries and fish farms) and Standard Industrial Classification 301 and 3012 (production, processing and preserving of aquaculture fish). The grant is provided directly to approved applications for new, upgrading or expansion projects. • The programme aims to stimulate investment by commercially viable enterprises in the aquaculture sector as well as creating and sustaining jobs; broadening participation; increasing production and ensuring geographical spread (DTIC, n.d.).
Operation Phakisa (2014)	• Identified aquaculture as a priority growth sector and developed an implementation plan to boost investment, production, job creation and regulatory efficiency. Key actions included establishing Aquaculture Development Zones (ADZs), improving infrastructure, enhancing market access and streamlining authorisations for marine and freshwater aquaculture.

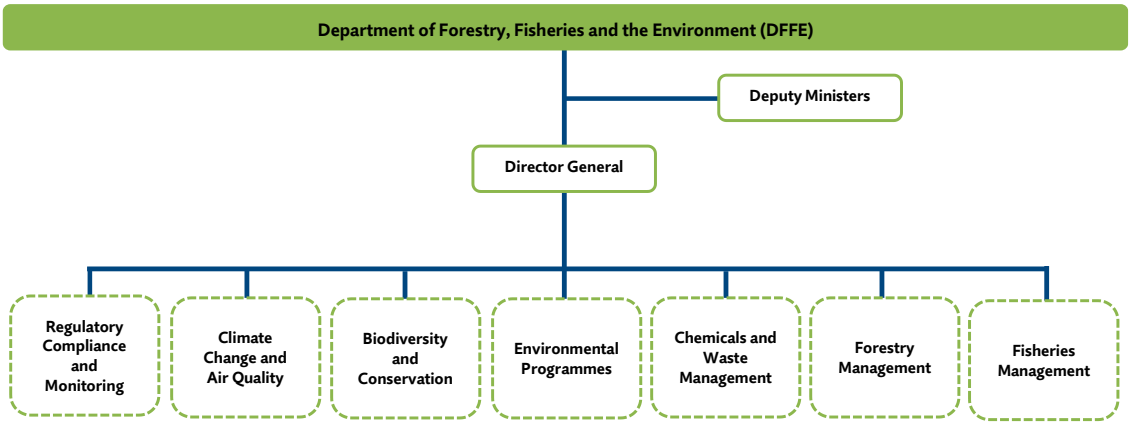
3.2.4 Institutional Arrangements

The DFFE serves as the primary custodian of aquaculture at the national level in South Africa. It is responsible for developing policies, strategic planning, promoting investment, coordinating research, and providing regulatory oversight for both marine and freshwater aquaculture. The department also oversees the Aquaculture Development and Enhancement Programme (ADEP) administered by the Department of Trade, Industry and Competition (DTIC). The South African Bureau of Standards (SABS) develops voluntary standards that guide production practices, product quality, and safety in the aquaculture sector. Complementing this, the South African Veterinary Services, operating under the Department of Agriculture(DoA), shares responsibility with DFFE for regulating aquatic animal health and ensuring biosecurity. This includes overseeing disease control measures and managing health certification processes for the import and export of aquaculture species. Provinces play a key role in the implementation of aquaculture projects and the enforcement of certain regulatory functions, particularly in relation to freshwater aquaculture. At the local level, municipalities are involved in critical support functions such as land use planning, local economic development, provision of water supply, and conducting environmental health assessments, all of which are essential for the successful operation and sustainability of aquaculture initiatives.

The National Aquaculture Strategic Framework (NASF) and the National Aquaculture Policy (approved in 2013) provide a comprehensive blueprint for sustainable aquaculture development, emphasising ecosystem health, environmental sustainability, and economic growth. These frameworks establish governance structures, including an Aquaculture Intergovernmental Forum (AIF) coordinating national and provincial government roles, and related sectoral entities like sector liaison forums and extension officers. Legal oversight includes environmental impact assessments, monitoring, and compliance enforcement. The frameworks promote integrated intergovernmental coordination to harmonise regulatory measures, streamline authorisations, and support sector growth through financial incentives like the Aquaculture Development and Enhancement Programme (ADEP). Aquaculture regulation intersects with environmental laws that address water and ecosystem health, aligning to ensure aquaculture activities are sustainable and consistent with broader water and environmental governance in South Africa.

Marine aquaculture is primarily governed by the Marine Living Resources Act (MLRA), No. 18 of 1998, which establishes the legislative framework for the conservation, sustainable utilisation, and management of marine aquaculture. The MLRA authorises the allocation of rights, permits, and licenses for aquaculture-related activities and sets the foundation for regulatory oversight (Republic of South Africa, 1998).

Expanding into freshwater aquaculture on this governance framework is the Draft Aquaculture Development Bill (2023) which proposes a holistic legal foundation for the regulation of both marine and freshwater aquaculture. The Bill promotes sustainable aquaculture development, enhances sectoral coordination, and addresses historical inequities in access to aquaculture opportunities. It aligns with the constitutional and legislative mandates of DFFE and outlines the department's roles, including licensing and permitting, compliance monitoring, and sector development initiatives (DFFE, 2023).



Source: (DFFE, 2022)

Figure 3-3: DFFE organisational structure

3.2.5 Sector Development Priorities

To promote sustainable growth of the aquaculture sector and create an enabling environment, the DFFE has identified land and sea-based sites suitable for aquaculture activities along the South African coastline. These suitable sites are referred to as Aquaculture Development Zones (ADZs), areas that have been earmarked specifically for aquaculture activities. The benefits of ADZs are to encourage investor confidence, create incentives for industry development, provide aquaculture services, manage the risks associated with aquaculture, create employment, promote skills development, empower rural communities and most importantly benefit from Special Economic Zones incentives.
The goals of the DFFE are to negotiate and obtain consent from the landowners, undertake EIA process where necessary, declare an ADZ, install the required basic infrastructure (roads, electricity, security fence, reservoir, water pump, water extraction and discharge pipeline) and establish support facilities e.g., laboratories. The establishment of several ADZs have been undertaken by the DFFE over the past few years, including the establishment of Qolora ADZ and Algoa Bay ADZ (Eastern Cape); Saldanha Bay ADZ and Mossel Bay ADZ (Western Cape); Amatikulu ADZ and Richards Bay ADZ (KwaZulu-Natal); and lastly, Vanderkloof Trout ADZ (Northern Cape).

3.2.6 Key Considerations for the NCC Methodology

Aquaculture in South Africa remains a relatively small and developing sector. While the marine subsector has grown in recent years, the freshwater component of aquaculture is particularly limited, with an estimated value of only R50–100 million per year (Aquaculture yearbook, 2022; CSIR 2019; Britz et al 2009). In the broader context of South Africa's water-dependent industries that could be charged non-consumptive water use charges, this is currently economically insignificant. This has important implications for the feasibility of implementing a non-consumptive water use charging framework in the aquaculture sector:

- **Jurisdictional considerations:** Marine aquaculture is responsible for the vast majority of SA aquaculture revenue and falls entirely under the mandate of DFFE. Marine aquaculture operations already pay a range of licensing and concession fees through this department. As such, DWS has no jurisdiction over marine aquaculture, nor is there any mechanism by which marine producers could reasonably be included in a non-consumptive freshwater use framework.

- **Location of freshwater aquaculture:** Based on current knowledge, freshwater aquaculture in South Africa is limited within DWS infrastructure. Activities are either in private land-based tank systems or, in some cases, on private dams. There are no known aquaculture operations occurring in DWS-managed reservoirs or other state-owned water schemes. Water uses identified in the NWA are regulated irrespective of whether they occur on public or private land, meaning private land use remains within the scope of the Act. However, the pricing strategy stipulates that non-consumptive water use must either be associated with DWS infrastructure or incur a cost to the DWS to justify charges. This should be taken into consideration when identifying and developing non-consumptive charges for the aquaculture sector.
- **Economic scale and administrative burden:** Given the limited size of the freshwater aquaculture sector, the potential revenue from imposing non-consumptive water use charges would be minimal. Any system for administering such charges would likely be more costly to establish and maintain than the revenue it could generate. Moreover, additional regulatory and financial burdens would run counter to current policy objectives that aim to support and grow the aquaculture industry, particularly the struggling freshwater subsector.

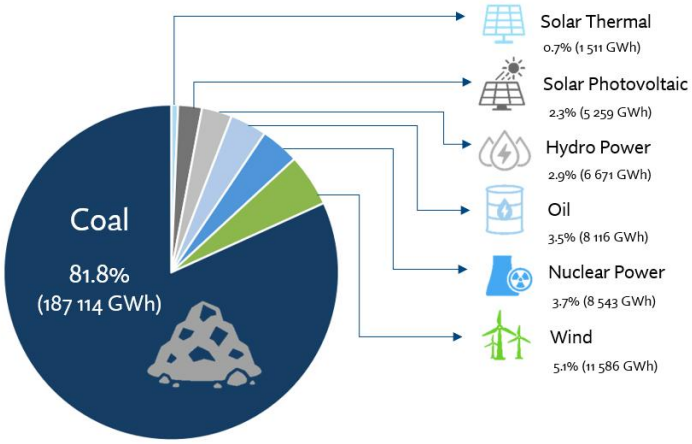
On the basis of these considerations, there is a limited case for introducing non-consumptive water use charges in relation to aquaculture. The marine sector is outside of DWS jurisdiction, and freshwater aquaculture is both too small in value and not operating within DWS-managed infrastructure. Introducing additional fees at this stage would place unnecessary strain on a sector that government is actively trying to support.

Therefore, this report will outline a framework for how non-consumptive charges could apply to aquaculture in the future. Should the freshwater industry expand, and should production begin to utilise DWS-owned infrastructure, such as major dams and reservoirs, there may be an opportunity to consider a non-consumptive use framework at that point. For now, however, the costs of implementing such a system clearly outweigh any potential benefits.

3.3 ENERGY GENERATION

3.3.1 Sector Overview

South Africa's energy sector plays a central role in the economy, contributing roughly 3 percent to South African GDP (CEIC Data and Statistics South Africa, 2024). Supply disruptions have a significant impact on other sectors and consumers due to the country's high energy intensity. Despite recent electricity challenges, South Africa's electricity network has one of the highest rates of access in sub-Saharan Africa (Ratshomo, 2021). Currently, South Africa's energy sector is working on diversifying the energy mix, enhancing energy security and mitigating environmental impacts. Coal has traditionally dominated the energy supply sector, and more than 80 percent of the country's primary energy needs are provided by coal (International Trade Administration, 2024). The country has taken policy initiatives aimed at incorporating renewable energy sources, such as wind, solar and hydroelectric power, into its energy mix. The transition aligns with global trends emphasising clean and sustainable energy solutions to address climate change concerns (Manyane, 2023). **Figure 3-4** below indicates South Africa's energy sector generation capacity by source.

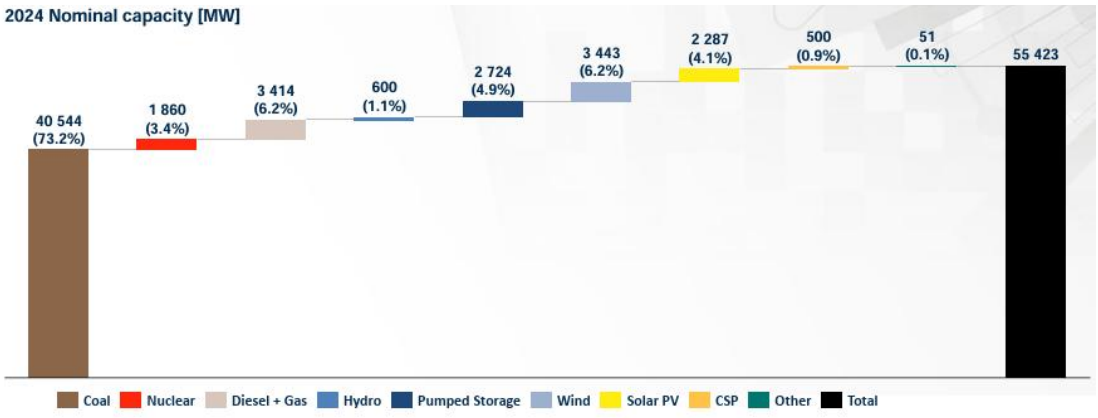


Source: (Intelpoint, 2023)

Figure 3-4: South Africa's electricity generation capacity by source

Energy generation in South Africa has for many years been dominated by the power plants of Eskom, the government-owned national electric utility. While in recent years there has been some private sector investment in renewable energy resulting from government-sponsored procurement programs, Eskom continues to account for the major share of generation. South Africa uses Integrated Resource Plans as a key input to the expansion of its electric power system, with the most recent such plan being a draft released earlier this year.

South Africa has an installed electricity generating capacity of over 60,000 MW. The generating fleet is diversified with coal, hydro, nuclear, diesel, wind, solar PV, and concentrated solar power (CSP). The capacity of each type of generation is shown in Figure 3-5. The country has historically been heavily reliant on coal-fired generation owned by Eskom but has made strides over the last decade to add significant solar and wind power (CSIR, 2024).



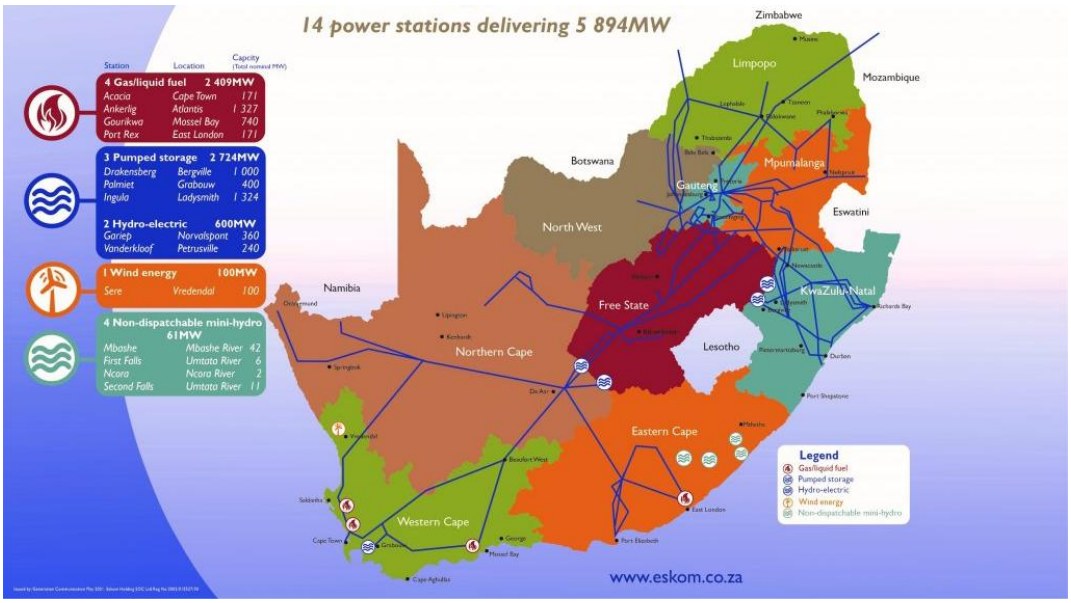
Source: (CSIR, 2024)

Figure 3-5: South Africa Electricity Generation Nominal Capacity 2024 (MW)

As shown in **Figure 3-5**, conventional hydro power accounts for only 1% of the generating capacity. However, Pumped Storage Hydro (PSH) accounts for almost 5% of installed capacity. Solar and wind power together account for 11% of the installed capacity (CSIR, 2024).

Eskom operates 14 peaking power stations in South Africa, as depicted in **Figure 3-6**, in order to meet fluctuations in electricity demand and supplement generation from base-load stations, primarily coal and nuclear. These peaking power

stations include hydroelectric, pumped-storage, gas and wind turbine facilities. Peaking generation refers to stations that operate during periods of high demand or when the system is constrained, meaning demand exceeds the capacity of base-load stations. Peak load refers to the additional demand placed on the system beyond normal base-load requirements. In South Africa, peak demand typically occurs in the early mornings and evenings between 05:00 and 21:00. Morning peaks result from combined industrial and domestic consumption, while evening peaks are mainly domestic. Seasonal variations also influence demand (Eskom, 2025).



Source: (Eskom, 2025)

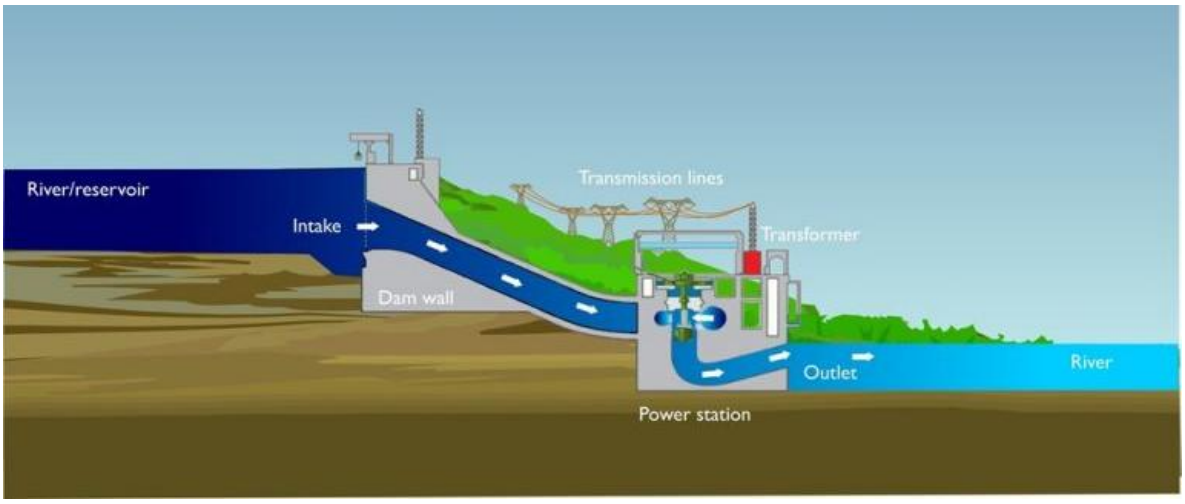
Figure 3-6: Eskom peaking power stations by region

Hydropower, also known as hydroelectric power, is a renewable energy source that generates electricity by using a dam or diversion structure to modify the natural flow of a river or other water body. This process relies on the continuous water cycle, which replenishes water without reducing or eliminating it during generation. Hydropower facilities harness the kinetic energy of flowing water as the water moves downstream. Turbines and generators convert this energy into electricity, which is then supplied to the electrical grid (U.S. Department of Energy, 2023).

Eskom operates two hydropower stations and four non-dispatchable mini-hydropower stations. The Gariep and Vanderkloof Hydroelectric Power Stations are located near the Gariep and Vanderkloof Dams on the borders of the Eastern Cape, Free State, and Northern Cape. These stations supply electricity to the national grid during peak and emergency demand periods and provide base-load power when excess water poses a flood risk (Eskom, 2025).

The Gariep and Vanderkloof Dams are managed by DWS, and are the largest and second-largest reservoirs in South Africa. Vanderkloof is situated 130 km downstream of Gariep. Both form key components of the Orange River Water Scheme. The cooperation agreement between Eskom and DWS ensures integrated management of water resources for irrigation, urban

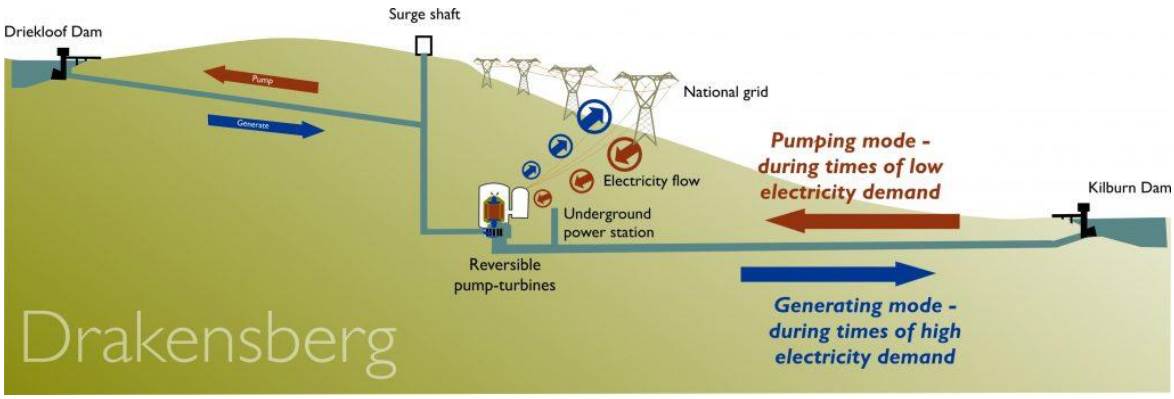
supply, recreation, and power generation (Eskom, 2025). The process of hydropower generation at these dams is depicted in **Figure 3-7**, below.



Source: (Eskom, 2025)

Figure 3-7: Eskom's hydropower generation process

Pumped storage hydropower is a type of hydroelectric energy storage that consists of a configuration of two water reservoirs at different elevations which generate electricity from the movement of water from one to the other by passing through turbines (U.S. Department of Energy, 2023). Eskom operates three pumped storage schemes; Drakensberg, Ingula, and Palmiet. The Drakensberg Pumped Storage Scheme was commissioned in 1982 and is located in the northern Drakensberg of KwaZulu-Natal. It forms part of a joint undertaking between DWS and Eskom. Most of the station infrastructure is located underground with four reversible pump turbines installed 156m below the ground level. The station contributes approximately 1 000 MW electricity to the national grid during peaking periods. (Eskom, 2025). The process of energy generation used at the Drakensberg Pumped Storage station is indicated in **Figure 3-8** below.

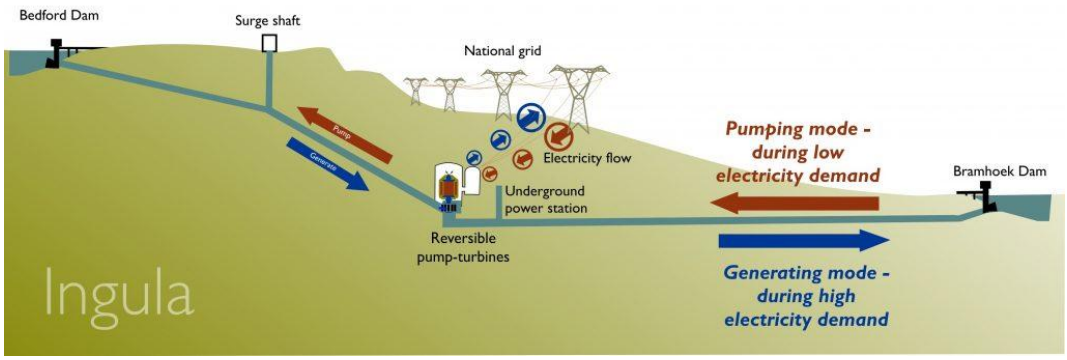


Source: (Eskom, 2025)

Figure 3-8: Eskom's Drakensberg Pumped Storage Scheme electricity generation process

Eskom's Ingula Pumped Storage Scheme is located at the border of the Free State and KwaZulu Natal and has a generating capacity of 1 332 MW. It consists of two dams, each with a capacity of approximately 22 million cubic metres of water, located

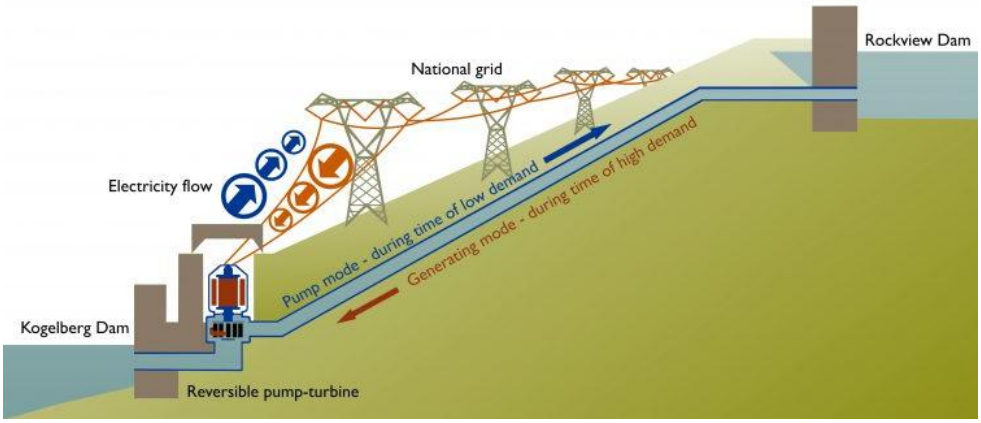
4.6 km apart and linked by underground waterways through a subterranean powerhouse housing four 333 MW pump turbine generators. During peak demand, water flows from the upper to the lower dam to generate electricity, while in low-demand periods, water is pumped back to the upper dam. Eskom manages the surrounding area, spanning parts of the Free State and KwaZulu-Natal, as a conservation zone that supports biodiversity and serves as a critical water source for the Highveld (Eskom, 2025). The process of energy generation used at the Ingula Pumped Storage station is indicated in **Figure 3-9** below.



Source: (Eskom, 2025)

Figure 3-9: Eskom's Ingula Pumped Storage Scheme electricity generation process

Commissioned in 1988, Eskom's Palmiet Pumped Storage Scheme (Figure 3-10) is located near Cape Town and is a joint venture of DWS and Eskom. Water is released from the upper Rockview Dam to the two reversible pump turbines located 60 metres below the ground and up to 180 tons of water a second pass through the main waterway to the two turbines. The infrastructure is also used to pump additional water from the Palmiet River via the Rockview Dam to the Steenbras Dam to supplement the Cape Town water supply. Operated by remote control from Eskom's National Control Centre at Simmerpan, Germiston, Gauteng, the power station can respond rapidly to any changes in demand for electricity and supply power to the grid. The station is located in a conservation area, which was declared a Biosphere Reserve by UNESCO in December 1998 (Eskom, 2025).



Source: (Eskom, 2025)

Figure 3-10: Eskom's Palmiet Pumped Storage Scheme electricity generation process

In addition to these stations Eskom also operates four mini-hydropower stations situated in the Transkei and Ciskei. Although primarily designed as peaking stations, these facilities can operate as base loads when water availability permits. As non-dispatchable plants, they generate electricity continuously but cannot be adjusted to meet fluctuating demand. These stations include First Falls and Second Falls (located downstream from First Falls) on the Umtata River, which were commissioned in 1979, with flows supplemented by Umtata Dam during dry periods as well as Mbashe (commissioned in 1985) on the Mbashe River, which relies on releases from Ncora Dam, and also hosts the small Ncora station (commissioned in 1983). All of these stations employ run-of-river designs (Eskom, 2025).

Floating solar PV systems consist of solar modules mounted on anchored structures that rest on water surfaces. This design offers significant advantages, including reducing evaporation from water bodies, optimising space by avoiding the use of arable land, and potentially improving panel efficiency due to the cooling effect of the water. Such systems provide for sustainable energy generation where land availability is limited, or water conservation is a priority (Wendyl, 2021).

Floating solar generation is still a very small and emerging sector in South Africa, with installations mostly on private farms such as the Boplaas Marlenique farm located near Franschhoek. The Boplaas Marlenique floating solar farm, established in March 2019 was the first of its kind in South Africa (Boplaas, 2019). Since this development, a few other floating solar operations were established, notably including the Kraaifontein floating solar plant (installed in 2021), which is a collaborative project between the City of Cape Town, WRC, Floating Solar (Pty) Ltd and UCT that produces electricity at pilot scale (Wendyl, 2021).

3.3.2 Legal and Policy

South Africa's energy policy and law are anchored by five core objectives, that is:

1. Increasing access to affordable energy services,
2. Improving energy governance,
3. Stimulating economic development,
4. Managing energy-related environmental and health impacts,

5. Securing supply through diversity.

These foundational pillars are presented in the 1998 White Paper on the Energy Policy of the Republic of South Africa (Department of Minerals and Energy, 1998). The White Paper established the principles of integrated resources planning, market processes, equitable access, and environmental considerations, which provide a robust foundation for subsequent legal reforms.

Supporting the objectives of the White Paper is a suite of interrelated legal frameworks developed over time. The National Energy Act (Act No. 34 of 2008) provides the overarching framework for ensuring security of energy supply, promoting sustainable energy development, and guiding the formulation of the Integrated Energy Plan (IEP). Complementing this, the Electricity Regulation Act (Act No. 4 of 2006), later amended through the Electricity Regulation Amendment Bill (2023), establishes a comprehensive regulatory regime governing the generation, transmission, distribution, and trading of electricity. Further legal frameworks are provided by the Municipal Structures Act (Act No. 117 of 1998), which clarifies the responsibilities of municipalities in electricity reticulation and service delivery, thereby aligning local governance with national energy objectives. In addition to these, several complementary frameworks support the governance of the energy sector in South Africa, including the Gas Act (Act No. 48 of 2001) and the Petroleum Products Act (Act No. 120 of 1977), which support energy diversification, environmental management and market regulation.

The core mandates and/or objectives of these legal frameworks are summarized in **Table 3-5**.

Table 3-5: Relevant national legislation and policies for Energy Generation in South Africa

Legislation / Policy / Regulation	Description
White Paper on Energy Policy (1998)	• The policy sets out the framework for the restructuring of the energy sector to promote efficiency, equitable access, and sustainability. It emphasizes diversification of energy sources, the introduction of renewable energy technologies, and the establishment of transparent regulatory mechanisms.
National Energy Efficiency and Conservation Policy (Draft) (2022)	The primary objective of the Draft National Energy Efficiency and Conservation Policy is to enhance the country's energy productivity by reducing energy intensity through efficiency measures, conservation practices, and enabling frameworks. The policy seeks to: • Achieve a significant reduction in final energy consumption relative to business-as-usual by 2030, contributing to national climate change mitigation goals. • Promote energy efficiency as a key pillar of sustainable development, balancing economic growth, social welfare, and environmental stewardship. • Foster a culture of energy conservation among consumers, industry, government, and civil society. • Support integrated energy planning by embedding efficiency and conservation targets within sectoral strategies, infrastructure planning, and development policies.
White Paper on Renewable Energy (2003)	The White Paper's goal is to promote renewable energy to contribute significantly to national energy security, climate change mitigation, rural development, and economic growth. Key objectives include: • Ensuring that renewable energy contributes a targeted share to final energy consumption. • Supporting power generation from biomass, wind, solar, and small-scale hydropower, as well as renewable-powered non-electric technologies such as solar water heaters and biofuels.

Legislation / Policy / Regulation	Description
	• Fostering an enabling environment for the development, demonstration, and commercial deployment of renewable technologies. • Supporting rural communities by providing affordable, decentralized renewable energy solutions.
Electricity Regulation Act 4 of 2006	• Facilitating a transparent, competitive, cost-effective, and equitable electricity supply industry. • Providing a licensing system that covers all electricity activities, ensuring that entities meet technical, safety, environmental, and financial requirements. • Promoting private sector participation in generation and other segments of the electricity value chain. • Ensuring access to the national grid on fair and regulated terms. • Mandating compliance with health, safety, environmental, and energy efficiency standards. • Empowering NERSA to regulate tariffs and pricing structures to balance consumer affordability with sustainable investment returns.
National Energy Act 34 of 2008	Establishes legal framework for sustainable energy planning, use, diversification, and regulation by DoE. Its key objectives include: • Promoting energy resource diversity, encompassing renewable energy, fossil fuels, and alternative carriers to ensure sustainable supply security. • Advancing coordinated energy planning through the Integrated Energy Plan (IEP). • Supporting the increase of energy generation, consumption of renewable energies, facilitating a transition towards a low-carbon economy. • Ensuring the acquisition and maintenance of strategic energy feedstocks and carriers to buffer against supply disruptions. • Mandating adequate investment in and maintenance of energy infrastructure to enable reliable access. • Requiring data collection and information dissemination in the sector.
Petroleum Products Act (Act No. 120 of 1977)	• Ensure the saving of petroleum products and promote an economy in the cost of their distribution. • Maintain price controls to protect both consumers and market stability. • Regulate the sale and supply of petroleum products, including petrol, diesel, and lubricants. • Oversee and control services related to motor vehicles, such as repair, maintenance, and dispensing services. • Empower the Minister of Minerals and Energy to regulate various aspects of petroleum product markets, including the establishment and operation of retail outlets.
Gas Act (Act No. 48 of 2001)	• Promote the orderly and coordinated development of the piped gas industry. • Establish a national Gas Regulator tasked with licensing, monitoring, and enforcement functions. • Facilitate transparent and non-discriminatory access to gas transmission and distribution infrastructure. • Encourage investment and private sector participation to expand gas infrastructure and supply. • Promote economic transformation including ownership by historically disadvantaged South Africans. • Protect consumer interests through regulation of tariffs, safety, and service standards.
Nuclear Energy Act (Act No. 46 of 1999)	It establishes the South African Nuclear Energy Corporation (NECSA) as a public company owned by the state. NECSA's mandate includes: • Conducting and promoting R&D related to nuclear energy, radiation science, and related technologies. • Managing radioactive waste and irradiated nuclear fuel. • Develop nuclear technology applications across energy, medicine, and industry sectors.

Legislation / Policy / Regulation	Description
Carbon Tax Act (Act 15 of 2019)	The act is based on Polluter pays principle; supports climate resilience and sustainable development. Its objective is to impose tax on CO_2 equivalent emissions to reduce GHG emissions and promote low-carbon growth. The initial rate is proposed per ton CO_2 equivalent, and phased adjustments linked to inflation and policy updates. Implementation of Phase 1 (2019-2022) was with allowances and exemptions, while Phase 2 (from 2026) will include all sectors.
Electricity Regulation Amendment Act 38 of 2024	• Set out to update and redefine key concepts and definitions to reflect evolving sector realities. • Streamline the processes for considering, issuing, revoking, and deregistering licenses related to electricity generation, transmission, distribution, import/export, electricity trading, and market/system operation. • Introduce provisions for additional electricity generation capacity and infrastructure development to ensure reliable supply. • Establish the Transmission System Operator SOC Ltd with clear duties, powers, and transitional measures. • Facilitate the creation of an open market platform operated by a Market Operator to enable competitive electricity trading. • Assign responsibilities of the Transmission System Operator SOC Ltd to the National Transmission Company South Africa SOC Ltd to centralize grid management. • Introduce mechanisms for delegation, assignment, offences, and penalties strengthening regulatory enforcement.
Municipal Systems Act (Act No. 32 of 2000)	• Defines the legal nature of municipalities as inclusive of both government structures and their local communities in partnership. • Enable municipalities to progressively advance the social and economic well-being of their communities. • Provide a framework for the manner in which municipal powers and functions are exercised. • Promote community participation and the development of a culture of democratic governance at the local level. • Establish core processes such as integrated development planning, performance management, resource mobilization, and organizational change that underpin developmental local government. • Support equitable service delivery with specific provisions empowering the poor through tariffs, credit control policies, and service delivery agreements. • Provide institutional frameworks for local public administration and human resource management. • Facilitate cooperative governance across national, provincial, and local spheres to promote
National Development Plan (NDP) 2030 – Energy Chapter	• Provides strategic policy direction for energy sector transformation. It sets out the goal of achieving an energy sector that is reliable, efficient, competitive, and environmentally sustainable by 2030

3.3.3 Strategy and Planning

Furthermore, several strategies and planning instruments have been developed to support the energy generation sector in South Africa. The most relevant are presented in **Table 3-6**.

Table 3-6: Relevant strategies and plans for energy generation in South Africa

Strategy / Plan	Description
National Energy Efficiency Strategy (2019)	• The strategy builds upon the White Paper on Energy Policy (1998) and focuses on how to further promote energy efficiency improvements through financial incentives and enabling measures.
Just Energy Transition Investment Plan (JET IP) (2022)	• Outlines South Africa's plan to tackle climate change for the period 2023-2027. • The vision and objectives are to establish an ambitious long-term partnership to support South Africa's pathway to low emissions and climate resilient development, to accelerate the just transition and the decarbonisation of the electricity system, and to develop new economic opportunities to support South Africa's shift towards a low carbon future.

3.3.4 Institutional Arrangements

The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) provides the foundational legal framework for energy governance. It allocates institutional responsibilities for energy sector governance between the national and provincial governments under Schedules 4 and 5, where energy regulation, electricity, and gas reticulation are concurrent functions (Government of the Republic of South Africa, 1996).

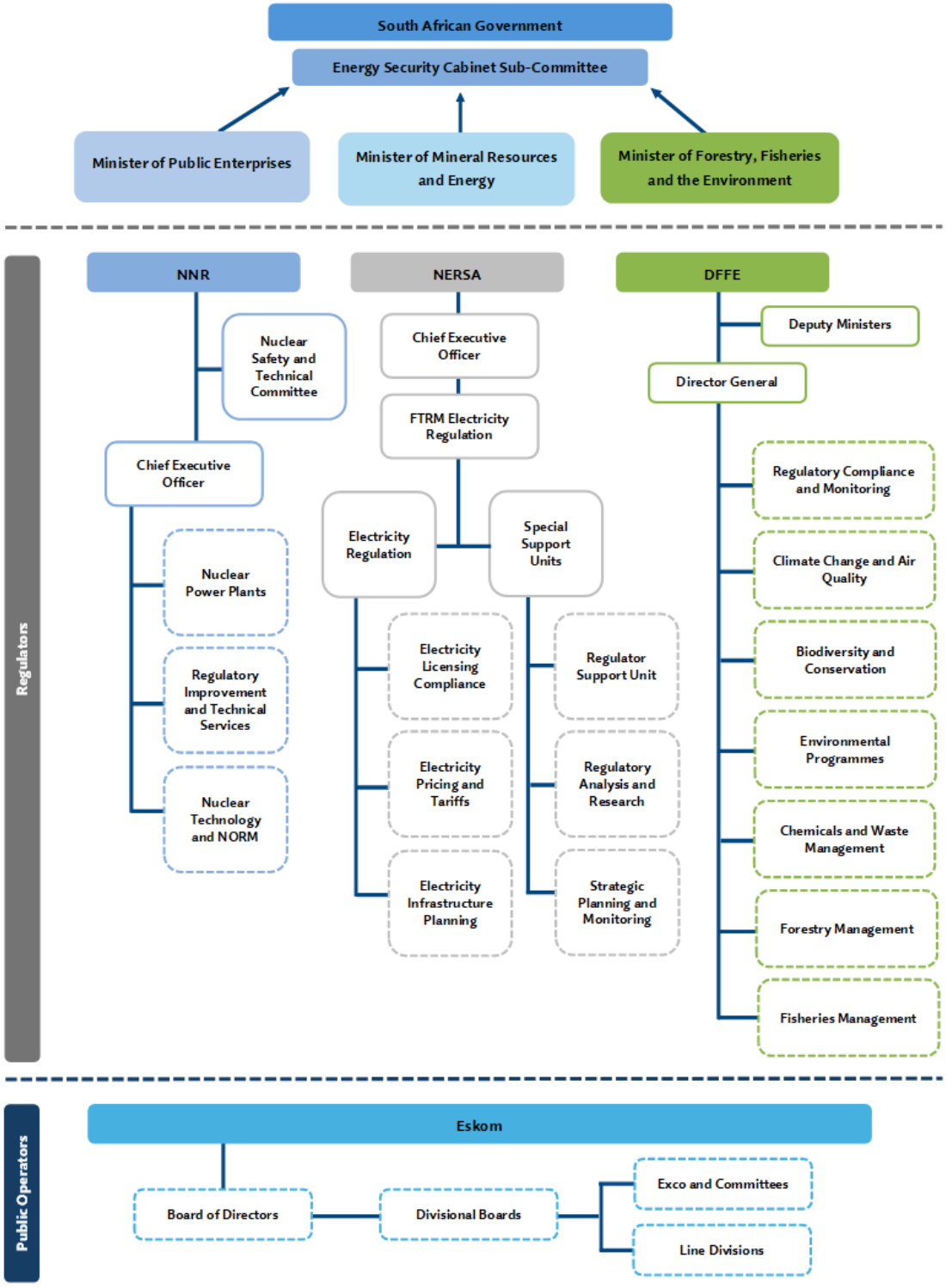
The Department of Electricity and Energy (DEE) is the lead national authority responsible for legal frameworks formulation and oversight, while state-owned enterprises and regulatory bodies, such as the National Energy Regulator of South Africa (NERSA), the Central Energy Fund (CEF), and Eskom operationalize and enforce specific mandates across the energy value chain (DMRE, 2023), (Republic of South Africa, 2025).

There is cooperation among national departments (DEE and DWS), CMAs, local governments in managing water resources infrastructure, and the NERSA, which licenses and regulates electricity generation, including hydropower and floating solar panels projects. This collaborative governance ensures legal compliance, environmental protection, and optimization of South Africa's energy resources toward sustainability and increased private sector participation.

The DWS and CMAs regulate water use for hydropower under the National Water Act, ensuring sustainable resource management, while NERSA licenses and regulates electricity generation, transmission tariffs, and facilitates competitive markets per the Electricity Regulation Act and its 2024 amendment. Local authorities manage water infrastructure, facilitate community engagement, enforce relevant by-laws, and implement small-scale hydropower and distributed energy projects aligned with their constitutional mandates. The Transmission System Operator (TSO), established under the 2024 Amendment Act, manages grid operations to ensure fair market access for all power producers. The TSO currently operates under the National Transmission Company South Africa (NTCSA). National Treasury works with DEE and DWS on the financing frameworks for major renewable energy programmes, such as the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), and on interventions to support infrastructure investment in alignment with national development objectives (Department of Energy, 2020), (DMRE, 2020).

Eskom Holdings SOC Ltd is the primary public operator in the energy sector. It is a state-owned company governed by the Companies Act 71 of 2008 and is wholly owned by the South African government, with the Minister of Electricity and Energy acting as the shareholder representative. Eskom operates across the electricity value chain, providing generation, transmission and distribution services, and participates in regional power trading within the Southern African Development

Community (SADC). Following structural reforms introduced by the seventh administration in 2024, Eskom now falls under DEE, which sets policy direction and oversees performance through instruments such as the Integrated Resource Plan (IRP), Electricity Regulation Act (ERA) and Electricity Pricing Policy (EPP). Regulatory oversight is primarily provided by the National Energy Regulator of South Africa (NERSA) for tariffs and compliance and the National Nuclear Regulator (NNR) for nuclear safety, along with additional governance by National Treasury, environmental authorities and parliamentary committees (Eskom, 2025). **Figure 3-11** presents a graphical view of the institutions governing the energy sector in South Africa.

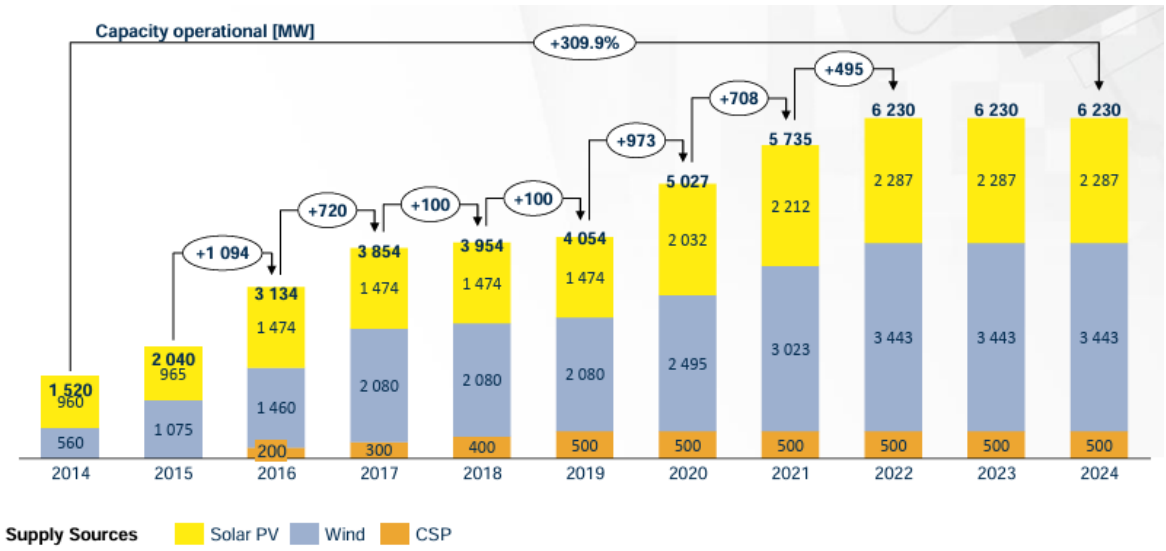


Sources: (Department of Mineral Resources and Energy, 2021), (Department of Energy, 2020)

Figure 3-11: Energy sector organisational structure in South Africa

3.3.5 Sector Development Priorities

There has been an increasing amount of variable renewable energy (VRE) in South Africa's power system owing to the government-led Renewable Energy Independent Power Producer Procurement Program (REIPPPP) since 2011, followed by large-scale battery procurement since 2021. These initiatives have fostered private sector participation. Private sector involvement is expected to increase further with ongoing electricity sector reforms, which include unbundling of Eskom into generation, transmission, and distribution and migrating from a single-buyer model to a competitive electricity market. As shown in **Figure 3-12**, from 2014 to 2024, 3 443 MW of wind, 2 287 MW of large-scale solar PV, and 500 MW of CSP became operational under the REIPPPP, which is a growth of over 300% of total renewable energy installed capacity (CSIR, 2024).



Source: (CSIR, 2024)

Figure 3-12: South Africa RE Growth Under REIPPPP in 2014-2024

South Africa aims to achieve net zero emissions by 2050 according to its Low-Emission Development Strategy formulated in 2020. The updated Nationally Defined Contributions (NDC) submitted in 2021 align with this target, committing to 31% reduction and a fixed target for greenhouse gas emissions of 398-510 Mt CO_2e by 2025 and 350-420 Mt CO_2e by 2030. Achievement of this goal will require implementation of increasingly large increments of renewable energy (DFFE, 2020).

South Africa's most recent IRP (the "2025 IRP") is currently in draft form. This draft IRP is the most up to date document and analysis related to electricity system expansion planning for the country. The IRP presents a capacity expansion plan through 2030 focusing on addressing prevailing generation capacity constraints and closing the electricity supply shortage gap. From 2031 to 2050, it presents long-term electricity pathways to guide policy choices for a secure and sustainable optimal energy mix. **Figure 3-13** below illustrates the baseline (Horizon One) capacity expansion plan through 2030. As can be seen, this plan does not include any new hydropower projects but does include significant amounts of solar PV, wind and distributed generation (much of which can be expected to be VRE) (Eskom, 2024).

	Coal	Gas – IPP Programme	Gas - Eskom	Dispatchable Capacity	Nuclear	Hydro	Pumped Storage	CSP	Solar PV	Wind	Hybrid IPP Programme	Distributed Generation[k]	BESS – IPP Programme	BESS - Eskom	Unserved Energy (TWh)
Current Base (MW)	38 800	1 005	2 825	-	1 860	1 600	2732	500	2 287	3 443	-	5 000	-	20	
2024	720							100			150	900		199	13.06
2025	720	1 220							2 115	644	476	900	513	141	7.63
2026										140		900			7.66
2027		1 000								684		900	2 000 615		4.55
2028		1 000	3 000						500			900	615		0.22
2029									500	1 500		900			0.25
2030		1 000		1 376					500	1 500		900			0.27
Additional New Capacity (MW)	**1 440**	**4 220**	**3 000**	**1 376**				**100**	**3 615**	**4 468**	**626**	**6 300**	**3 743**	**360**	

Installed Capacity
Capacity under construction
Capacity procured
New Capacity
Distributed Generation Capacity for own use
Unserved Energy, preferred as low as possible

Source: (Eskom, 2024)

Figure 3-13: South Africa Baseline Capacity Expansion Plan Through 2030

3.3.6 Key Considerations for the NCC Methodology

- South Africa has a relatively small amount of conventional hydropower, which will limit the potential application and revenue generation of the NCC.
- There is a limited number of good sites for additional hydropower stations and, consequently, the future potential for NCC is limited. In fact, no additional hydropower capacity is indicated in the IRP.
- South Africa does have a significant amount of pumped storage hydropower. This might justify a different fee schedule than that for conventional hydropower. The NCC charges could be complicated by the fact that two of the three pumped storage hydro projects operate as both generation and water supply schemes.
- To meet its target of net zero emissions by 2050, a significant amount of additional solar PV and wind power generating capacity will need to be installed in the coming years. To use land space effectively, some of this new capacity could be floating on ponds, reservoirs and other inland water bodies and could be subject to NCC charges.
- An understanding of the existing charge schemes in place and how the financial arrangements would need to be accommodated is required as a basis.

3.4 RECREATION

3.4.1 Sector Overview

Recreational water use is recognised as a formal water use in the National Water Act (NWA) and encompasses a wide range of activities such as access to water for sports, culture, and tourism, each with a considerable contribution to the country's economy **(City of Cape Town, 2019)**; **(WRC, 2020)**. Water use in this sector ranges from personal use to commercial use and involves water resources such as dams, lakes, estuaries, rivers, streams, and wetlands. Recreational water use is managed through licensing and authorisation processes by water governing authorities to ensure resource sustainable use, to support ongoing resource management, to manage access and compliance with legal and regulatory frameworks as well ensure the promotion of safety (DWS,2004).

The economic benefits from recreational water use extend across multiple industries, contributing to regional development, supporting informal and formal sectors, and enhancing livelihoods, especially in rural and peri-urban areas. The sector promotes job creation, stimulates local businesses, and generates revenue in both formal and informal economies. Tourism contributed 9.5% to South Africa's GDP in 2019, and it is projected to rise to 10.4% by 2030 **(South African Government, 2025)**; **(WRC, 2020)**. This is because recreational water activities attract tourists who spend money on accommodation, transport, food, and entertainment, particularly in areas with popular water-based activities. For example, water-based tourism hubs contribute to regional development by supporting lodges, sporting events, and local businesses heavily reliant on clean and accessible water resources. This spending sustains small and medium enterprises as well as creating a multiplier effect in local economies **(WRC, 2020)**. However, the sustainability of these businesses is closely linked to the status of water resources and particularly that of water quality. This therefore builds motivation for sustainable water management legal frameworks that protect against negative impacts on water resources for continued supply of ecological services and economic opportunities **(WRC, 2020)**.

3.4.2 Legal and Policy

In the National Water Act (Act No. 36 of 1998), water use for this sector is established as water required to meet basic human needs and to protect aquatic ecosystems. Schedule 1 of the National Water Act exempts some recreational water use activities from requiring water use authorisation, where persons have lawful access to that resource. However, a CMA can impose limits on these uses under Schedule 3 of the NWA. Water users under Schedule 1 may undertake their activities without notifying DWS. Separate from Schedule 1, General Authorisation for water use can be granted without a licence, provided it complies with specific conditions and is registered with DWS beforehand. A responsible authority may waive the need for a licence if another valid authorisation exists under different legislation. Notably, recreational water use, including activities like fishing and boating, requires authorisation per section 21(k) of the NWA and is further regulated by the Management and Use of Rivers By-law (2012) and SAMSA's Boating & Inland Waters Safety Regulations **(DWS, 2025)**.

In addition, various manuals developed by DWS, including the 2003 RWU GP4, 2006 RWU GP2, 1964 RWU RP1, and 2004 RWU OP1, address key aspects of recreational water use management. They cover the management of recreational activities by designated authorities such as CMAs, local municipalities, conservation agencies, parks, water boards, and private sector agents **(DWS, 2023)**. The regulation outlines a legal framework that governs access, utilisation, and development of water resources and surrounding state land for recreational purposes. Legal frameworks for recreational water use as presented

in ***Table 3-7*** advocate for integrated planning and management supporting sustainable water use and safeguarding of ecosystems.

Table 3-7: Relevant national legislation and policies for Recreational Water Use in South Africa

Legislation / Policy / Regulation	Description
Legislation	
National Water Act (NWA) 36 of 1998	Fundamental law recognizing recreational water use as a formal water use under Section 21(k). Sets broad water use management framework including authorisation, protection, equitable access, and sustainability. Provides the legal basis for all water uses, including recreation. Defines "water use" and empowers DWS to regulate and license water bodies used for recreation.
National Environmental Management Act (NEMA) 107 of 1998	Framework environmental legislation that applies to recreational water use to protect ecosystems, manage environmental impacts, and ensure compliance with broader environmental norms. Requires Environmental Impact Assessments for development in or near water resources. Guides protection of ecological integrity of water resources in recreational areas.
National Sport and Recreation Act 110 of 1998	Provides guidance on recreational activities including those involving water, supporting safe and equitable access.
Municipal Structures Act 117 of 1998	Enables municipalities (e.g., City of Cape Town) to enact and enforce by-laws related to recreational water use and public amenities.
Water Services Act (No. 108 of 1997)	Mandates access to basic water services, such as sanitation and safe public facilities around recreational water sites.
National Health Act (No. 61 of 2003)	Ensures safe water quality standards and monitoring, particularly for public swimming and water-contact activities.
Tourism Act (No. 3 of 2014)	Encourages the development of sustainable tourism infrastructure, including water-based recreational site developments.
Policies	
Department of Water Affairs and Forestry (DWAF) Policy for Using Water for Recreational Purposes (2002)	Outlines the responsibility of the government to regulate recreational water use, ensuring sustainability, environmental protection, equitable community involvement, authorisation, and cooperation across government spheres.
By-Laws and Regulations	
Recreational Water Use By-law, 2018 (City of Cape Town)	Local by-law regulating recreational water use within Cape Town jurisdiction, covering vessel control, safety, charging for access, prohibition of harmful activities, and establishment of Water Body Advisory Committees.
Boating & Inland Waters Safety Regulations (SAMSA)	Sets vessel safety standards, boating licenses, and operating procedures on public dams and rivers.

Legislation / Policy / Regulation	Description
Regulations relating to Access and Use of Government Waterworks for Recreational Purposes (2023 draft)	Most recent drafted regulation manual on regulating access and use of government waterworks and surrounding state-owned land for recreational purposes in terms of the National Water Act,1998. It provides guidance on requirements for written approval for all activities, managing access, and financial agreements for commercial use and events. Notably, these regulations were withdrawn by DWS in Oct 2023 and have not had any progress.
Recreational Water Use Manual - Guidelines for Resource Management Plans (RWU GP2, 2006)	Provides guidelines for compiling Resource Management Plans (RMPs) for recreational waters, emphasizing sustainability, stakeholder involvement, community beneficiation, integrated planning, legal frameworks, and institutional structures.
Recreational Water Use Manual (Operational Policy, 2004)	Clarifies NWA provisions for recreational water use, emphasizing sustainability, redress of past inequities, promotes integrated resource management (RMPs), and motivates for permits and monitoring.
Recreational Water Use Manual Institutional Arrangements (RWU GP4), 2003	Addresses institutional matters at regional government level, recommending conditions for institutional roles, cooperative governance, and stakeholder engagement for effective recreational water management. The specified institutional arrangement concerns DWS, CMAs and the involvement of other bodies (local municipality, conservation agencies, NGOs) through a specified in the concession agreements and/or appointed by the management body.
Recreational Water Use Manual - Resource Planning (RWU RP1), 1964	Foundational resource planning document outlining principles and approaches for managing recreational waters, focusing on balancing use and conservation. Serves as an early framework laying the groundwork for systematic planning and resource assessment in recreational water use, stressing the necessity of balancing demand with ecosystem preservation.

Importantly, the policy principles that underpin the DWS approach to recreational water use are informed by the NWA and the National Environmental Management Act, 1998 (Act No. 107 of 1998) and include:

- Sustainable and beneficial resource protection, use, development, conservation, planning, management and control;
- Appropriate consideration to and compliance with relevant legislation, policies and regulations;
- Provision of lawful, reasonable and procedurally fair administrative services and support;
- Government providing an enabling framework for the water-based recreational industry to flourish, through clarification of policy and development of appropriate regulatory instruments to guide development and promote co-operative governance;
- Private sector driven development, investment and operation; and

- Effective and equitable community involvement to ensure the basis for sustained growth of the related industry and developments, as well as the empowerment of previously neglected communities.

Table 3-8 outlines the suite of policy objectives in the DWS 2004 Operational Policy for Recreational Water Use.

Table 3-8: DWS recreational water use policy objectives

Key Performance Areas	Objectives
1. Integrated Resource Planning, Management and Classification	Objective 1: A planning and zonation framework for water resource planning and management is established and included in provincial and local planning frameworks. Objective 2: Resource management plans (RMPs) are compiled based on the principles underlying the recreational water use resource planning procedure. Objective 3: Based on RMPs water resources are classified, and RMPs and classification are utilised as decision support tools.
2. Safety	Objective 1: The manner, purpose and extent to which water resources are used safely are appropriately regulated, controlled and managed. Objective 2: Compliance with industry norms and standards is ensured. Objective 3: The safe use of water is promoted.
3. Authorisation	Objective 1: Appropriate authorisation of recreational water use is ensured and facilitated. Objective 2: Appropriate management of water use entitlements is ensured.
4. Equitable Access	Objective 1: The rights of communities to physically access resources for recreational purposes are protected. Objective 2: Equitable access to the water-based recreation economy for communities is ensured.
5. Communication and Capacity Building	Objective 1: Understanding of recreational water use and co-operation with and among stakeholders are ensured by changing perceptions and attitudes through the promotion of the value of recreational water use. Objective 2: Stakeholders and role-players are empowered by ensuring sufficient capacity regarding recreational water use.
6. Institutionalisation and Linkages	Objective 1: Appropriate institutions are established to manage recreational water use effectively. Objective 2: Functional linkages are established to ensure co-operative governance and effective sharing of management responsibilities regarding the sustainable management of water resources for recreational purposes.
7. Legal Framework	Objective 1: Compliance with relevant legislative requirements is ensured. Objective 2: Recreational water use is positioned as a strategic issue and DWAF as a strategic partner in the legal processes related to recreation, water use, and the use and management of associated resources, etc.
8. Monitoring, Evaluation and Information Management	Objective 1: Performance and compliance regarding recreational water use are monitored and evaluated. Objective 2: Information is managed and provided in a user friendly and effective manner to assist in decision-making regarding recreational water use.

3.4.3 Strategy and Planning

Strategies and planning for recreational water use are part of the country's integrated and sustainable resource management framework. As a leading water authority, the DWS has developed resource management plans, operational policies and regulatory manuals. These frameworks aim to harmonise environmental, social, cultural, and economic needs

while addressing the interests of recreational water activities for communities and businesses (DWS, 2003) (DWS, 2023) (DWS, 2006).

Since 1964 DWS has published various manuals to regulate access and use of government waterworks for recreational purposes (see ***Table 3-7***). The latest publication is the 2023 draft regulations under Section 116 of the National Water Act (1998) proposing updated guidelines for accessing and using government waterworks for recreational activities. The guidelines focus on safety, ecological protection, economic development, water use authorization procedures, and advocate for equitable water uses (Government of South Africa, 2025) (DWS, 2023). However, the 2023 regulations were withdrawn by DWS in Oct 2023 and have not been republished **(South African Government, 2025)**.

3.4.4 Institutional Arrangements

The 2003 RWU GP4 Recreational Water Use Manual outlines the institutional arrangements for the recreational water use sector **(DWS, 2003)**. However, it does not provide guidance on coordination between institutions. The DWS is the leading governing authority and consists of various directorates and branches. Recreational water use falls under the Infrastructure Management Branch, within which the Chief Directorate: Water Resources Infrastructure Operations and Maintenance is responsible for the operation and maintenance of national water resources infrastructure through four Operational Clusters (Northern, Eastern, Central, and Southern). Each cluster manages infrastructure within its geographic boundaries and is responsible for operations and maintenance, technical support services, corporate support services, and financial support services.

These clusters enter into Memoranda of Agreement (MoAs) with government organisations or implementing agents for the management of recreational activities on state dams and surrounding state land. Such agreements are guided by approved Resource Management Plans (RMPs), which are overseen by the Directorate: Environmental Impact Monitoring (EIM) under the Chief Directorate: Engineering Services. The EIM, in collaboration with the Operational Clusters, develops zoning maps for state dams with approved RMPs, with additional input from Land Rights Administration, Survey Services, and Dam Safety and Operations.

The issuance of authorisations for recreational water use, such as water use licenses is the responsibility of the Chief Directorate: Water Use Authorisation Management of DWS, through its regional offices or CMAs. Under the guidance of the Chief Directorate: Economic and Social Regulation, CMAs are further mandated to ensure compliance with legislation, policies, and standards, including those related to raw-water pricing and tariffs. At the local level, water service providers such as municipalities manage recreational water use within their jurisdictions, enforce local by-laws, and ensure water access. In certain cases, local authorities, conservation agencies, and non-governmental organisations may be appointed by DWS, CMAs, and/or operate under concession agreements, to manage recreational water use activities in specific water areas.

Additional DWS branches involved in recreational water use include the Branch: Water & Sanitation Services, responsible for oversight and management of water supply and sanitation infrastructure grants; the Office of the CFO, which manages financial aspects of infrastructure grants and revenue; and the Directorate: Infrastructure Risk Management, which advises on risks associated with water infrastructure development. The Sub-Directorate: Water Resource Development Central provides planning support for national water infrastructure projects, coordinating with all Operational Clusters. Notably, in 2026, the National Water Resources Infrastructure Agency (NWRIA) is set to replace certain functions currently performed

by the Trans-Caledon Tunnel Authority (TCTA), particularly in financing and implementing bulk raw water infrastructure projects. This institutional framework coordinates management, operation, and regulation of recreational water use.



Figure 3-14: Hierarchy of recreational water use management stakeholders

3.4.5 Sector Development Priorities

South Africa's sector development priorities for recreational water use are guided by integrated national strategies that emphasise sustainability, equitable access, and socio-economic advancement. The National Water Resource Strategy III (NWRS-3) emphasises the importance of protecting water resources to ensure their long-term availability for diverse uses, including recreation. It promotes improved water quality, ecological infrastructure restoration, and institutional strengthening through CMAs.

Strategic Objective 4 of chapter 5 of the NWRS-3 states the intention to use water resources infrastructure, particularly major dams, to promote multi-purpose use. This will entail undertaking feasibility studies on hydroelectric power, aquaculture and recreation development at dams and canals. While recreation is mentioned as a benefit or use, the overall strategic focus of the NWRS-3 is heavily weighted toward achieving equitable and sustainable access to water and sanitation services, socio-economic growth, and ecosystem protection. In the NWRS-3 recreational use is listed alongside basic domestic and social use and economic use as a purpose for which water and sanitation institutions should develop systems. The strategy emphasizes that water resources provide essential ecosystem services required for economic and social growth. The functioning of aquatic ecosystems, which are protected by ensuring sufficient water quantity and quality, supports recreation and tourism.

While the 2025-2030 national Tourism Five-year Strategic Plan does not place specific emphasis on water-based recreational activities, it references the global shift towards sustainability and how this is shaping tourism experiences across the globe. Thus, the importance of sustainable tourism practices aligns well with the preferences of modern travellers who are increasingly seeking eco-friendly destinations. This must be underpinned by environmental conservation, supporting local economies, and enhancing cultural tourism that builds a more sustainable and inclusive tourism sector **(DFFE, 2025)**.

Most large dams in South Africa are owned by DWS, but the responsibility for recreational use is typically delegated to local municipalities, conservation agencies, and/or private operators. **These sites are often managed through multi-agency arrangements. DWS may oversee dam safety, while entities such as Nature Conservation Agencies manage reserves, and local governments handle infrastructure and public amenities.** In certain instances, subsidiary organisations have been established to specifically manage the various recreational and other associated activities around these government works. This includes the protection of aquatic ecosystems and adjacent land towards improved pollution control, invasive alien plant management, and biodiversity conservation. Msinsi Holdings, for example, manages these on behalf of uMngeni-uThukela Water, which operates and maintains a number of large dams in KwaZulu-Natal. Various concession agreements underpin these arrangements, linked to the use of land riparian to the water resources. Regulations and permit requirements differ across sites, with some requiring fishing or boating permits and others imposing conservation or entry fees. Notably, DWS policy mandates sustainable and equitable management, control, conservation, protection, development, and recreational use of water resources and government waterworks. This is guided by integrated water Resource Management Plans (RMPs) developed with stakeholders. Without RMPs, informed decision-making is challenging, requiring a precautionary approach to access, use, and development.

RMPs focus on four key areas: resource management, utilisation management, benefit flow management and institutionalisation. Zoning Plans preceded RMPs but were traditionally applied only to State dams, focusing mainly on spatial and environmental issues, and often overlooked economic, social, and institutional aspects necessary for effective implementation. The 1999 Approved Zoning Plans include dams approved for 40 years unless reviewed, such as Bospoort Dam, Klipvoor Dam, and Roodekopjes Dam, and dams approved for 5 years, including Craigieburn Dam, Ebenezer Dam, and Tzaneen Dam **(DWS, 2025)**.

3.4.6 Key Considerations for the NCC Methodology

The legal foundation for water pricing is provided in the NWA, in terms of section 56 which outlines the requirements and steps for the development of the Raw Water Pricing Strategy. The Raw Water Pricing Strategy 2024 recognises the importance of water use charges for non-consumptive uses that result in water resources management costs, noting that these costs must be recovered. It also goes further to note that the charge applied will need to provide for:

- costs associated with issuing the required water-use authorisations;
- monitoring adherence to the conditions of the water-use authorisations; and
- a contribution to the operation and maintenance of the scheme to provide access to the water.

It is important to recognise that recreational water use falls under both section 21(k) as well as Schedule 1 of the NWA with there being uncertainty linked to the nature of activities and associated thresholds which may differentiate between what is considered a permissible use under Schedule 1 and a licenced use (section 21(k)). This will prove critical in determining when a user is liable for a water use charge.

In effect, a non-consumptive water use charge for recreation would need to cover the ability to have access to that recreational site as well as to recover the costs associated with the management and maintenance of that site in a clean, safe and environmentally sustainable state. This would be underpinned by ongoing monitoring to assess current resource status as well as to guide ongoing operations and maintenance to ensure the resource adheres to standards as well as any regulatory requirements, including Resource Quality Objectives.

Where recreational activities take place on government-owned infrastructure, particularly large dams, these are often linked to concessionary arrangements. Noting that section 56 2(b) and 111 of the NWA provide for the recovery of costs related to the acquisition, construction, alteration, repair, operations and control of government waterworks, the Pricing Strategy considers the full lifecycle of the infrastructure and makes provision for the recovery of costs associated with the operations and maintenance (O&M), amongst others. The various components of the water resources infrastructure charge will be based on annually updated capital and operational expenditure plans of institutions managing water resources infrastructure. This will then take into consideration the funding that is received from the fiscus as well other contributions, and will then result in a differentiated tariff for the water use categories, and costs will be developed and be recovered on a scheme-specific basis **(DWS, 2024)**. As such, it is perceived that concessionaires operating recreational activities at these waterworks could be charged to support operations and maintenance. However, this will require an assessment of the impact of these recreational activities on the resource and thus the ongoing need to maintain the resource.

Where recreational activities take place on publicly accessible resources, such as rivers and estuaries, the readily available mechanisms within the Pricing Strategy are limited. The Water Resource Management Charge is aimed at supporting broader water resource management, and covers:

- Catchment management strategy and water resources planning;
- Resource directed measures;
- Water use authorisation;
- Compliance monitoring and enforcement;
- Disaster management / pollution control and emergency incidents;
- Water related institutional development;
- River health, maintenance and restoration of ecosystems to improve water resources;
- Geo-hydrology and hydrology; and
- Administration and overheads.

The scale of these recreational activities, the costs associated with the impacts that these activities may have on the resource and the requirements to monitor these impacts would possibly require an assessment and non-consumptive water use charge to be developed on a case by case basis. In this instance, it could be more pragmatic to update the functions and activities under the Water Resource Management Charge to include these non-consumptive uses. This could result in adjusted water use tariffs negotiated for municipalities that have such recreational activities within their areas of jurisdiction, and these municipalities could then recoup these costs through the pricing instruments available to them.

3.5 FINANCING PRINCIPLES AND INSTRUMENTS

Climate change, pollution, and biodiversity loss place pressure on the water system, which can negatively affect water resources and service provision. These pressures can significantly impact human health, natural resources, the environment, ecosystems, economic growth, and can produce various financial risks (OECD, 2022). The structuring of basic financing principles is therefore crucial for ensuring sustainable water resource management. These principles are used as guidance during the development and implementation of pricing policies in order to encourage efficient water use, environmental

protection, and social equity (OECD, 2016). When applied, these principles provide measures for the sustainable financing of water resource management, services, infrastructure, and the protection of water ecosystems and biodiversity, which is achieved through the generation of adequate revenues (OECD, 2012).

3.5.1 The Four Financing Principles

Four standard principles for financing water resources and infrastructure are recommended by the OECD. These principles can be used by governments as a framework to ensure the efficient management of water resources. These four principles are illustrated in **Figure 3-15** below.

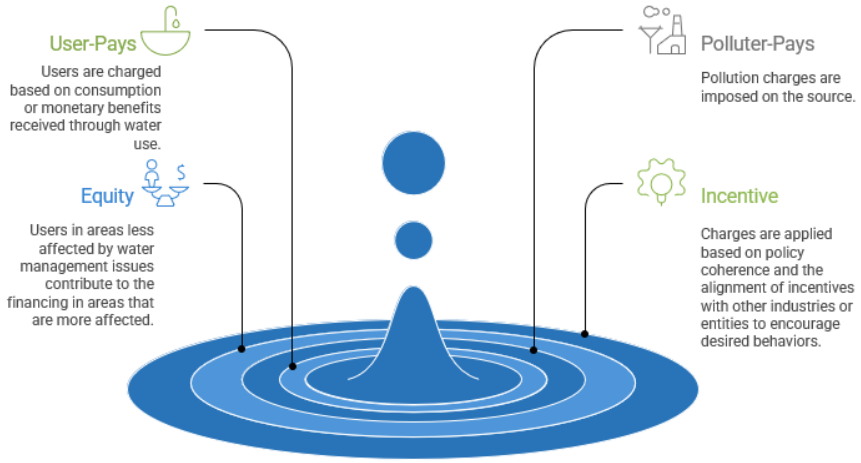


Figure 3-15: Standard water financing principles

Other principles for financing water resources and infrastructure exist, which often overlap with the above-mentioned OECD principles (Vidaurre, et al., 2017).

3.5.2 Financing Principles in the South African Context

The Pricing Strategy aims to increase transparency in how water is priced in South Africa. The strategy is informed by the National Water Act and recognises the development context of South Africa's water sector. The strategy addresses issues regarding the transparent recovery of shortfalls, where, due to social equity, environmental or affordability constraints, water management cannot be fully financed by water users in a sustainable manner (DWS, 2024). The principles adopted in the Pricing Strategy overlap with the OECD financing principles described above and expand on them **(Table 3-9)**.

Table 3-9: Pricing Principles Adopted in the Pricing Strategy

Pricing Strategy	Description	Alignment with OECD principles
Full cost recovery	• Aims to ensure that the full costs of management, use, conservation and development of water resources, including the associated administrative and institutional costs, are recovered from users. • Non-payment of water use charges will attract interest as per Section 80 of the PFMA. • Further, S59(3)(b) of the NWA allows the Department to restrict or suspend the flow of water to defaulting water users.	User-pays

Pricing Strategy	Description	Alignment with OECD principles
	• Users that default are given a chance to appeal, within a reasonable timeframe, on any proposed restriction or suspension before they are imposed on their water use license.	
Polluter-pays	• The cost of treating water discharge and pollution must be claimed from users who do not adhere to the Resource Quality Objectives or Resource Water Quality Objectives. • The waste discharge charge system provides the basis of measurement for the application of this principle.	Polluter-pays
Ecological sustainability	• The strategy serves to enable funding to ensure the allocation of water for the ecological reserve and to ensure the continued maintenance of water ecosystems by the water sector. • The Minister must in terms of the NWA S56(6)(a) of the NWA consider the class and resource quality objectives for different water resources. • In terms of Chapter 3 of the NWA, the water requirements for the functional operation of aquatic ecosystems must be preserved. This acknowledges the indivisibility of water as a natural resource, the role of ecosystems as the base from which the resource is derived, and the importance of healthy ecosystems in sustainable water use. • In terms of Section 56(2)(a)(iv) of the NWA, as part of the water resources management charge the management activities necessary to provide adequate water for the ecological reserve and continued maintenance of water ecosystems by the water sector must be paid for by all registered and billable users.	Polluter-pays

Differentiated charges	• The strategy allows for differential charges to elected water use categories to support the achievement of key national socio-economic and economic development objectives, such as food security, job creation, equity and inclusion.
	• S56(3) and 57 (1) of the NWA allows for the pricing strategy to differentiate on an equitable basis between different types of geographic areas, socio-economic attributes, categories of water use, and water users.
	• The pricing strategy provides for the following categories of water use:
	  ○ Abstraction
	  ○ Waste discharge
	  ○ Non-consumptive
	• This pricing strategy provides for the following categories of water users:
	  ○ Agriculture
	  ○ Municipalities
	  ○ Industry and mining
	  ○ Strategic
	  ○ Stream flow reduction activities
	  ○ Non-consumptive
		Equity

Accountability and governance	• Water management institutions are required to ensure the transparent management of funds. • Water management institutions are required to ensure the affordability of charges through providing water resource services and conducting development in a cost effective and efficient manner.	Other
Equity and affordability	• The strategy ensures the allocation of water resources according to the needs of users and the affordable access to water for the poor, as well as marginalised and historically disadvantaged communities.	Equity

Source: (DWS, 2024)

3.5.3 Financial Instruments

In the context of defining financing and pricing mechanisms for water resources, a distinction between financial instruments and economic instruments is necessary. Financial instruments consist of approaches for raising the financial resources and revenues required in delivering functions. On the other hand, economic instruments are designed as incentives to influence individual behaviours towards collective goals and do not have revenue functions. However, financial instruments that generate incentives for water users are also regarded as economic instruments. Financial instruments that overlap with economic instruments increase the water system's overall resilience. When considering pricing mechanisms in this section, focus is placed on financial instruments; it is noted that these financial instruments can act simultaneously as economic instruments (Vidaurre, et al., 2017).

The most common approach for classifying pricing mechanisms is the 3T's method proposed by the OECD. This method defines the sources of finance as tariffs, taxes, or transfers, as depicted in **Figure 3-16**.

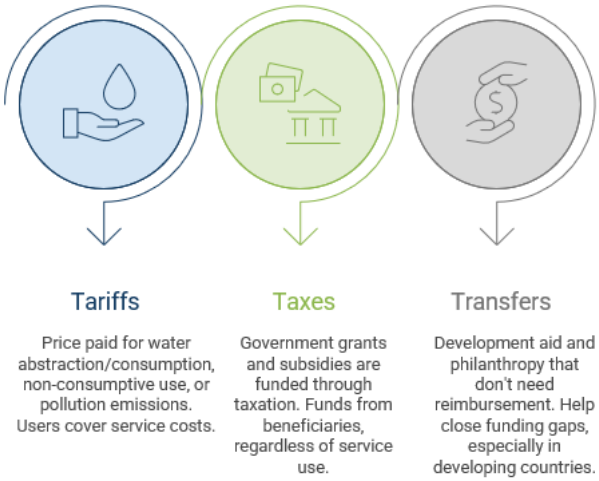


Figure 3-16: The 3T's method for classifying pricing mechanisms

Tariffs include charges, fees, user payments and beneficiary payments and refer to the amounts paid for the abstraction, consumption, non-consumptive use, or pollution of water resources by different users. This mechanism implies that users and beneficiaries fully cover water resource management costs. On the other hand, taxes are used synonymously with government budgets and are used to fund government grants and subsidies. Taxes are usually collected from beneficiaries of water services, regardless of their use of those services. Transfers include aid and grants from donor agencies, such as development aid and philanthropic donations from local or international organisations, which are not required to be reimbursed. Transfers can assist in closing funding gaps and are often considered key components in water resource management for developing countries. Other financing sources exist beyond the 3T's, such as public loans, private loans, bonds, and funding from public and private investors; however, these require reimbursement. While these alternative financing sources may assist in bridging funding gaps, the resources required to close funding gaps are mostly derived from the 3T's (Vidaurre, et al., 2017).

3.6 INTERNATIONAL ASSESSMENT OF NON-CONSUMPTIVE WATER USE FINANCIAL INSTRUMENTS

There are numerous international examples of the application of non-consumptive water use and sector related tariffs, charges, fees, licenses, permits, taxes, transfers, voluntary agreements and payments, and trade of permits and rights.

Specific to recreation, there are various approaches utilised internationally to both authorise and charge for recreational water use. The approaches are fundamentally linked to the broader governmental arrangements and the legal premises upon which water and environmental resources are managed. A number of examples are outlined below.

- **United States of America:** Having a federal form of government, the states develop fit-for-purpose instruments to recoup the costs for managing resources. At a national scale, the Federal Lands Recreation Enhancement Act permits five different government agencies to collect fees for recreational use, often linked to land management and national parks, but inclusive of water bodies. Fees are retained by these agencies for ongoing management and betterment. Generally, the principle of cost-sharing is used, rather than cost-recovery, translating to in the order of 20-40% of costs being recovered.

- **European Union:** While the EU Water Framework Directive indicates that Member States should recoup costs associated with the provision of water services, it is explicit in excluding non-consumptive water uses from these cost recovery methods. The approach is rather one of partial cost recovery, but also to use these charges as a way of preventing overuse of the resource.

- **Kenya:** The 2016 Water Act makes provision for the application of charges for water use as well as water services, including recreational activities. Generally, the approach is one of supporting resource management through contributions, not full-cost recovery. Due to the changes in the Constitution in 2010, the County Governments have been provided with powers and duties linked to water resource management and the provision of services and as such they often levy associated service fees, recreational permit fees and fees linked to tourism licenses.

3.6.1 International Financial Instruments

Pricing mechanisms often differ between countries and depend largely on the regulations and technological capacity of each country. **Table 3-10** provides some examples of non-consumptive water use pricing mechanisms and financial instruments applied internationally.

Table 3-10: Examples of International Non-Consumptive Water Use Pricing Mechanisms and Financial Instruments

Financial Instrument	Countries/ Regions
Tariffs, charges and fees	
Abstraction charges	Georgia, United Kingdom, Czech Republic, Mexico
Abstraction charges for thermal power stations	Georgia
Abstraction charges for hydropower	Georgia, Czech Republic

Financial Instrument	Countries/ Regions
Abstraction charges for surface water	Georgia
Hydropower tariffs and charges	Brazil, Armenia, Ukraine, Kazakhstan, Cameroon
Surface water levies	Czech Republic
Water system charges for buildings and land	Netherlands, Scotland
Impoundment charges	United Kingdom
Effluent charges	Scotland, Netherlands
Licenses and permits	
Hydropower licenses	Sweden, Scotland
Hydropower royalties	Sweden, Tajikistan
Abstraction licences	Georgia, Scotland
Abstraction licences for hydropower generation	Georgia
In-stream water rights	United States of America
Aquaculture permits	Norway
Taxes	
Hydropower taxes	Russia, Norway
Water storage taxes	France
Abstraction taxes	France
Water body obstruction taxes	France
Aquatic environment taxes	France
Fishing taxes	France
Hydropower water rent taxes	Ukraine
Water transport water rent taxes	Ukraine
Aquaculture water rent taxes	Ukraine, Norway
Transfers, voluntary agreements and payments	
Green hydropower	Sweden
Payments for ecosystem services	Brazil, Colombia
Trade of permits and rights	
Water rights	Chile, Mexico, Peru
Water abstraction rights	Australia, China, Chile, Mexico, Spain, United States of America

3.6.2 Tariffs, Charges and Fees

Water charges are fees for water usage, encompassing the costs of transporting and storing water, as well as the economic value of the resource itself. These charges are often implemented through earmarked tariffs, which are a pricing mechanism used by utilities or governments to regulate the supply and consumption of water. Tariffs set the specific charges that individuals and businesses must pay for their water usage. Tariffs can be highly variable and often depend on geographic

location, consumer type (residential, commercial, or industrial), consumption volume, and the costs of water treatment and distribution. The primary purpose of implementing a water tariff is to cover the expenses of operating, maintaining, and expanding water infrastructure while simultaneously promoting responsible water use and conservation (Gómez, et al., 2023).

Water abstraction charges are levied on individuals or entities for the removal of water from natural waterbodies. Water abstraction charges are used as both financial and economic instruments in order to ensure the sustainable management of water resources and to promote efficient water stewardship. Water abstraction charges can be applicable to both non-consumptive and consumptive water use (Merrett, 1999). Non-consumptive water use licenses and permits provide authorisation to organisations or individuals for the use of water resources for non-consumptive purposes. These licenses often vary between countries and regions (OECD, 2018).

In 1994, charges for abstractive and non-consumptive use of water resources were introduced in Georgia. In 1997, the Georgian Tax Code established charges for the use of natural resources, including water. However, in 2004 natural resource charges were removed and replaced by fees for the use of natural resources governed by the Law on Fees for Use of Natural Resources 2004 (OECD, 2018).

In the United Kingdom, water abstraction charges consist of three parts; a fixed application charge, an advertising administration charge, and an annual charge. The higher rate is applied to the fixed application charge for the impoundment of water and the use of water for small-scale production. The annual charge comprises a standard charge applied to the licensed amount of water abstraction, which is adjusted according to source, seasonal variation and loss factors relevant to the applicant. A compensation charge is also included in the annual charge to cover the cost of dealing with the revocation or variation of existing licenses. The loss factors adjust the annual charge for non-consumptive water use, such as cooling, hydropower and fish farming (OECD, 2018).

In Scotland, a subsistence charge is payable in respect to water abstraction. The charge is based on the percentage of water abstracted for non-consumptive use that is returned to the water environment. Within this charge, non-consumptive water use includes hydropower generation, amenity pools, hydraulic testing, fish farms, watercress growing, and non-evaporative cooling (Figure 3-17). The charge also includes a distance factor measured between the abstraction point and the location where the water is returned to the environment. The distance factor serves to encourage the return of abstracted water to its original source (Scottish Environment Protection Agency, 2015).

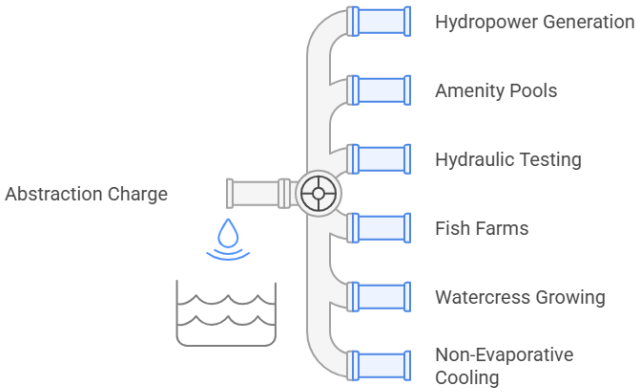


Figure 3-17: Coverage of water abstraction charges in Scotland

In Mexico, water abstraction charges are a critical source of finance for the water sector, accounting for approximately 74% of finances collected from water users. In 1992, Mexico's Water Law made the registration of water use and discharge permits compulsory and levies were applied to water use and discharge. These levies are charged based on water scarcity within regions and adhere to the equity financing principle (EU Water Initiative, 2012).

Fee rates for the abstraction of surface water resources in Georgia vary by river basin and water use category, with each source having a different base rate. Georgia also imposes water abstraction charges for thermal power stations, hydropower stations, and irrigation proportional to the base fee rates. Surface water abstraction fees in Georgia have, however, not been efficiently enforced due to conflicts between the Law on Fees for Use of Natural Resources, which stipulates the requirement of water resource use licenses, and the Law on Licences and Permits of 2005, which does not require licenses for surface water resources after amendments made in 2007. Groundwater abstraction charges have on the other hand been effective due to stricter licensing requirements. Abstraction of water for non-consumptive use in hydropower generation and cooling in thermal power stations in Georgia is significant, with these operations having an impact on river flow, hydro morphology and the transport of sediments. However, concerns have been raised regarding the effects of surface water abstraction fees on energy prices, sector profitability and economic growth within the sector, which further limits the enforcement of surface water abstraction fees in Georgia (OECD, 2018).

Surface water levies in the Czech Republic are a primary source of funding for water resource management, with water abstraction charges representing 65% of revenues and hydropower charges 15%. These surface water levies are based on the volume of water abstracted (EU Water Initiative, 2012). In addition to Georgia and the Czech Republic, water abstraction charges for hydropower are also implemented in Brazil, Cameroon, Armenia, Ukraine and Kazakhstan, generating substantial revenues for the water sectors in these countries. These charges can be adjusted according to the location, timing and seasonality of abstraction in order to capture potential opportunity costs on other water users. In Armenia, Ukraine, and Georgia, abstraction charges for hydropower generation are based on the volume of water flowing through the turbines. On the other hand, countries such as Kazakhstan, Brazil and Cameroon base these charges on the amount of electricity produced, either measured in megawatt-hours or as a percentage of the market value. The choice for the basis of measurement for these charges depends on technological availability and capacity within each country (OECD, 2018).

In the Netherlands, water board charges are used to manage waterways and water quantities. These charges include levies on owners and renters of infrastructure and property based on the value of these assets (EU Water Initiative, 2012). In

Scotland, a subsistence charge is imposed on water in respect of Engineering Works Licenses, measured in terms of a length factor and a bed factor. The length factor accounts for the length of engineering works affecting inland waterbodies, and the bed factor accounts for the proportion of the length of engineering works affecting water beds (Scottish Environment Protection Agency, 2015).

Additionally, Scotland imposes water impoundment and effluent charges related to non-consumptive use. The impoundment charges differentiate between different forms of non-consumptive use, for example, a fish pass factor is applied to aquaculture and a factor based on the megawatts of generating capacity is applied to hydropower. The effluent charges are based on a contents factor that incorporates measures relating to the presence of toxic substances, bacterial loads, aquatic diseases and aquatic parasites. The substances measured include pesticides, fungicides, herbicides, polyhalogenated biphenyls, aliphatic hydrocarbons, aromatic hydrocarbons, halogenated hydrocarbons including haloforms, alcohols, glycols, aromatic nitrogen compounds, phenolic compounds, heterocyclic hydrocarbons, esters, ethers, ketones, aldehydes, metals and metalloids, cyanides, sulphides, phenolic compounds (total and monohydric), methanol, ethanol, butanol, propanol, carboxylic acids, and organic nitrogen compounds, which are classed according to different weight bands. In relation to caged fish farms, parameters measured include bacterial toxicity and the presence of unpermitted substances for the treatment of diseases or parasites. A volume factor for trade effluent from caged fish farms is also applicable, which is based on the weight of fish held and the annual production of fish (Scottish Environment Protection Agency, 2015).

3.6.3 Licenses and Permits

Non-consumptive water use licenses are often applied to the authorisation of engineering works in watercourses, the generation of hydropower, water abstraction, and effluent discharges. The application process for licenses involves the assessment of the potential impact of the activities on the water resources, including the possible harm posed to water resources or surrounding ecosystems and the effects on other water users (Seaton Environmental, 2025), (DWS, 2025). Furthermore, royalties can be levied on non-consumptive water use licenses and permits to ensure the recovery of costs associated with issuing and monitoring these authorisations, operational and maintenance costs of infrastructure, and the costs associated with the management of the water resources. For example, royalties can be levied on the use of water in hydropower plants or for floating solar panels on reservoirs (DWS, 2024), (Global Water Partnership, 2025).

The Ministry of Environment and Natural Resource Protection (MENRP) in Georgia identified the restoration of licensing regimes for water abstraction as a strategic priority. These licenses include components for the abstraction of water for non-consumptive purposes, which impose costs and inconveniences on other users. The licenses for non-consumptive use are charged at a fraction of the rate applicable to consumptive use, and depending on the sector and location. This ensures adherence to the equity financing principle. Additionally, the MENRP highlights the need for effective implementation of hydropower licensing regimes (OECD, 2018).

In Tajikistan, non-consumptive water use charges in the form of royalties on hydropower generation were introduced in the Tax Code of the Republic in 2009. These royalties are designed to capture the economic rent earned from utilising water resources for hydropower generation. The Tax Code bases the measurement of these royalties on the megawatt-hours of

power generated. When fully enforced, these royalties provide substantial revenues and are projected to increase in the long run (OECD, 2018).

Water rights can be used as innovative instruments for raising revenue when functions are difficult to fund. In the United States of America, hydropower producers are required to invest in salmon restoration through the acquisition of in-stream water rights (OECD, 2012). However, in certain regions within the United States of America, water rights, based on the prior appropriation doctrine, grant primary rights to those who initially diverted water resources for non-consumptive use and established beneficial use of the water. Subsequent claimants can only obtain rights after prior rights holders have received their allocations. While regimes vary by state, changing the rights to the use of water for non-consumptive purposes generally requires authorisation from state authorities, often through a lengthy and costly process. These water rights are thus non-tradeable rights, serving a similar purpose to licenses and permits, which can undermine the effectiveness of the water rights (Holden & Thobani, 1996).

Norway's Aquaculture Act of 2005 establishes a comprehensive licensing system to regulate the industry. The Ministry has the authority to set limits on the number, geographic distribution, and fees for licenses. These limitations are applied at the national, regional, and local levels to ensure controlled development while considering environmental impacts and other industries. The license system requires that specific information, as described in **Figure 3-18**, be recorded by production entities on a daily basis (FAO, 2025).

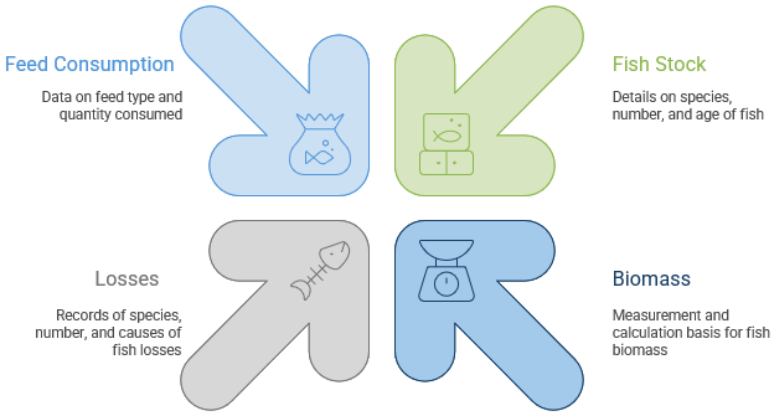


Figure 3-18: Aquaculture license information requirements in Norway

Aquaculture licenses in Norway also include provisions for professional competence and staff levels to ensure fish welfare and limit escapes. To ensure site restoration, a mandatory deposit or insurance is required for all licensed facilities. Land-based aquaculture requires a construction permit from the municipality and environmental impact assessments. These assessments are mandatory for large facilities and hatcheries that could significantly affect the environment or community. Additionally, regular environmental surveys are conducted for specific species to monitor and maintain acceptable conditions. If these conditions are not met, a site may be temporarily decommissioned. Norway also prohibits the establishment of new salmon and trout farms in protected wild salmon areas. Norway's Pollution Control Act of 1981 requires aquaculture license applicants to obtain a permit for wastewater discharge. This permit is granted based on the environmental status of the receiving water body and specifies the permitted discharge levels. Regulations also require facilities to maintain specific water quality standards to prevent unnecessary harm to fish. All land-based facilities must have

backup oxygen and metabolite supplies in case of system failure, and systematic surveys of water values like oxygen and pH are mandatory. Specific restrictions on water sources are in place to prevent wild fish from entering hatcheries. Furthermore, facilities must meet hygienic standards and disinfect inlets and wastewater. Licensees are required to report and recapture any escaped fish and receive fish recaptured by others. The release of fish from a facility is strictly prohibited. Finally, regulations under both the Aquaculture Act and the Food Safety Act aim to prevent the spread of diseases by limiting the movement of contaminated organisms, water, and equipment (FAO, 2025). Licensees are obligated to monitor operations on a regular basis as specified in the license conditions, and to keep records of operations as described in **Figure 3-19** .

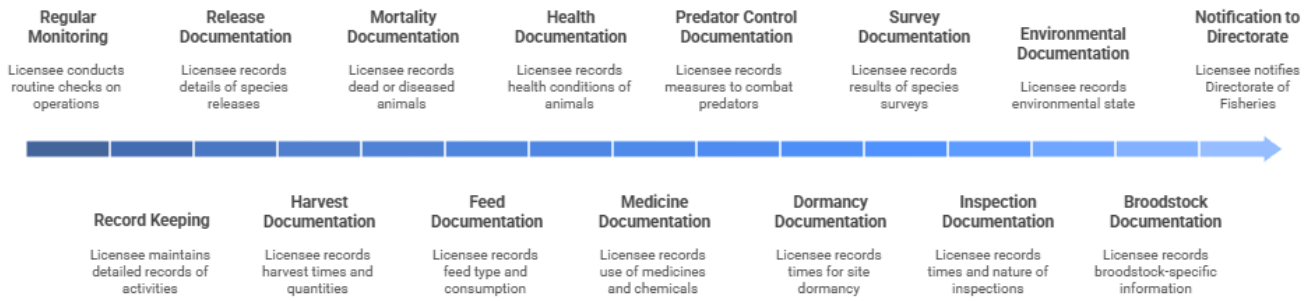


Figure 3-19: Aquaculture license obligations in Norway

3.6.4 Taxes

In Norway, hydropower producers face a multi-layered tax structure. A property tax is levied on a hydropower plant's capitalised value, calculated at a 4.5% interest rate. However, this tax is capped based on the kilowatt-hours of electricity generated. For smaller plants, with a nominal capacity under 10 000 kilovolt-ampere, the tax base aligns with the income tax value (PwC, 2025). The core tax regime includes a 22% corporate income tax for both hydropower and wind power. Hydropower is subject to an additional 45% ground rent tax, bringing the total tax rate to 67%. In high-price markets, a 23% "high price contribution" applies to electricity sold over NOK 0.7 kilowatt-hours, temporarily increasing the total tax rate to 90%. A municipal property tax is also applied. Hydropower also includes a natural resource tax, which funnels revenue to local municipalities without increasing the company's overall tax burden (Grytten, et al., 2024). In contrast, Russia's hydropower taxation is more direct, with a tax based on the megawatt-hours of electricity produced (OECD, 2018).

Since January 1st, 2008, French water agencies charge seven types of taxes, as indicated in **Figure 3-20**.



Figure 3-20: Types of water taxes charged in France

In France, water management is funded through a variety of targeted taxes and fees. Taxes on water pollution are based on the annual volume of water billed for households. For cattle breeders, the tax is based on the size of the cattle and for industries, the tax is based on annual pollution discharged to the environment. Owners of water reservoirs are subject to a water storage tax during periods of water scarcity. Water abstraction taxes are imposed on water users based on the annual volume of withdrawals and depend on the purpose of use and the water bodies from which the water is abstracted. A tax on diffuse agricultural pollution is paid by retailers of pesticides. A tax on obstacles in rivers is levied on those with structures that obstruct a river's natural flow. Fishermen contribute through a tax for the protection of aquatic environments. Additionally, municipalities can impose a tax for the management of stormwater, based on the surface area of buildings connected to a public drainage network, with reductions for properties that limit their discharge. The French Inland Waterways also generate revenue through tolls on freight and yachting, a hydraulic tax on hydraulic works, and a tax on state land used by various enterprises (OECD, 2012).

The Tax Code of Ukraine imposes rent taxation for non-consumptive water use, which applies to the use of water for:

- Hydropower production, where the basis for the rent taxation is measured by the actual volume of water passing through the turbines of hydropower plants.
- Water transport, where the basis for the rent taxation is measured by the time of use of surface water by operated self- and nonself-propelled cargo fleets, depending on the tonnage transported, and passenger fleets, depending on the number of seats.
- Fish farming, where the basis for the rent taxation is measured through the volume of water required to replenish waterbodies to sustain breeding and aquatic biodiversity, which includes the replenishment of water losses resulting from filtration and evaporation (UNECE, 2024).

In Norway, resource rent taxes are levied on aquaculture permits for commercial fish farming. The tax is limited to the income received by fish producers from both the coastal and offshore production of salmon, trout and rainbow trout. The resource rent taxation for the aquaculture industry is calculated on the basis of a special tax base or base rent income. Similar to land rent taxes for hydropower plants, the regulations also state which income can be taxed and which costs can be deducted from income (Ulltveit-Moe, et al., 2019).

3.6.5 Voluntary Agreements and Payments

Payments for ecosystem services schemes are voluntary agreements that can be applied to various types of ecosystem services related to water quality, water conservation, air quality, and emissions. Through payments for ecosystem services, entities are encouraged to maintain and enhance ecosystem services in return for compensation from the parties benefiting from these services. In some cases, public authorities may also agree to supply the resources required to implement these schemes. Payments for ecosystem services are generally flexible, easy to implement, and serve as efficient policy instruments. The “Fondos de Agua” in Colombia and “Productores del Agua” in Brazil are examples of payments for ecosystem services that aim to support water security in metropolitan areas through investments in green infrastructure. In general, water-related payments for ecosystem services schemes can be developed for a wide range of spatial scales; however, these schemes are usually implemented within the boundaries of a waterbody (Vidaurre, et al., 2017).

In Sweden, voluntary agreements targeting hydropower producers provide additional financial resources for the conservation of natural waterbodies, particularly for river and hydro-morphological restoration. Within these agreements, a share of the hydropower traded is allocated to funding mechanisms which aim to mitigate the externalities resulting from hydropower production through the eco-label Milöval managed by the Swedish Society for Nature Conservation (Farnault & Leflaive, 2024).

3.6.6 Trade of Permits and Rights

Water rights are defined in various ways, often as a share of a water source's flow or volume, or as an allotted time of use. These definitions can be combined or made conditional on water availability. For example, a right might be volumetric only above a certain water level, otherwise it is proportional. Rights can also be defined as a share of excess flow above a specified threshold. Under an appropriative rights system, junior rights are often secondary to senior rights, which must be fulfilled first. Additionally, rights are classified as consumptive or non-consumptive. Consumptive rights do not require water to be returned, whereas non-consumptive rights, such as those typically held by hydropower companies, often stipulate that the water be returned at a specified quality and quantity to a particular location (Holden & Thobani, 1996).

Chile implemented tradable water rights following the country’s transition to a market-oriented economy in 1973 in order to enhance property rights and improve water management efficiency. While the water market began operating in 1976, the 1981 Water Code solidified the system. This law grants existing water users free property rights to both surface and groundwater, while new rights are auctioned. Water rights are separate from land rights and can be transferred or sold freely at market prices, allowing market forces to determine allocation and use (Kraemer, et al., 2003). All rights acquisitions and their intended use, whether consumptive or non-consumptive, must be publicly registered and different regulations apply depending on the intended use as depicted in **Figure 3-21**.

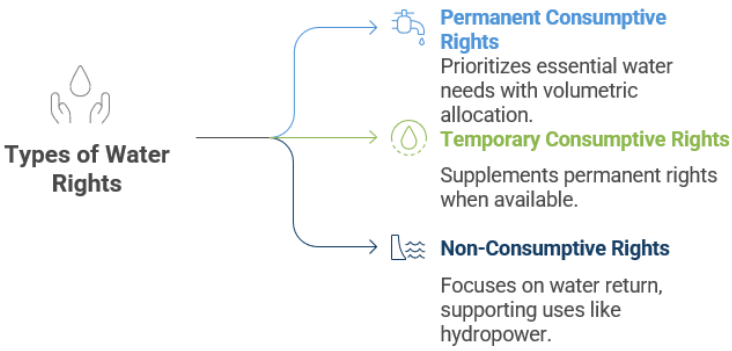


Figure 3-21: Types of water rights traded in Chile

Chile's experience in arid regions demonstrates that tradable water rights can be a viable strategy for efficient water allocation, benefiting the poor and increasing user participation. This system has facilitated voluntary water transfers to more productive uses and has stimulated investment by guaranteeing water access. While implementing an effective tradable water rights system is complex, its market-based approach often proves more effective than administrative solutions. However, the system is not without challenges. In high-rainfall areas, transaction costs can outweigh the benefits of trading. Furthermore, a lack of clear definitions for non-consumptive rights has led to conflicts between hydropower companies and farmers, and some legal loopholes have allowed certain companies to acquire large volumes of rights without charge. Despite these issues, Chile's system has resulted in fewer conflicts and more efficient water use (Holden & Thobani, 1996). Other countries with experience in tradable abstraction rights include Australia, China, Mexico, Peru, Spain and the United States of America (EU Water Initiative, 2012).

Recognising that economic liberalisation required secure and flexible water use, Mexico's 1992 water law and its subsequent 1994 regulations allowed users to convert precarious rights into tradable concessions with terms ranging from five to fifty years, typically set at thirty years to enhance security. While rights are recorded in a public registry for both surface and groundwater and defined volumetrically, they are proportionally allocated by user associations during water deficits or surpluses. However, these concessions are not as secure as those in Chile. Under the Mexican Constitution, all water is considered national property, and concessions can be forfeited for reasons of public interest, such as inefficient use or if not exploited for three consecutive years. The new legal framework has facilitated a more dynamic water market, with a significant increase in the leasing and selling of both surface and groundwater rights in water-scarce regions. This new system has not only encouraged private investment by providing better protection for aquifers from depletion and third-party rights but has also brought previously clandestine water transactions into a regulated and transparent environment. By the end of 1995, the National Water Commission had successfully processed applications for approximately 85% of volumetric water rights, demonstrating a significant move toward a formalised and more efficient water management system (Holden & Thobani, 1996).

Prior to 1992, Peru's water management policies had proven ineffective, leading to a host of problems, including neglected infrastructure, irregular water delivery, declining water quality, and increased conflicts. Widespread water theft and inefficient water use were common, even in scarce areas. For example, while Lima faced water rationing, the city's water company experienced high losses, and nearby farmers continued to cultivate water-intensive, low-value crops. Additionally, the threat of state expropriation of water rights discouraged essential investments that relied on secure water access. These

issues highlighted the need for significant water reform. To address these problems, the Ministry of Agriculture proposed a new water law modelled along the lines of the 1981 Chilean water code. The draft legislation would grant existing water users rights at no cost, with new rights to be distributed through public auctions. These rights would be tradable at market prices, provided that transfers do not negatively impact other users, ecological flows, or the quality of life in urban areas. The rights could also be mortgaged or leased. To acquire a right, users would be required to record specific details in a public Water Rights Registry, including flow volume, diversion points, and whether the use is consumptive or non-consumptive. A property tax on water rights would also be established. The law would prohibit actions that harm water quality, deferring to the Environmental Code for enforcement. This proposed law represents a significant departure from the current system by separating water rights from land rights and eliminating priorities among different uses. The new rights would not be tied to a specific purpose, providing users with greater flexibility. However, the passage of this legislation has been delayed. Key obstacles include congressional concerns about the initial allocation process, insufficient involvement of water users in the law's design, and opposition from those who benefit from the existing system (Holden & Thobani, 1996).

3.7 REVIEW OF THE PRICING STRATEGY MECHANISMS

Selecting the right pricing strategy is critical to the acceptance of the price point of a product. If the price/charge is set too high, the product becomes prohibitive for anyone to utilise. If the price/charge is set too low, then the cost recovery and the 'user-pays' principle become undermined. Costa (2025: 2) groups pricing strategies into the following four categories:

1. Cost-Plus Pricing Strategy;
2. Value-Based Pricing Strategy;
3. Competitive/ Market Pricing Strategy; and
4. Dynamic Pricing Strategy.

Each of these pricing strategies has advantages and disadvantages and is suitable for different scenarios and products. Competitive/market-based pricing and cost-plus pricing are two of the most widely adopted strategies, offering distinct ways to set prices (Dicky 2024: 2). However, when considering the NCC for each sector, the appropriate pricing strategy needs to be applied.

3.7.1 Cost–Plus Pricing Strategy

Cost-plus pricing is one of the most common pricing strategies utilised. This strategy considers all direct and indirect costs associated with the product or service for sale. To determine the price, calculate the cost price of your product or service and add a set percentage, i.e., the profit or surplus margin.

Retailers, manufacturers, restaurants, distributors and other intermediaries often think of cost-plus pricing as a fast and straightforward way of setting prices. This approach fits specific situations, particularly when the costs are predictable and transparent. Government services often run cost pricing strategies or cost-plus pricing. It is also the most common pricing strategy for products that relate to or make use of significant infrastructure-based products. Cost-plus pricing strategies are also commonly used in situations where there is a monopoly or few alternatives. The biggest disadvantage of this

method is that it does not account for what customers are willing to pay, which can result in prices that are too high or too low. Whilst cost-plus pricing is straightforward and ensures costs are covered, it does not consider market demand or customer preferences, making it less adaptable in dynamic or new industries. It is also less suitable for intangible products or services.

DWS currently uses a cost pricing strategy for the sale of raw water, aligning with methods used by government in well-established sectors, for larger infrastructure charge determination, for stable and predictable costing approaches and for where there are very few alternatives.

3.7.2 Value-Based Pricing Strategy

Value-based pricing takes a more customer-centric approach. Prices are set according to the perceived value of the product or service to the customer, and not simply the production costs or competitor prices. This strategy works exceptionally well for businesses offering premium, unique, or innovative products, where customers are willing to pay more for perceived quality, exclusivity, or differentiation. Value-based pricing is therefore not appropriate for raw water nor NCC.

3.7.3 Dynamic Pricing Strategy

Dynamic pricing is a variable and evolving strategy where the price changes based on what's happening in the market right now. Thus, where demand spikes, prices increase. Where competitors drop their rates, then one can adjust to remain competitive and where there are seasonal shifts then prices can be adjusted accordingly.

This pricing strategy treats price as a living number and not a fixed decision. While the airline industry invented this approach and the hotel industry perfected it, many companies are now endeavouring to determine how to make it work for software and other practicalities. Dynamic pricing does not provide consistency or predictability by its nature and as such is not used by DWS. Dynamic pricing strategies are not appropriate for government products and services as they create complexity.

3.7.4 Competitive / Market Pricing Strategy

Market-based pricing involves setting prices based on what the market can bear, i.e. it is about pricing the product at a level that customers are willing to accept while considering the alternatives. By aligning prices with what customers are willing to pay, DWS can achieve buy-in for new pricing mechanisms for new markets.

This may translate into the need to lower prices especially if the market price is less than your cost. However, this can be re-evaluated as markets shift and requires active monitoring of market trends and customer behaviour to remain relevant to the price point. Competitive/ market pricing offers a shortcut and is particularly useful in new or growing sectors.

DWS currently uses the competitive/market pricing approach for land leases and current charges paid by Eskom for use of water would also fit in this pricing strategy.

3.8 KEY CONSIDERATIONS FOR THE NCC METHODOLOGY

The nature of the sub-sectors and NCC make market/competitive pricing the most suitable pricing strategy. This is motivated by the current key points:

- Non-consumptive use by their nature is not for a physical product or service, making cost pricing inappropriate.
- New charges and new sectors require pricing that is market-based (especially as economies of scale are not in place yet). Aquaculture, recreation and smaller-scale energy generation fit this description.
- Currently DWS uses a hundred percent of cost to determine raw water and related prices. Using a cost pricing approach for NCC will require a percentage of the current cost to be allocated to NCC. With no accurate data available for these sectors, it is not possible to calculate the exact revenue, risking financial loss for DWS. If a cost basis is used once the sectors are mature, it will also mean a reconfiguration of revenue sources with the same overall revenue rather than any additional revenue for DWS.
- Aquaculture, energy generation and recreation all have viable established alternatives. Pricing higher than these alternatives will make it uncompetitive and limit the expansion and uptake of these options.
    - For aquaculture, land-based aquaculture is a more common and valid alternative.
    - For energy generation, there are traditional alternatives such as coal and renewable energy alternatives such as solar panels on land or wind turbines.
    - For recreation, there are many different alternatives for recreation than water-based activities in national dams or rivers.
- Costs associated with non-consumptive use are difficult to calculate as a key cost is the opportunity cost rather than direct costs associated with the non-consumptive use.

4 NCC Framework for Aquaculture

4.1 ENABLING LEGISLATION

4.1.1 Water Use

The National Water Act 36 of 1998 (NWA 1993): Section 21: *"In general a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence."*

"21. For the purposes of this Act. water use includes—

(a) taking water from a water resource:

(b) storing water:

(c) impeding or diverting the flow of water in a watercourse:

(d) engaging in a stream flow reduction activity contemplated in section 36;

(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1):

(f) discharging waste or water containing waste into a water resource through a pipe, canal. sewer. sea outfall or other conduit:

(g) disposing of waste in a manner which may detrimentally impact on a water resource;

(h) disposing in any manner of water which contains waste from or which has been heated in any industrial or power generation process;

(i) altering the bed, banks, course or characteristics of a watercourse

(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people: and

(k) using water for recreational purposes,"

Section 21 of the NWA provides a list of 'water uses' that require authorisation. There is no direct reference to aquaculture as a water use in the NWA and thus no requirement to license the aquaculture water use *per se*. Aquaculture is thus considered an Activity and dealt with as a subsector of agriculture. The activity of aquaculture at times includes different water uses which require authorisation and licensing. An example of this is when water is abstracted and held in tanks, ponds, raceways, etc. to culture fish, marron, crocodiles, etc. In such an example, the abstraction of water would be a section 21a use, the storage of water would be a section 21b use and if the water is returned to a river this would be 21f. Each of these water uses would require authorisation.

4.1.2 Authorisation and Licenses

These sections of the NWA form the basis of a charge/tariff for any water use.

NWA 1998: *Section 29 (1) A responsible authority may attach conditions to every general authorisation or licence —*

(b) relating to water management by -

(iv) requiring the payment of charges for water use as provided for in Chapter 5;

Section 56 (4) The pricing strategy may differentiate under subsection (3)(a)

(b) in respect of different types of water uses, on the basis of—

ii) whether the use is consumptive or non- consumptive

Section 59 (I) Water use charges contemplated in this Chapter -

(a) may only be made in respect of a water use to which a person is voluntarily committed: and

(b) must bear a direct relationship to the water use in question.

4.1.3 Government Waterworks

Any aquaculture activities in a government waterworks, such as a dam, can include charges for the use of the facilities.

NWA 1998 Section 116 Regulations regarding government waterworks

(1) The Minister may, with regard to a government waterworks, make regulations providing for--

(c) charges for—

(i) entrance to:

(ii) use of facilities at; and

(iii) the private development of,

a government waterwork.

4.1.4 Schedule 1

Schedule 1 enables water to be used without authorisation for purposes such as reasonable domestic use, domestic gardening, animal watering, fire fighting and recreational use.

NWA 1998 Schedule 1 –

A person may, subject to this Act-

(a) take water for reasonable domestic use in that person's household, directly from any water resource to which that person has lawful access;

(e) for recreational purposes –

(i) use the water or the water surface of a water resource to which that person has lawful access; or

(ii) portage any boat or canoe on any land adjacent to a watercourse in order to continue boating on that watercourse;

4.1.5 Revised Pricing Strategy NCC

The revised Pricing Strategy refers to aquaculture as an example of a non-consumptive use. In fact, certain types of aquaculture are non-consumptive in nature and other types are consumptive. It will be important to distinguish between these.

4.2 TYPE OF WATER

4.2.1 Types of Water

Aquaculture activities can occur in different environments and types of water resources as indicated in Table 4-1 below.

Table 4-1: Types of water for aquaculture

No.	Type	Description	Comment
1.	**Government Works**	Government Works and surrounding land	Charges covered by NWA for abstraction
2.	**Municipal Works**	Municipal owned dams, works and surrounding land	Not recommended as outside of the scope of DWS
3.	**Rivers**	All rivers	Yes, considering schedule 1 exclusions. Any commercial use. This would be considered section 21i water use. Water resource management costs.
4.	**Private**	Privately owned dams/ tanks etc, regardless of source (borehole, river abstraction, run-off)	Licenses and authorisations currently required for: a) abstraction of water Sec21a b) storage of water Sec 21b c) Discharging of water 21 f As such this activity would not be viewed as a NCC but rather a consumptive charge.
5.	**Seawater**	Pumping seawater to the land and then seawater stored for aquaculture	Excluded as seawater

4.2.2 Municipal Works

Regulations under section 116 of the NWA allow DWS to charge for aquaculture and all other activities and use of DWS and national government-owned works (reservoirs, dams, etc.). If municipalities own their own dams, they are required to be licensed and get authorisation for water uses as per section 21 uses. The NWA or other legislation does not allow for DWS to charge the municipality or anyone else using the municipality's facilities for activities separate from the water uses. As such, DWS cannot charge for aquaculture activities in municipally owned dams; this would be up to the municipality unless core legislation is changed. It can charge for water uses as per the NWA linked to aquaculture.

4.3 WATER USE ACTIVITIES

4.3.1 Types of Activities

The activity of aquaculture can take the form of different categories of aquaculture. There are two broad categories which are relevant for NCC as follows:

3. Open-Water Systems – e.g. cage culture in dams, reservoirs, or rivers

4. Land-Based Systems – any system where water is extracted and discharged separately (ponds, recirculating aquaculture systems, raceways, aquaponics)

The activity itself falls within the scope of DFFE. For freshwater aquaculture, licences/permissions are granted by provincial environmental authorities, with varying systems and fees between provinces. DWS is required to license the water uses associated with the activity. Table 4-2 below includes examples of different activities with potential exclusions, costs and charges.

Table 4-2: Activities in aquaculture and potential charge basis

No.	Activity	Type	Excl.	Cost to DWS	DWS Current Charge	Potential Charge Basis
1.	**Private dam with aquaculture for domestic use**	Private Dam	Y Sch1	N	N	N
2.	**Private dam/pond/ raceway with commercial aquaculture**	Private Land-based System	N	Auth, Mon & Catchment Management	Licence, but no current sec 21 charge	Charges for Sec 21 activities but no NCC
3.	**Private dam/pond/ raceway with commercial aquaculture performed by renter**	Private Land-based System where dam is used by someone other than the land owner for aquaculture	N	Auth, Mon & Catchment Management	Licence, but no current sec 21 charge	Charges for Sec 21 activities but no NCC
4.	**Aquaculture in cage or equivalent for commercial use in government works**	Open Water: Government Works	N	Auth , Mon & Works O&M	N	Y, of space utilised / rented or 'pollution'
5.	**Aquaculture in cage or equivalent for commercial use in river**	Open Water: River	N	Auth, Mon & Catchment Management	N	Y, rental of space utilised or 'pollution' by the activity
6.	**Aquaculture activity in the sea and ocean**	Ocean	Y	N	N	N
7.	**Seawater stored on land and used for commercial aquaculture**	Ocean	Y	N	N	N

4.3.2 WARMS Registrations

Table 4-3 below presents the summary of WARMS data and information received.

Table 4-3: WARMS data summary

Form	Type	Use	Number of Registrations	Registered cubic metres per year	Gross Storage Capacity (cubic metres)
DW760	Abstraction	Sec 21 a	173	44,3 Million	N/a
DW762	Storage	Sec 21 b	173	N/a	1.1 Billion

Overall, there were 173 total entries in WARMS for aquaculture where the biggest value entries for registered use were not for commercial aquaculture. This demonstrated that there is a lack of understanding around what is classified as aquaculture when completing the DW760 and DW762 forms. This had resulted in users ticking the aquaculture box on these forms without a clearly understood definition of aquaculture, resulting in misinformation on the actual size of the industry and the applications that exist. This necessitates that DWS trigger a validation and verification process to ensure accurate and reliable information.

4.4 CURRENT AQUACULTURE ACTIVITIES

Freshwater aquaculture in South Africa remains a relatively small and developing sector with an estimated value of only R50–100 million per year (Aquaculture yearbook, 2022; CSIR 2019; Britz et al 2009). The freshwater aquaculture industry growth has been modest overall with a 50.2% increase from 2006 to 2021 (3.3% p.a.). Unlike the marine subsector, the freshwater subsector has limited growth projections. This translates into a total industry value of R112 million revenue a year by 2050 (Figure 4-1).

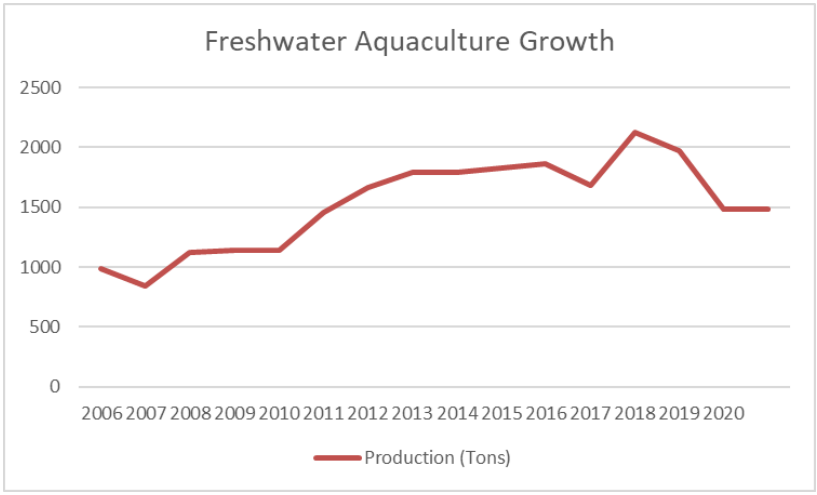


Figure 4-1: Freshwater Aquaculture Growth

This modest revenue makes it an unlikely source for additional revenue for DWS. Furthermore, to the best of current knowledge, freshwater aquaculture in South Africa was only practised in one DWS infrastructure or open-water system (Kleinplaas Dam). Activities are land-based either in private land-based tank systems or, in some cases, on private dams. There are no known aquaculture operations occurring in DWS-managed reservoirs or other state-owned water schemes.

4.4.1 Land-Based Systems

In land-based systems, water is abstracted and stored in ponds, raceways or tanks that contain aquatic organisms (e.g. fish) . The majority of the country's freshwater aquaculture falls in this category. After the aquaculture activity takes place in this stored water, the remaining water is discharged back into the system. At least 10% and sometimes more of the water is lost between abstraction and discharge and is not considered non-consumptive in nature. Currently, DWS does not charge for this water that is being abstracted. DWS could charge based on current Sec 21, b, f & g tools if desired. As this does not comply to being non-consumptive use but an existing consumptive use, it is excluded from this study further. In addition to activation of the section 21(a) water resource management charge, this calls for a consideration of the activation of a waste related charge, which is also not non-consumptive in nature and falls outside of the scope of work.

4.4.2 Open-Water Systems

The activities and water use here are non-consumptive in nature and therefore the development of the charges will be undertaken. There are some cases of open water commercial aquaculture (cages in dams) occurring in South Africa at present. However, these aquaculture operations are occurring on private dams, meaning that while section 21 can be applied, we cannot apply the NCC to these dams.

The NCC charges could be applied to open-water aquaculture in government works (dams) or rivers. However, based on the research to date, there are no aquaculture operations in government works (dams) or rivers. Evidence indicates that the registrations in WARMs for aquaculture in public works are incorrect (refer to WARMS data and information).

Research had been undertaken for conducting aquaculture in certain public water bodies such as the Gariep Dam, however the only record of an open-water farm (rainbow trout) occurring in a public body of water was the Kleinplaas Dam in the Western Cape. This was a research/pilot scale operation that was run by the University of Stellenbosch and this site was where aquaculture began in the late 1800s. The site was unfortunately closed a few years ago due social unrest[1]. There was no charge for the use of the dam at the time as it was for research and the project was entirely self-funded. In addition, there were no guarantees by DWS on water quantity or quality to justify any charges to be implemented. Overall, this research did not provide any example of charges to be considered. Fortunately, DFFE has formulated a series of bioeconomic (financial) models which provide estimates of the production, spatial requirements and economics of both the two most likely open-cage fish farms (Nile tilapia and rainbow trout). The suggested pricing strategies can be validated against these models.

4.5 PROPOSED NCC CHARGE PRINCIPLES AND OPTIONS

4.5.1 Proposed NCC Charge Principles

The following principles are proposed for aquaculture NCC:

[1] Stander, H., 2025. Chief Technical Officer, Aquaculture Unit, Water Institute, Stellenbosch University, personal communication.

- Rental of exclusive space utilised in government works;
- Rental of exclusive space within public rivers;
- Sec 21 a, b & f charges if appropriate. These are not NCC and would be excluded from this study; and
- 'Polluter pays' monitoring and correcting 'pollution' for aquaculture activity.
    - This can be explored further as a basis of a charge with considerations around a possible penalty fee and under whose jurisdiction the charge would fall - either DFFE or DWS.

4.5.2 Proposed NCC Charge Options

The proposed charge options are outlined in Table 4-4.

Table 4-4: Summary of recommended charges

No	Category	Potential Charge	Potential Calculation
1.	**Open Water: Government Works**	Annual Rental: Exclusive water space	a) (Space rented/ Total available space) X O&M cost b) effect on water quality, charge to be investigated
2.	**Open Water: River**	Annual rental: exclusive water space	a) (Space rented/ Total surface area) X Water Resource Management Charge b) River flow at that point of river as % of Water Resource Management Charge c) effect on water quality, charge to be investigated
3.	**Open Water**	Pollution penalty	Cost of clean-up will be recovered through the Waste Mitigation Charge and as the Pricing Strategy does not make a provision of the Pollution Penalty.
4.	**Land-based systems**	No NCC	Use sec 21 charges if required

4.6 NCC CHARGE ASSESSMENT

4.6.1 Cost determination

Current charges associated with this activity:

- There is a once-off licence fee of approximately R115 (incl. VAT). This licence fee is under review. Other than this, there are no charges directly for aquaculture water uses by DWS.
- DWS could charge for abstractions or other section 21 uses.
- Licences/permission to conduct the activity must be applied for from provincial environment departments. The application process and fees vary depending on province.

Therefore, the DWS could possibly charge based on the costs to DWS and its entities as identified below:

a) *issuing the required water-use authorisation*
b) *monitoring adherence to the conditions of the water-use authorisations*
c) *contribution to the operations and maintenance of the scheme to provide access to the water*
d) *Water Resource Management Costs*
e) *Operations and Maintenance Costs of Government Works*

4.6.2 Salient Points from the Working Group

A working document was presented to the working group, which consisted of sector experts. The salient points are presented below:

- DFFE was clear that the licensing of freshwater aquaculture was not under its mandate, and is undertaken at the provincial level.
- There was consensus that any use of marine water was not relevant or governed by the National Water Act and fell outside the scope of this study.
- DWS confirmed that land-based aquaculture activities would trigger section 21 water uses such a, b and f and not non-consumptive uses and was excluded from this study.
- Industry representatives raised concerns that the freshwater aquaculture sector was already overregulated and was not growing; instead, there is a decline in farms since Covid 19.
- Industry representatives requested 'guarantees' of water quality in the resource should there be charges for the non-consumptive use of the water.

4.6.3 Land-based portion of open-water systems

The majority of current freshwater aquaculture is land-based and abstracts water from a source similar to agriculture and other productive uses. This triggers standard section 21 a, b and f water uses, which are standard consumption charges and not non-consumptive in nature. Currently, DWS is not implementing this charge. Implementing these charges would cover all aquaculture that abstracts water.

4.6.4 Pollution-related charges or penalty

Detailed consideration was given to basing charges on the level of pollution added to the water from the aquaculture activity. After due consideration it was determined that charges that related to the level of pollution caused would not qualify as a non-consumptive use. The level of pollution does however need to be monitored, and penalties should be charged for exceeding the agreed parameters. The parameters would need to be agreed as part of the licensing process.

4.6.5 Assessment of Short-listed Charge Options

An assessment of the shortlisted charge options is outlined in Table 4-5.

Table 4-5: Assessment of shortlisted charge options

No.	Draft Charge	Advantages	Disadvantages
1.	**Exclusive water space works:** Space rented/ Total available space) X O&M cost	• Clear contribution towards cost	• The charge would vary greatly from works to works, resulting in higher charges in smaller dams

No.	Draft Charge	Advantages	Disadvantages
2.	**Exclusive water space rivers:** (Space rented/ Total surface area) X WRM Charge	• Clear contribution towards cost	• The charge would vary greatly from one CMA to another • Complex calculations for total surface area
3.	**Exclusive water space rivers:** b) River flow at that point of river as % of WRM Charge	• Clear contribution towards cost • Flow of water is included which is a key factor for aquaculture	• The charge would vary greatly from one CMA to another • Complex calculations for water flow
4.	**Exclusive water space both: m3 rental based on average cost**	• Clear contribution towards cost • Standard price across the country • M3 basis captures exclusive space used best	• Cost may not be market related making all fresh water aquaculture unattractive • Calculations for average cost are complicated and effect other water users and existing revenue
5.	**Exclusive water space both: m3 rental based on market rate**	• Standard price across the country • Charge market related to encourage the activity • M3 basis captures exclusive space used best	• Challenges determining market rate
6.	**Exclusive water space both: m3 rental in blocks based on market rate**	• Standard price across the country • Charge market related to encourage activity • M3 basis captures exclusive space used best • Use of blocks simplifies administration and billing	• Challenges determining market rate
7.	**Exclusive water space both: m2 rental based on surface area in blocks**	• Standard price across the country • Charge market related to encourage the activity • Surface area basis simplifies calculations • Use of blocks simplifies administration and billing.	• Challenges determining market rate • Can have undesired consequences like deeper cages as based on surface area not cubic water space

4.7 RECOMMENDED NCC PRINCIPLES AND CHARGE

Based on the assessment of the charge options, the following approach to NCC for aquaculture is proposed.

4.7.1 Recommended NCC Charge Principles

The final charge principles for the NCC for aquaculture are:

- Rental of exclusive space in government works and rivers;
- The space is calculated on the basis of cubic metres;
- Market-related pricing is used;
- Tariff Blocks to be used to simplify administration and categorisation of the activity; and
- Where there is also a relevant land-lease the charge is to be included in the lease.

4.7.2 Recommended NCC Charge

The non-consumptive charge for aquaculture is based on the number of cubic metres required for exclusive use by the aquaculture activity on a rental basis. This includes walkways or water surface areas that may not be used for production, and the lessee requires exclusive access to. In these cases, they are deemed to be one metre in depth. In areas of production with, for example, cages, the actual depth is used to calculate the cubic metres.

4.7.3 Determination of Pricing Structure

Basis for the tariff block

Noting the lack of data for current sizes and costs of commercial aquaculture in open-water systems, an alternative method was used as the foundation to structure the tariff blocks and charges. The DFFE bioeconomic feasibility studies for Nile tilapia, Mozambique tilapia, and rainbow trout (DFFE, 2018a; 2018b) were selected as the most definitive source of information to inform tariff block structuring, using reported production levels and stocking densities of 53 kg/m³ for tilapia and 25 kg/m³ for trout.

Cage volumes were estimated by dividing production by the maximum stocking density. As the feasibility studies did not explicitly define cage volumes, these values represent an upper-bound estimate. In practice, cage volumes may be lower depending on production strategy. The tariff blocks proposed in this study were then based on the calculated cage volumes, considering the minimum profitable levels and optimal profit levels in these studies.

The recommended NCC for aquaculture was calculated as a percentage of operating costs. This was done to ascertain what portion of operating costs should be attributed to the NCC charge. In reality, as a new charge, this would also change the cost structure and change the outcome of the feasibility studies to a degree. By introducing the NCC for aquaculture, the increase in operating cost should not be more than 5%. The sensitivity of the feasibility studies is such that introducing a cost of greater than 5% of total operating cost would significantly change the feasibility points. Table 4-6 below compares the recommended NCC charge as a percentage of total operating cost, which ranges between 0,6 and the maximum of 5%.

Table 4-6: Evaluation of pricing structure against operating costs

Farm scenario	Production (tons/yr)	Stocking density (kg/m³)	Cage volume (m³)	Total operating cost (R)	5% of operating cost (R)	Annual charge (R)	Charge as % of operating cost
Nile tilapia, minimum profitable	75	53	1,415	3,340,763	167,038	80,000	2.4%
Nile tilapia, optimal profit	786	53	14,830	33,457,890	1,672,895	200,000	0.6%
Mozambique tilapia, minimum profitable	34	53	642	1,750,103	87,505	80,000	4.6%
Mozambique tilapia, optimal profit	774	53	14,604	27,175,834	1,358,792	200,000	0.7%
Rainbow trout, minimum profitable	38	25	1,520	1,607,176	80,359	80,000	5.0%
Rainbow trout, optimal profit	923	25	36,920	23,141,594	1,157,080	360,000	1.6%

Reference pricing

There are no current market activities for freshwater aquaculture and, therefore, determining a direct market price was not possible. Whilst acknowledging the significant difference between marine aquaculture and freshwater aquaculture, there are examples of 'water-use lease / water rental' in the marine sector which provided a good reference point.

In Saldanha Bay, marine aquaculture farmers, with a revenue of up to R10 million a year pay R324 000 a year for roughly 15 hectares. This equates to approximately 3% of their total operating cost. This aligns with the table above, where the range is from 0,6% to 5% and charges range from R80 000 to R360 000 per annum. Considering that the stocking density is higher in freshwater, the proposed NCC charges are approximately R200 000 for optimal profits. These charges are then in the same order of magnitude as the Saldanha Bay example of R324 000.

Basis for escalation

There is a case to base future escalation on either Producer Price Index (PPI) or Consumer Price Index (CPI). PPI measures inflation at the factory gate (input costs), whilst the CPI measures inflation at the retail level (cost of living). As the non-consumptive charge for aquaculture is effectively an input cost for aquaculture farming, PPI could be selected. Headline PPI components emphasise the final cost of the key final goods such as food and manufactured goods, which is not directly correlated to the value or market value of the exclusive water space on which the NCC is based.

Headline CPI's largest component is housing and utilities, which could relate more closely to exclusive water use. In reality, both PPI and CPI could be used as an indicative basis for escalation, but do not have a strong correlation to the exclusive water use nature of the NCC for aquaculture. In general, DWS has proposed the use of CPI in the revised Pricing Strategy. For simplicity and standardisation, escalation for the NCC for aquaculture should be based on CPI.

4.7.4 NCC Tariff Blocks for Aquaculture

DWS has the option to choose between two different tariff blocks, either a 4-level tariff block that allows for increased simplicity, as presented in Table 4-7 or a six-level tariff block that allows for greater differentiation in the size of the operation, as presented in Table 4-8.

Table 4-7: Proposed 4-level tariff block

No	Block in cubic metres	Annual Charge (excl. VAT)	Billing Cycle	Comment
1.	**0 -100**	Exempt	Exempt	Reasonable domestic use
2.	**101-500**	R8 000	Annual	Small-scale operations; primarily cost recovery for administration and monitoring
3.	**501-5000**	R80 000	Annual	Medium-scale commercial operations
4.	**5001-20000**	R200 000	Monthly	Large-scale operations
5.	**>20 000**	R200,000 + R10,000 per additional 1,000 m³ (or part thereof)	Monthly	Very large operations; incremental charge applied in bands
	Cubic metres are calculated based on the exclusive use area. Walkways and areas without cages are deemed to be 1 metre deep. Cages and other related equipment are calculated on their actual depth.			
	Escalation: These amounts escalate annually on 1st April by CPI			
	Base Charge Review Period: Base charges are to be reviewed and reset in line with market pricing every 10 years			
	A three-year allowance period is proposed for new entrants, during which no charge is applied, to support early-stage business viability.			
	It is recommended that this mechanism be communicated as a water-use lease rather than a non-consumptive charge, as this framing is likely to be more intuitive and acceptable to operators			

Table 4-8: Proposed six-level tariff block

No	Block in cubic metres	Annual Charge (excl. VAT)	Billing Cycle	Comment
1.	**0 -100**	Exempt	Exempt	Reasonable domestic use
2.	**101-500**	8 000	Annual	Small-scale operations; primarily cost recovery for administration and monitoring
3.	**501-2500**	R36 000	Annual	Medium-scale commercial operations
4.	**2501-5000**	R80 000	Annual	Medium-scale commercial operations
5.	**5001-10 000**	R140 000	Monthly	Large-scale operations

No	Block in cubic metres	Annual Charge (excl. VAT)	Billing Cycle	Comment
6.	**10 001-20 000**	R200 000	Monthly	Large-scale operations
7.	**>20 000**	R200,000 + R10,000 per additional 1,000 m³ (or part thereof)	Monthly	Very large operations; incremental charge applied in bands
	Cubic metres are calculated based on the exclusive use area. Walkways and areas without cages are deemed to be 1 metre deep. Cages and other related equipment are calculated based on their actual depth.			
	Escalation: These amounts escalate annually on 1st April by CPI			
	Base Charge Review Period: Base charges are to be reviewed and reset in line with market pricing every 10 years			
	A three-year allowance period is proposed for new entrants, during which no charge is applied, to support early-stage business viability.			
	It is recommended that this mechanism be communicated as a water-use lease rather than a non-consumptive charge, as this framing is likely to be more intuitive and acceptable to operators			

4.7.5 Administration and Revenue Collection

Administration and revenue collection will depend on the location of aquaculture activity. These fall into two categories:

- Aquaculture in government works (land lease)
- Aquaculture in rivers

Government Works (Land-leases)

Open water aquaculture in national government works or rivers using cages, is a similar approach that will require a portion of adjacent land. The adjacent land is used to access the aquaculture infrastructure in the water. The land will normally be used for storage, processing and general tasks relating to aquaculture. If the adjacent land is owned by DWS, it will require a land lease following the normal process within DWS. The adjacent land and the water space would need to be rented together in a single land lease for the aquaculture activity. The land would be of little use without the water space and vice versa for the aquaculture lessee.

The land-lease process includes a market-related price determined by the valuator general. The water space portion would be determined by the NCC and added to the market-related land rental to determine the overall rent. Although a single overall rental will be paid by the lessee, this differentiation and split allow for allocation of the different components of the rent (revenue) collected to be allocated to the relevant water management institutions.

There are currently no running examples or clear indication of growth for this category in South Africa, making reasonable revenue projection not possible.

Rivers (without land lease)

In this category, administration and revenue collection should be done by the CMAresponsible for the region in which the aquaculture activity is located. The expected number of transactions is very low, making administration simple and not

requiring many resources. There are currently no running examples or clear indication of growth for this category in South Africa, making reasonable revenue projection not possible.

5 NCC Framework for Energy Generation

5.1 ENABLING LEGISLATION

5.1.1 Water Use

Section 21 (elaborated in Section 4.1.1 above) provides a list of ' water uses', for example storing water, that require authorisation. Different renewable energy generation activities often trigger one or more of the listed water uses, with each requiring authorisation.

Section 37 of the NWA: *"37. (1) The following are controlled activities:*
(c) a power generation activity which alters the flow regime of a water resource;

(2) No person may undertake a controlled activity unless such person is authorised to do so by or under this Act"

Power generation in the form of hydroelectricity is covered specifically in section 37c, when altering the flow of a water resource. These controlled activities require authorisation. Currently different types of hydro electricity generation are also covered in terms of water uses such as taking water, storing water and impeding or diverting the flow of water in a watercourse. As such these water uses require licenses, which can have relevant charges attached.

Floating solar is not directly covered by the NWA nor currently listed as a controlled activity. If this activity occurs at a government works, then it is covered under use of government works.

5.1.2 Authorisation and Licenses

The NWA sets out in section 29 (1) that:
A responsible authority may attach conditions of every general authorisation or licence—
(b) relating to water management by –
(iv) requiring the payment of charges for water use as provided for in Chapter 5;

Section 56 (4) The pricing strategy may differentiate under subsection (3)(a)
(b) in respect of different types of water uses, on the basis of—
ii) whether the use is consumptive or non- consumptive

Section 59 (1) Water use charges contemplated in this Chapter
(a) may only be made in respect of a water use to which a person is voluntarily committed: and
(b) must bear a direct relationship to the water use in question.

5.1.3 Government Waterworks

This allows for charges for floating solar panels or any other method that uses government waterworks or the surrounding land.

NWA 1998 Section 116

(1) The Minister may, with regard to a government waterworks, make regulations providing for

(c) charges for—

(i) entrance to:

(ii) use of facilities at; and

(iii) the private development of,

a government waterwork."

5.1.4 Revised Pricing Strategy for NCC

"There are various non-consumptive uses of water resources where these non-consumptive uses result in water resource management costs. The pricing strategy needs to provide for these costs to be recovered. Examples of non-consumptive use include aquaculture, generation of renewable energy using water resources (such as hydropower and ***floating solar****), and recreational use of water resources. The charge will provide for costs associated with issuing the required water-use authorisation; monitoring adherence to the conditions of the water-use authorisations; and a contribution to the operations and maintenance of the scheme to provide access to the water (e.g. operating and maintaining a canal in which a user has located a generator)" (DWS, 2024).*

The pricing strategy reiterates the controlled activity of hydropower. In terms of floating solar, there in only one reference as an example basis in the revised Pricing Strategy.

5.2 TYPE OF WATER

5.2.1 Types of Water

Renewable energy activities can occur in different environments and types of water resources as indicated in Table 5-1 below.

Table 5-1: Types of water for Energy Generation

No.	Type	Description	Comment
1.	**Government Works**	Government Works and surrounding land	Charges covered by NWA. O&M and capital costs can be considered
2.	**Municipal Works**	Municipal owned dams, works and surrounding land	Not recommended
3.	**Rivers**	All rivers	Yes, if diverting the flow of the river. Catchment management costs

No.	Type	Description	Comment
4.	**Private**	Privately owned dams, regardless of source (borehole, river abstraction, run-off)	License required aligned with sec 21 for abstraction, water storage and discharge
5.	**Private Mines**	Private mines used for pumped storage	License required aligned with sec 21 for abstraction, water storage and discharge

5.2.2 Municipal Works

Regulations under section 116 of the NWA allow DWS to charge for energy generation and all other activities involving the use of DWS and national government-owned works (recreation, dams, etc.). If municipalities own their own dams, they are required to be licensed and get authorisation for water uses as per section 21 uses. The NWA or other legislation does not allow for DWS to charge the municipality or anyone else using the municipal facilities for activities separate to the water uses. As such DWS cannot charge for renewable energy generation in municipally-owned dams. This would be up to the municipality unless core legislation is changed.

5.3 WATER USE ACTIVITIES

5.3.1 Types of Activities

Table 5-2: Types of activity for energy generation

No.	Activity	Type	Exp Grw	Cost to DWS	DWS Current Charge	Potential Charge
1.	**Hydro Electricity**	Orange River Scheme: Gariep & Vanderkloof Dam (Eskom)	N	Capital, O&M and CMA	Y. Fixed and Variable Charge on KW and kWh per month basis with parameters	No. Existing long-term agreements
2.	**Pumped Storage**	Drakensberg, Palmiet, Steenbras (Eskom)	P	Capital, O&M and CMA	Drakenberg, Palmiet agreement received but multi use, where Eskom charges DWS. Ingula information outstanding	Current agreements to be considered for renegotiation. Including transparency in fees by both parties rather than netting
3.	**Pumped Storage: Mines**		P	Auth & CMA	No current info	
4.	**Mini: Non dispatchable hydro**	First Falls & Second Falls (Mthatha River) Mbashe. Ncora (Eskom)		Auth &CMA	Yes to Eskom plants only. Fixed and variable KW Charges	Yes, to IPP's. For the very small hydro project categories, and likely floating solar, there could be a consideration for a fixed charge related to equipment

No.	Activity	Type	Exp Grw	Cost to DWS	DWS Current Charge	Potential Charge
						installed and not a variable charge based on energy production.
5.	**Micro: Run-in River**	7 License Received	Y	Auth & CMA	No current Info	Yes. Smaller Annual fee
6.	**Floating Solar in Government Works**	3 applications for lease received	Y	O&M &CMA	N/a	Yes 'Space rental' or kw basis
7.	**Floating Solar in River**	Not practiced			Currently not covered by NWA	

5.3.2 WARMS Registrations

WARMS data was received for power generation based on the different water uses (Table 5-3). Whilst the data identified the industry link to power generation, the data did not identify those actually undertaking hydroelectric power generation or floating solar activities. The data is based on the customer selecting a block on the form that indicated the industry they operate in. If the industry is power generation, then all water uses are abstracted and supplied, regardless of if the water use is related to the electricity generation. For example, a wind turbine farm abstracting water, storing it, even for human consumption at the facility is included in these records. Similarly, when it comes to impeding, diverting or altering watercourses the most numerous records relate to power lines or access roads by power generation companies. Based on the data, it was difficult to ascertain whether the uses could be non-consumptive in nature.

Table 5-3: Registrations for Power Generation

No	Form	Use	Records / Registration	Comment	Identified as relating to Power Generation
1.	**DW760**	21(a) Abstraction	10 611	331 million cubic metres per year	All
2.	**DW762**	21(b) Storing Water	27 747	339 Billion Cubic metres gross capacity	56
3.	**DW763**	21(c) Impede or Divert	7 461	Majority impede through infrastructure poles or crossing	1 solar, 6 hydro
4.	**DW768**	21(i) Altering Watercourse	8 014	Majority power or other lines on banks or watercourse	All

The existing WARMS data could not be used to accurately identify hydropower or floating solar activities. This also made determining the exact size, revenue and growth of the industry impossible. Therefore, secondary methods were used to

plug data gaps, such as the direct data from DWS and public data from Eskom. These were further supplemented by the literature review of research data.

5.4 CURRENT RENEWABLE ENERGY ACTIVITIES

5.4.1 Hydroelectricity

Currently, there are two hydroelectricity facilities in South Africa and both are on the Orange River Scheme: Gariep and Vanderkloof hydroelectric power stations operated by Eskom. These two facilities came online in stages in the 1970's. The agreement for these two schemes was signed between DWS and Eskom in 1984. There was a further update of the operating rules in 1998. The main contract pre-dates the current National Water Act and was based on the 1956 Water Act. There are currently no allowances for the NWA or the revised Pricing Strategy and items such as non-consumptive charges.

The charging method utilised in the contract is based on kW/h. There is a monthly fixed portion relating to the agreed output rating (essentially the designed capacity) of the facility (in kW) and a variable portion based on electricity production in the month. There are certain considerations for conditions to be met by DWS and the agreement provides the cost, at time of the agreement in South African cents per kW and per kW/h.

Unfortunately, the principles, charge basis and calculation of how the initial amounts where derived were not included in the agreement. Considering the lack of information on the business model, including discounts on electricity for DWS pumping on the scheme and capital costs contribution, it is difficult to evaluate the current method of charging. It is recommended that these contracts be explored to confirm alignment with more recent legislation. Reflections from international benchmarking on similar schemes and suggested processes are presented below for consideration.

International Benchmarking on Charge Basis for Hydro Electricity

International benchmarking shows two main bases of charging of the power production entity:

- **On an energy production basis.** This generally includes a fixed fee relating to capacity and a variable fee based on electricity generated.
- **On a percentage of revenue of the utility.** In this case, the revenue per production facility is ringfenced and a percentage of revenue is used as the basis of the charge.
    - For example, in Ontario, Canada, the calculation of water rental charges is based on the deemed annual gross revenue of a hydro plant, which is taken to be the actual generation in a year multiplied by CAD 40,000 per GWh (4 cents/kWh).
    - The fixed water rental charge rate is 9.5% of the Annual Gross Revenue (so this amounts to 4 cents x 0.095 = 0.38 cents per kWh generated.
    - To encourage development of new hydro power plants, the government offers a programme that gives a 10-year holiday for paying water rental charges.

Unlike in South Africa, in most international cases the hydroelectric projects are single purpose. This makes the costs associated easier to track and allocate as all costs are associated with the hydroelectricity production. In the South African hydropower examples, most dams are multi-purpose including irrigation, human consumption and hydroelectricity.

Proposed steps for Evaluating Current Contracts

The legal basis for NCC is that it compensates DWS for costs it incurs associated with, in this case, a renewable energy project and its associated non-consumptive use. For renewable energy projects covered by existing agreements that do not explicitly identify how DWS is compensated for its costs, it would be necessary to:

a) understand the basis of the financial charges specified in the agreement; and
b) obtain specific information on the project to understand the relationship between the parties for the investment costs, ongoing operating & maintenance costs of the facilities and administrative costs. These steps would require obtaining detailed project information from representatives of both the owner of the renewable energy project and DWS.

With respect to item a), the objective would be to review the basis for any financial charges specified in the agreement between the owner and DWS. It would be necessary to understand what aspect(s) of the project these cover and whether they are based on market rates or reflect subsidies or upcharges.

With respect to item b), it would be necessary to obtain drawings or schematics of the project and identify

- any incremental investments made by DWS (or its predecessor agency) to enable the renewable energy project and/or investments made by the owners of the renewable energy project that directly benefit DWS operations at the site;
- any amounts that DWS spends on an ongoing basis to operate and maintain assets that directly benefit the renewable energy project and vice versa; and
- administrative costs that DWS incurs on an ongoing basis to monitor the operations of the renewable energy project with respect to its compliance with the project agreement and broader water usage regulations and to deal with any disputes that arise with respect to the renewable energy project.

The findings of items a) and b) above would then be used to determine the extent to which the existing agreement is resulting in the renewable energy project adequately compensating DWS for its costs. Depending on the complexity of the project, this analysis may be faced with the need to make judgements on the allocation of common costs.

In the case of longstanding agreements that include provision for fixed monthly payments, it may be necessary to make judgments as to whether such charges have already recovered investment costs or, alternatively, to consider such costs as sunk costs. Finally, it should be recognised that for renewable energy projects that date back many years, it may not be possible to obtain all the data that would be needed for a full-scale analysis.

5.4.2 Pumped Storage

South Africa has three main pumped storage electrical generation schemes: Drakensberg, Palmiet, and Ingula. These three are all Eskom-owned generation units. South Africa's latest Integrated Resource Plan issued by DEE in October 2025 shows the intention to develop at least one more pumped storage facility.

Drakensberg

In the early 1970's, demands made on the Vaal River system were growing relentlessly and problems of future water supply for industries, commercial and domestic use in the Gauteng area were becoming increasingly serious. It was decided to transfer water from the Tugela River catchment into the Vaal River catchment. As water transfer over the Drakensberg would require the construction of reservoirs, channels and pumps, it opened the way to build a hydroelectric power station which could further utilise the potential of water resources being made available. The then Department of Water Affairs and Forestry (DWAF) and Eskom started work on this dual-purpose scheme in 1974. In 1982 the project was completed, operating as a pumped storage scheme and as a pumping station for water transfer over the Drakensberg from the Tugela into the Vaal. The scheme has a generating capability of 1 000MW.

As a dual-purpose scheme, the catchment transfer agreement has DWS paying Eskom at net rates, in the form of discounted electricity pricing in return for the allowance to use the scheme for hydropower generation. Therefore, there is no direct charge to Eskom but rather any charge to Eskom is netted against the charge to DWS for electricity for pumping. Considering this dual-purpose, this agreement is bespoke and thus difficult to find similar schemes to compare to.

It seems unlikely that even with re-negotiation, the Drakensberg pumped storage facility will produce net additional revenue for DWS. It is possible for DWS to implement additional charges, but this would increase Eskom's costs and be charged back to DWS as higher electricity costs for operating the scheme, resulting in the same net effect. This approach could however bring greater transparency, which may be more appropriate with Eskom as a separate parastatal and DWS moving towards operating national water infrastructure through the NWRIA.

Palmiet

For several years, DWS conducted investigations in the Western Cape to survey possible dam sites to augment existing water supplies to the Cape Town metropolitan area. The Palmiet River basin not only met these requirements but also provided a potential site for a pumped storage scheme. It was clear that a venture such as this required the expertise of Eskom. The development of the Palmiet Pumped Storage Scheme was therefore a joint venture between the DWS and Eskom. The design and construction of the power station and waterways were undertaken by Eskom, whereas that of the two reservoirs, Rockview and Kogelberg, together with the connecting canal and pipeline between the Rockview and Steenbras Dams, were the responsibility of the department. The contribution of the DWS amounted to about 25% of the project's financial outlay. The power station can generate 400MW during peak demand periods and began commercial operation in 1988.

In a similar manner to the Drakensberg agreement, the focus of the Palmiet agreement is linked to the transfer of water. The agreement provides a net effect by reducing the overall charge of Eskom to DWS through the ability to generate energy during the process of water transfer.

Ingula

Ingula is Eskom's third pumped storage scheme and is used solely for power generation during peak demand. It is situated 55km from Ladysmith (20km northeast of Van Reenen's Pass), within the Drakensberg range, on the border between the Free State and KwaZulu-Natal. The 1 332MW station is fully operational, with the last of its four units going live on 30 January 2017. It was ascertained that this is a more standard electric generation pumped storage scheme, unlike Drakensberg and Palmiet, which were driven by water relocation needs.

Pumped Storage Going Forward

Pumped storage schemes in South Africa can have different uses, which include the transfer of water separately to power generation. In the two main examples, the focus of the current agreements, written some time ago, is on the power costs of transferring the water. The net effect is written into agreements. Considering the separate commercial nature of Eskom and the DWS requirements for revenue in current times it would be recommended for the revenue and costs to be tracked transparently even if they are still to be netted against each other. Considering this, DWS could charge Eskom on one of three bases:

a) **kW/h basis:** On a kW/h basis with a separate base charge and variable charge based on electricity production. This would be aligned with the principles used elsewhere in South Africa for hydro-related activities
b) **Percentage of Revenue:** DWS could charge Eskom on a percentage of revenue generated by the power plant. This approach is aligned with benchmarking in other countries and would require clear financial ring-fencing by Eskom.
c) **Volume of water:** Water flow and/ or volume of water-based charge. This could be approached with Eskom purchasing the water that is cycled up and down. It would be calculated based on the volume of water abstracted from the top dam less the volume of water received into the lower dam. This could be a once-off purchase or a water rental fee.

To determine the best solution and propose charges and calculations, an understanding of the operating rules would be needed.

5.4.3 Pumped Storage: Mines

Pumped storage power generation in mines has been flagged as a potential growth area in South Africa. Companies like Anglo American are said to be exploring this "Ruphes" (Renewable Underground Pumped Hydro Energy Storage) concept, leveraging the mines' geological stability and significant head height to create long-life, integrated energy solutions. No further data was received, and the understanding of this sub-sector is limited.

5.4.4 Mini: Non-dispatchable hydropower

These hydroelectric power stations fall into two categories:

- **Category A: Eskom Plants –** there are four of these situated in the former Transkei and Ciskei. While primarily peaking stations, they also operate in non-peak hours when water is available as they are non-dispatchable power stations that cannot store water to meet fluctuating demands for electricity.
- **Category B: Independent Power Producers** – two of these have been identified and are covered below.

Category A – Eskom

The four relevant plants are:

- **First Falls 6MW:** This is a run-of-river hydroelectric power station on the Umtata River, commissioned in 1979. It has two 3MW units.
- **Second Falls 11MW:** Downstream of First Falls, Second Falls is also a run-of-river hydroelectric scheme with two 5,5 MW units commissioned in 1979. During the dry season, the flow to the two stations is augmented by releases from Umtata Dam, situated some 5km north west of Umtata in the Eastern Cape.
- **Mbashe 42MW:** This run-of-river hydroelectric station on the Mbashe River in the Eastern Cape has three 14 MW machines commissioned in 1985. Make up water for this station is released from the Ncora Dam via the small Ncora hydro station.
- **Ncora 2.4MW:** This small hydropower station in the Ncora River has three units with a total installed capacity of 2 MW and was commissioned in 1983.

In 2012, a document was signed by the relevant DWS offices titled: *Approval of Raw Water Charges for 2011/2012 financial year for Eskom Power Generation in the Eastern Cape*. This document forms the basis of the charging of these units. At the request of Eskom, this document differentiated charging in Summer and Winter. The charge basis and summary are as follows.

Table 5-4: Southern Area Eskom Tariff for Hydropower 2011/2012

	Summer Tariff	Winter Tariff
Fixed Charge	R186.96 per Megawatt (MW) installed	R344.08 per Megawatt (MW) installed
Variable Charge	R0.0087 per Kilowatt hour (kWh) generated	R0.01869 per Kilowatt hour (kWh) generated
Tariffs to increase by PPI each year		

These charge principles had been tested by both DWS and Eskom, and are the best-established basis for charges in South Africa.

Category B Independent Power Producers

There are two identified IPP hydroelectric schemes:

- **Kakamas Hydroelectric Power (KHEP) project** - a 10 MW run-of-river small hydropower plant located on the Orange River near Kakamas in the Northern Cape. It was the first run-of-river project to be developed under the government's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). Non-consumptive charges would need to be considered here.
- **Kruisvallei Hydro -** The Kruisvallei Hydroelectric Power Generation Scheme, also known as Kruisvallei Hydro, is a 4MW small-hydroelectric plant owned, built and operated by Red Rocket, a fully integrated African Independent Power Producer. Located along the Ash River between Clarens and Bethlehem in the Free State Province, Kruisvallei Hydro will generate approximately 23GWh of energy annually, catering to the energy needs of more than 1 916 households. Developed under the South African Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), the primary purchaser of power generated by the plant will be Eskom.

5.4.5 Micro: Run-in River

In the South African context, these are normally private (non-Eskom) smaller power generation schemes of typically less than 1 MW. These either divert water or are directly in rivers or dams and are non-consumptive in nature. As such they would qualify for a NCC charge in principle, but their low capacities make this more expensive to manage the administration costs than the revenue that is likely to be generated. Seven copies of the licenses were reviewed but unfortunately they do not include financial information. A summary of the licenses received is in Table 5-5 below.

Table 5-5: Summary of run-in river licences

	Authorizer	Company	Flow	MW	Source	Description
1.	**KwaZulu-Natal**	Clife Power Pty Ltd	0,032 m3/s	0.6MW	Quaternary Catchment U202 – between Pongola and Umzimkhulu	Albert falls Dam
2.	**KwaZulu-Natal**	Clife Power Pty Ltd	1,026 m3/s	0.84 MW	Quaternary Catchment V11M – between Pongola and Umzimkhulu	Spionkop
3.	**Gauteng**	Gert Tack Family Trust	36m3/a		Liebenbergsvlei River	
4.	**KwaZulu-Natal**	Woodstock Hydropower company			Wagendrift Dam	The turbines for this operation will be installed at the dam outlet and will be reliant on dam releases as per the Department.
5.	**National**	Sabie Hydro Power			Sabie River X3ID	Water diverted on enlarged existing canal
6	**KwaZulu-Natal**	Wild Blend		Inserting a hydropower turbine in a 250mm diameter pipe discharging into the water course.	Quaternary catchment W42B Pongola to Umzimkhulu	Store water from a spring in two existing dams on the property
7	**Mpumalanga**	Day to Day Grace Services	Max. flow of 3m3/s. The steel pipe is of	Flow rate-4.17 · Volume-48 435 000m3 /a · Power output rating- 0.13		The hydropower plant will be retrofitted to the existing dam wall. The Francis turbines of 2x2MW, with an option to reverse as a pump for

	Authorizer	Company	Flow	MW	Source	Description
			diameter 1.1m.	MW · Annual energy production- 1910 MW		energy storage, will be pre-installed in a container that will be installed on a barge (float) on the river below the dam wall,

There are two main charge principles that can be considered:

- **The amount of electricity production capacity** is often used as the proxy method of calculation. This could be used. It is noted that the efficiency of the system in generating electricity is not considered. This is also directly linked to the water use.
- A **method directly linked would be the quantity of water, or the flow rate, on which the design is based**. The flow rate would have the most direct link. This could be based on the original design.
- A **hybrid combination of both electricity production capacity** and flow rate could be used. For private production of own use flow rate seems most appropriate. If this electricity is sold on, it could attract a kWh-based fee as well. In cases where the electricity is sold, there are also clear metering in place which facilitates the basis of this billing.

When doing initial calculations, the value of revenue would not justify the administrative burden. It is proposed that these are exempt from a true NCC charge. At the same time, there are costs associated with issuing and monitoring licenses. Taking this into account, it is believed that licenses should include an annual cost each year. This cost should be a set cost for all Micro (under 1 MW) facilities. This exact charge is still to be calculated, but is likely to be in the order of R2000 a year.

5.4.6 Floating Solar in Government Works

Overview

In South Africa, floating solar is in its infancy. The City of Cape Town is piloting floating solar at its Kraaifontein Wastewater Treatment Works. There are also private installations on private dams for private use. DWS received three applications to lease for floating solar, but no data exists for operating examples or contracts or existing charges to be considered.

Benefits and Disadvantages

1. Government policy is encouraging the addition of renewable power. As solar PV installations require significant amounts of relatively flat land, this policy can result in the use of land that could otherwise be used for agriculture, settlements or other uses by the general population.
2. Using hydropower or water supply reservoirs for installation of floating solar panels can eliminate or limit currently allowed uses of such water bodies for water sports and/or fishing and thus reduce usage revenues as well as result in complaints from impacted users. The reservoir operator would likely also have to use its resources to monitor activities surrounding the floating solar and resolve disputes related to any human or water level disturbances of the floating solar facilities.
3. For developers of floating solar, there is a benefit of less opposition by civil society to taking away land from other uses.

4. Floating solar has been reported to be 5-15% more efficient in terms of energy generation due to the cooling of the solar panels by the water. This benefit continues over the life of the solar project.
5. However, initial installation costs are higher (reported in some articles as 15-25%) due to the flotation systems (typically pontoons), devices to hold the floating systems in place and adapt to changing water levels and more robust cabling to evacuate electricity produced. In addition, operation and maintenance costs can be higher due to the need for more frequent inspection and perhaps the regular cleaning needed to remove bird droppings.
6. On the positive side for the reservoir operators, floating solar can reduce water loss due to evaporation and reduce the growth of algae. These benefits would typically be site-specific.

Charge Principles Considered

Floating solar is a clear non-consumptive use. It is also cited as reducing evaporation of water, thus having a positive effect on the quantity of water rather than a reduction. There are two categories of effects on the water that can be the basis of charges:

a) If the activity affects the overall temperature of the water, plant photosynthesis, etc., this would have an environmental impact on the dam. When the Environmental Impact Assessment (EIA) is done, any mitigating measures would need to be considered. It is not possible at this time to calculate the cost that this could cause to DWS, making it difficult to calculate a charge to cover this cost.
b) Floating solar does require a portion of a reservoir to be demarcated for exclusive use for electricity generation. It also often requires a small portion of ground alongside the dam/reservoir and the panels. This exclusive use of the surface area of the dam can be a rental charge, noting that this area could no longer be used by recreational users or general members of the public.

Alternative floating solar NCC charges could be approached similarly to hydroelectric, where the charge is based on electricity produced. This approach would bring consistency across the energy generation NCC.

5.4.7 Floating Solar in Rivers

Although this is theoretically possible, it has not occurred in South Africa yet and is unlikely to in the future. Solar panels need to be secured, and in a river environment, there are shifts in the flow of water as well as potential debris that could affect the operation of the panels.

5.5 PROPOSED NCC CHARGE PRINCIPLES AND OPTIONS

5.5.1 Proposed NCC Charge Principles

- If water is abstracted and not returned, then the abstraction charge is applicable.
- Water that is stored, e.g. pumped storage, should include a fee for the licence and monitoring of storage.
- Where surface space is utilised on government works, then space rental for exclusive use (opportunity cost) can be triggered.

- Run-in-river: can attract a license and monitoring cost/ charge. This may also attract a portion of CMA cost and can be charged on the flow rate.
- 'Polluter pays:" If floating solar has a negative impact and cost associated with it, then this is to be charged.

5.5.2 Proposed NCC Charge Options

Table 5-6: Proposed charge options or energy generation

Number	Type	Preferred Option	Alternate Option(s)
1.	Hydro Electricity	Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced	
2.	Pumped Storage	Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced. Multi-use plants to show separate revenue for Eskom vs DWS before nett effect	Water abstracted & stored Sec 21 charges (as water is taken out and not returned, it is not an NCC)
3.	Pumped Storage : Mines	N/a but to be same as standard pumped storage	
4.	Mini: Non dispatchable hydro	Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced	Annual license fee based on flow into the facility (in categories
5.	Micro: Run-in River	Annual license fee covering license monitoring costs. Likely to be same fee for all	kW/h basis if selling electricity
6.	Floating Solar	Exclusive space Rental: Square metres as a percentage of surface area, recovering O&M	R per Kilowatt-hour. Same as hydro for there to be consistency in charges

5.6 NCC CHARGE ASSESSMENT

5.6.1 Cost Determination

The charge will provide for costs associated with:

- *issuing the required water use authorisation*
- *monitoring adherence to the conditions of the water use authorisation*
- *contribution to the operations and maintenance of the scheme to provide access to the water*
- *Water Resource Management Costs*
- *Operations and maintenance costs of government works*
- *Capital cost in specific cases*

Current Charges

- On a kW basis.

5.6.2 Salients findings from the Working Group and direct Eskom Interaction

- For the NCC, energy generation as considered in its current form and the use of a market value as a proxy for the charge.
- Charges based on water volumes are strongly discouraged and will create increased complications in charging.
- Metering of water volumes is not accurately recorded currently and is further complicated in pumped storage schemes where water is pumped through the meter and then back again multiple times, expanding any inaccuracies.
- Water-based power generation by Eskom is used with peak-hour top ups rather than continuous power production.
- Eskom's view was that on the current pumped storage contracts, it is subsidising DWS, especially with the inter-basin transfer energy requirements for pumping. Revising the contracts may result in higher costs for DWS as all the principles would need to be renegotiated.
- For floating solar activities, the charge should be consistent across the sector for ease of understanding and comparison of the NCC.

6.6.1 kW/h as a charge basis

The international norm for water use charges in energy generation is energy generation or a percentage of the revenue of the energy generation utility. The percentage of revenue is also directly attributable to the amount of energy generated by the utility. Confirming that the norm for energy generation utilities is to be charged for water use on the basis of the value created, which is measured by the amount of energy generated. KW/h is also the measure used to charge the end consumer when consuming electricity and the standard across the sector.

5.6.3 Assessment of Short-listed Charge Options

Table 5-7: Assessment of the short-listed charge options

No	Draft Charge	Advantages	Disadvantages
1a.	**Hydro Electricity:** Scheme-specific fixed charge on installed capacity and Variable charge on Kilowatt-hours produced	• Preferred by Eskom • Current basis of agreements • Simplicity in charge are calculating charge • Fixed portion assists with cashflow • Variable portion aligns with the value created by the water use for Eskom	• Does not relate directly to the quantity of water utilised • No differentiation between if Eskom or DWS required the water release
1b.	**Hydro Electricity:** Scheme-specific charge based on water release	• Links the NCC with the quantity of water utilised • Differentiation in charges is possible based on which entity requires the release of water.	• Currently no accurate meters and reading for this volume • Eskom would be discouraged to use the facility as a higher relative charge from beginning of water release. Hydro is currently used to top up the grid at

No	Draft Charge	Advantages	Disadvantages
			peak hours rather than consistent use. Eskom has alternate options for this top up • Difficulties in charging if DWS requires a release of water but Eskom utilises the water • Not aligned to international best practice on electricity generation charges • Would fundamentally change the basis of the charge and thus net charging on existing hydro agreements
2a.	**Pumped Storage:** Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced.	• Consistency and simplicity in the basis of NCC • Preferred by Eskom • Current basis of agreements • Fixed portion assists with cashflow • Variable portion aligns with the value created by the water use for Eskom	• Does not relate directly to the quantity of water utilised • No differentiation between if Eskom or DWS requires the water release • Does not provide a clear basis for multi-use schemes when used for both inter-basin transfer and energy generation
2b.	**Pumped Storage:** Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced. Multi-use plants to show separate revenue for Eskom vs DWS before nett effect	• Same as 2a • Transparency in the off-setting of costs and revenue with Eskom • Potential for additional revenue for DWS	• Same as 2a • Risk that, by opening discussion on the existing agreement, negotiation may end in a less favourable arrangement for DWS
2c.	**Pumped Storage:** Charged on water abstracted and stored as a sec 21 charge.	• Links the NCC with the quantity of water utilised • Differentiation in charges possible based on which entity required the release of water. • Higher rate per kl on water abstracted	• Currently no accurate meters and challenges with metering accuracy when water is repeatedly used. • Eskom would be discouraged to use the facility as a higher relative charge from beginning of water release. Pumped storage is currently used to top up the grid at peak hours rather than consistent use. Eskom has alternate options for this top up • Additional charges from Eskom for inter-basin transfer requested by DWS • Not aligned to international best practice on electricity generation charges

No	Draft Charge	Advantages	Disadvantages
			• Would fundamentally change the basis of charge and thus net charging on existing hydro agreements
3.	**Pumped Storage-Mines:** Water abstracted & Stored Sec 21 charges (as water is taken out and not returned it is not an NCC)	• Current systems, processes and prices based on abstraction can be used.	• The charge would be on a different basis than other electricity generation activities
4a.	**Mini – Non dispatchable hydro:** Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced	• Second choice of Eskom • Fixed portion assists with cashflow • Variable portion aligns with the value created by the water use for Eskom • Steady monthly revenue for DWS • Can be charged on same basis to IPP	• Does not relate directly to the quantity of water utilised • Changes the basis of the current charge and needs consultation and a new agreement
4b.	**Mini – Non dispatchable hydro:** Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced – Separate Summer and Winter rates	• Preferred by Eskom • Current basis of agreements • Fixed portion assists with cashflow • Variable portion aligns with the value created by the water use for Eskom	• Does not relate directly to the quantity of water utilised • Separate summer and winter rates preferred by Eskom are the reverse of rainfall and river flow. No link in summer and winter charge to NCC or water use • Varying annual cashflow for DWS although no variation in cost
4c.	**Mini – Non dispatchable hydro:** Annual license fee based on flow into the facility (in categories)	• Links the NCC with the quantity of water utilised • Efficiency of energy production not relevant to DWS or charge	• Currently no accurate meters and reading for this volume • Eskom would be discouraged to use the facility as a higher relative charge. • Not aligned to international best practice on electricity generation charges • Would fundamentally change the basis of charge and thus net charging on existing hydro agreements

No	Draft Charge	Advantages	Disadvantages
5a.	**Micro: Run-in-river:** Annual license fee covering license monitoring costs.	• Cost contribution to monitoring licenses as per license conditions • Simplicity in billing and charge • No need to measure kW/h or water flow	• Administrative burden for small amounts of revenue • Discourages micro-run-in-river as increasing costs to already slow and cumbersome license process for small kW/h production
5b.	**Micro: Run-in-river:** Exempt if for own use	• Simplicity • Alignment with Schedule 1 principle of reasonable domestic use	• No revenue generated
5c.	**Micro: Run-in-river:** Exempt if for own use on kw fixed and variable if electricity is sold back to grid	• As per 5b if exempt • If used for commercial gain and not therefore schedule 1, charge is in place • Based on installed capacity only to simplify	• As per 5b if exempt • Administration and revenue collection burden for low levels of revenue • No variable portion of the charge
6a.	**Floating Solar:** Exclusive space Rental	• Aligned to water use • Aligns with opportunity cost of water surface used for recreation or other purposes	• The charge would be on a different basis than other electricity generation activities • May have unintended consequences of less space between panels having additional detriment to the environment
6b	**Floating Solar:** Fixed charge on installed capacity and Variable charge on Kilowatt-hours produced	• Consistency in NCC for energy generation • Fixed portion assists with cashflow • Variable portion aligns with the value created by the water use for Eskom • Simplicity and comparability in the charge with other alternatives	• Does not relate directly to the quantity of water utilised

5.7 NCC CHARGE RECOMMENDATIONS

5.7.1 Recommended NCC Charge Principles

The final charge principles for the NCC for Energy Generation are:

- kW/h is used as the basis of the non-consumptive charge for energy generation.
- A fixed charge is included and will be based on installed capacity.
- A variable charge is included and will be based on the amount of electricity generated.
- There will be no changes in charges based on seasons.
- Market-related pricing is used based on the value of energy produced using kW/h.

- Micro run-in-river energy generation with the energy used locally and not sold to the grid will be exempt, in line with Schedule 1 use of water for reasonable domestic purposes.
- New large-scale hydropower or pumped storage schemes (i.e. >20 MW) may be negotiated between the Department and the owner/operator of such plant on the same charge principles.
- Multi-purpose schemes should have transparency in the charges that are netted against one another in determining the final charge.
- Floating solar uses the same basis of charge determination, for consistency.

5.7.2 Recommended NCC Charge

Water used in energy generation and which is non-consumptive in nature (has not been abstracted and paid for as such), attracts a non-consumptive charge for the benefit from the water and associated infrastructure. The charge is based on the market value created by using the water for energy generation and is based on the amount of energy produced and the capacity for energy production.

The installed capacity will be charged based on R/MW (Rands per megawatt(MW)) of installed capacity. The variable charge will be based on c/kWh (cents per kilowatt-hour) of energy generated.

There is a differentiation in the non-consumptive use charge between energy generation that makes use of or is integrated into government works infrastructure directly, versus that which makes use of water flows outside of the government works.

5.7.3 Calculation of Charge

Table 5-8: Categorisation of energy related NCC charges

No	Category of Energy Generation for NCC	Fixed Charge	Variable Charge	Comment
1.	**Hydro Electricity:** Scheme-specific fixed and variable charge	Negotiated per Megawatt (MW) installed	Negotiated per kilowatt-hour (kWh) generated	Rand value calculated scheme-specifically. DWS to negotiate with owner/operator. When multipurpose transparency in net charges required
2.	**Pumped Storage: Scheme-specific** fixed and variable charge	Negotiated per Megawatt (MW) installed	Negotiated per kilowatt-hour (kWh) generated	Rand value calculated scheme-specifically. DWS to negotiate with owner/operator. When multipurpose (inter-basin transfer and energy generation) transparency in net charges required

No	Category of Energy Generation for NCC	Fixed Charge	Variable Charge	Comment
3.	**Mini – Non dispatchable hydro:** Standard fixed and variable charge	R505,82 per Megawatt (MW) installed	R0,026088975 per kilowatt-hour (kWh) generated	All year-round same charge no separate summer and winter. Eskom and IPP to pay same charge. Negotiation and phase in on existing contracts
4.	**Micro: Run-in-river:** Exempt if for own use and below 2MW installed capacity	Exempt	Exempt	Exempt as deemed with Schedule 1 reasonable domestic use
5.	**Micro: Run-in-river:** If selling to grid or above 2MW installed capacity	R505,82 per Megawatt (MW) installed	R0,026088975 per kilowatt-hour (kWh) generated	
6.	**Floating Solar:** Standard fixed and variable charge	R505,82 per Megawatt (MW) installed	R0,026088975 per kilowatt-hour (kWh) generated	The charge is the same in if government works or rivers or alternate relevant locations
	Billed Monthly by DWS/NWRIA if in Government Works or by CMA if river based			
	Future Escalation: These amounts escalate annually on 1st April by NERSA approved average electricity increase			
	Base Charge Review Period: Base charges are to be reviewed and reset in line with market pricing every 10 years			

Review of current Eskom Contracts

Current contacts exist between Eskom and DWS with some dating as far back as 1984. These contracts include nett charges, having considered capital contributions and offset various energy uses by DWS with a degree of the energy produced by Eskom. A study should be undertaken to determine the value of this offsetting, which can inform the need for a contract review.

Basis for escalation

In South Africa, the headline PPI increases are common and appropriate for cost-based pricing strategies, as the price increases with the associated increases in costs.

However, NCC are based on market-related value-added pricing strategy and not cost. It logically follows that price increases should be on the same basis of the market-related value-added pricing increase. The method selected for pricing the NCC in energy generated, measured in kW, therefore, increases should be based on the increase in kW value. The main determination of this in South Africa is the NERSA average annual increase. Therefore, the NERSA average annual increase is the proposed basis of annual increase.

Determination of recommended Rand Value of Charge

The recommended Rand value of charges is based on the 2012 negotiations and memoranda of price determination for non-dispatchable hydro charges. These agreed to charges were then implemented. The charges have been escalated based on headline PPI as the escalation method referred to in the memorandum and draft versions of the revised Pricing Strategy. Aligned with the recommended NCC charge principles, a set annual charge is calculated rather than separate summer and winter charges. This is done on a straight calculation of average charge methodology. The summaries and outcome are included in Table 5-9 below.

5.7.4 NCC Tariff Blocks for Energy Generation

It is recommended that DWS use the current Rand value charged to Eskom for non-dispatchable hydro when this NCC is implemented. (The 2025/2026 Rand values were not available at the time of writing this report, resulting in the latest charges supplied (2012) being used as the basis of the Rand Value.) The separate summer and winter charges would be averaged to determine the all-year-round charge in the same manner as displayed in Table 5-9.

Table 5-9: Summary of proposed charges

Mini-non dispatchable Hydro 2010/2011 Charge			
Charge	**Approved Summer**	**Approved Winter**	**Proposed**
Fixed Charge	R186,96	R344, 08	R265,52
Variable Charge	R0,0087	R0,01869	R0,013695
Mini – non dispatchable Hydro 2025/2026 Proposed Charge			
Charge	**Summer Escalated**	**Winter Escalated**	**Proposed**
Fixed Charge	R356,16	R655,47	R505,82
Variable Charge	R0,016574	R0,035604	R0,026089

Table 5-10: Headline PPI Increase

2011-2010	2021	2022	2023	2024	2025	Total
57,7%	7,1%	14,4%	6,7%	3,1%	1,5%	90,5%

5.7.5 Administration and Revenue Collection

Administration and revenue collection will depend on the location of energy generation activity. These fall into two categories covered in turn below:

- Energy generation in government works
- Energy generation in rivers

Government Works

Energy generation in government works will be charged and collected by DWS / NWRIA. In certain cases, there may be a land portion to this arrangement and/or access to various areas within the government works. As the charge principle is on the proxy of electricity generated, it is unlikely for this to have a separate charge or agreement. If appropriate DWS/NWRIA may charge a separate rental for adjacent land use.

Rivers

Energy generation in or from rivers will be charged and collected by the CMA in whose geographical region the energy generation occurs.

6 NCC Framework for Recreation

6.1 ENABLING LEGISLATION

6.1.1 Water Use

Under section 4(1) of the NWA, "*A person may use water in or from a water resource for purposes such as reasonable domestic use, domestic gardening, animal watering, firefighting and recreational use, as set out in Schedule 1*".

Section 21 states that, "*In general a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence*". Recreational water use is listed as a regulated water use under section 21(k). This requires any recreational water use outside Schedule 1 to be licensed. As it stands, DWS does include such licenses in the WARMS system. However, there has been little documentation of the distinction between section 21(k) recreational water use and what is authorised as a Schedule 1 use.

6.1.2 Schedule 1

The NWA under Schedule 1 provides that "*A person may, subject to this Act-*

(1)(e) for recreational purposes –

(i) Use the water or the water surface of a water resource to which that person has lawful access; or

(ii) Portage any boat or canoe on any land adjacent to a watercourse in order to continue boating on the watercourse;"

The definition of a "person" under section (1) (xiv), "*includes a natural person, a juristic person, an unincorporated body, an association, an organ of state and the Minister*".

It is important to note that section 4(1) places emphasis on the concept of 'reasonable' use, which is not defined. However, a review of existing recreational activities at government waterworks, along with the distinction between consumptive water use for domestic and commercial purposes, leads to a similar conclusion. Schedule 1 would cover personal recreation, not for commercial benefit. This is elaborated further in the following section.

6.1.3 Government Waterworks for Recreation

The NWA also includes stipulations under section 113, covering *"Access to and use of government waterworks for recreational purposes"*:

113. (1) The water of government waterwork and the surrounding state-owned land may be made available for recreational purposes. either generally or for a specific purpose, on the conditions and to the persons determined by the Minister.

113 (2) The Minister may –

(a) control or prohibit access to any government waterwork; and

(b) subject to this Act, make reasonable charges for

(i) the use of';

(ii) entry into; and

(iii) the use of any water surface or land associated with,

any government waterworks for recreational purposes."

This section then establishes the basis for recreational use and associated charges at government waterworks and state-owned land surrounding these works. This would not apply to riverine or estuarine recreational activities commonly associated with coastal recreation.

Importantly, the differentiating element is thus the distinction between "reasonable use" and "commercial water use." A delicate balance must be struck between recognising water as a resource common to all held in public trust by national government, acting through the Minister of Water and Sanitation, and ensuring that those who benefit from state infrastructure or water resource management contribute equitably to the costs arising from the installation, operation and maintenance of government infrastructure.

Regulations Relating To Access and Use of Government Waterworks and Surrounding State-owned Land For Recreational Purposes in Terms of the National Water Act, 1998 (No. R 1046)

Promulgated in October 2015, these regulations were developed to manage and control recreational activities at government waterworks and surrounding state-owned land. As such they are applicable to all water storage reservoirs of all government waterworks. Recreational water use is defined as:

"...the use of government water works for recreational purposes and includes all activities that require the use of water, including the surface of water for –

(a) events, the exclusive purpose of sport, tourism or leisure;

(b) personal use including, but not limited to, religious and cultural practices;

(c) activities which contribute to the general health, well-being and skills development of individuals and society;

(d) the purposes of research and education; and

(e) commercial water uses including but not limited to bioprospecting, film production, photography and advertising."

Other definitions in the regulation are also instructive and include:

"commercial water use" means recreational water use for revenue generation, including organised sporting activities and events.

"event" means competitions, sporting, entertainment, educational, recreational, religious, cultural, exhibitional, organisational, or similar activities hosted at a government waterwork.

"high impact water use" means recreational water use which does or has the potential to impact detrimentally on a water resource or other water users of that water resource.

"operational plan" means a written plan, providing detailed information on the manner, purpose and extent of the operation of an impacting or high impact or commercial recreational water use, as approved by the Minister.

The regulations provide the following requirements for the *application and approval of impacting and commercial recreational water use*.

6. (1) A person who intends to engage in any activity that may impact on a government waterwork, must apply in writing for the approval of an operational plan for such recreational water use to the competent authority before commencing with the activity.

(2) A person who is currently engaging in any activity that may impact on a government waterwork, under the auspices of a lease agreement or any other appropriate permit, must apply in writing for approval of an operational plan for such recreational water use within 60 days of the date on which he or she is notified in writing by the competent authority to do so.

(3) The competent authority must, as soon as reasonably practicable but not more than 90 days after the submission of the operational plan by the applicant, consider that plan for approval, if the applicant has demonstrated the capacity, or has provided for the capacity, to mitigate and manage negative impacts on the water resource.

(4) The competent authority may call for additional information from the person who engages in water use for recreational purposes contemplated in sub-regulations (1) and (2) above, and may direct that the operational plan in question be adjusted in the way that the responsible authority may require.

(5) If the competent authority deems the recreational use unfit for the government waterwork, it may refuse the proposed activity or require that an existing activity be terminated.

(6) Any person who intends to engage, or is currently engaging in, commercial activities on a government waterwork, state land, or on private land using the water surface of the government waterwork, must comply with Treasury Regulation 16, issued under the Public Finance Management Act, 1999 (Act No. 1 of 1999).

6.1.4 Revised Pricing Strategy NCC

The revised Pricing Strategy (p.23) notes that *"There are various non-consumptive uses of water resources where these non-consumptive uses result in water resource management costs. The pricing strategy needs to provide for these costs to be recovered. Examples of non-consumptive use include aquaculture, generation of renewable energy using water resources (such as hydropower and floating solar), and recreational use of water resources. The charge will provide for* ***costs associated with issuing the required water-use authorisation; monitoring adherence to the conditions of the water-use authorisations; and a contribution to the operations and maintenance of the scheme to provide access to the water*** *(e.g. operating and maintaining a canal in which a user has located a generator)".*

The Pricing Strategy lists recreation as a "use" which is covered by section 21 (k) and also refers to this as "non-consumptive", which it can be, but this does not provide clarity on a threshold between Schedule 1 and a section 21(k) use.

6.1.5 Operational Policy for Recreational Water Use (2004)

The DWS 2004 Operational Policy for Recreational Water Use outlines a suite of policy objectives as presented in Table 6-1 hereunder. These imply a managerial and operational oversight function that incurs cost.

Table 6-1: DWS recreational water use policy objectives

Key Performance Areas	Objectives
9. Integrated Resource Planning, Management and Classification	**Objective 1:** A planning and zonation framework for water resource planning and management is established and included in provincial and local planning frameworks. **Objective 2:** Resource management plans (RMPs) are compiled based on the principles underlying the recreational water use resource planning procedure. **Objective 3:** Based on RMPs water resources are classified, and RMPs and classification are utilised as decision support tools.
10. Safety	**Objective 1:** The manner, purpose and extent to which water resources are used safely are appropriately regulated, controlled and managed. **Objective 2:** Compliance with industry norms and standards is ensured. **Objective 3:** The safe use of water is promoted.
11. Authorisation	**Objective 1:** Appropriate authorisation of recreational water use is ensured and facilitated. **Objective 2:** Appropriate management of water use entitlements is ensured.
12. Equitable Access	**Objective 1**: The rights of communities to physically access resources for recreational purposes are protected. **Objective 2:** Equitable access to the water-based recreation economy for communities is ensured.
13. Communication and Capacity Building	**Objective 1:** Understanding of recreational water use and co-operation with and among stakeholders are ensured by changing perceptions and attitudes through the promotion of the value of recreational water use. **Objective 2:** Stakeholders and role-players are empowered by ensuring sufficient capacity regarding recreational water use.
14. Institutionalisation and Linkages	**Objective 1:** Appropriate institutions are established to manage recreational water use effectively. **Objective 2:** Functional linkages are established to ensure co-operative governance and effective sharing of management responsibilities regarding the sustainable management of water resources for recreational purposes.
15. Legal Framework	**Objective 1:** Compliance with relevant legislative requirements is ensured. **Objective 2:** Recreational water use is positioned as a strategic issue and DWAF as a strategic partner in the legal processes related to recreation, water use, and the use and management of associated resources, etc.
16. Monitoring, Evaluation and Information Management	**Objective 1:** Performance and compliance regarding recreational water use are monitored and evaluated. **Objective 2:** Information is managed and provided in a user friendly and effective manner to assist in decision-making regarding recreational water use.

6.2 TYPE OF WATER

6.2.1 Types of Water Resource

The DWS 2004 policy noted the scale of recreational water resources as being (Table 6-2):

- impoundments such as dams (over 140 large dams are registered, offering a surface area of approximately 234 303ha);

- rivers and streams (the river-based industry has classified more than 140 river sections over 70 rivers within South Africa as having potential for utilisation for river trips);
- enclosed resources such as lakes, wetlands and estuaries; and
- groundwater.

Table 6-2: Types of water for recreation activities

No.	Type	Description	Comment
1.	**Government Works**	Government Works and surrounding land	Clear Charges covered by NWA 1998 section 113
2.	**Municipal Works**	Municipal owned dams, works and surrounding land	Not recommended
3.	**Rivers**	All rivers	Yes, considering schedule 1 exclusions. Possible if commercial use definition
4.	**Private**	Privately owned dams, regardless of source (borehole, river abstraction, run-off)	Not recommended. If considered, then commercial use definition
5.	**Estuaries**	partially enclosed, coastal water body where freshwater from rivers and streams mixes	Unclear if considered different from rivers. At first glance of NWA to include in rivers and attracts water resource management costs
6.	**Wetlands**		Already covered by the WRM charges to some extent.
7.	**Lake**		Already covered by the WRM charges to some extent.

6.2.2 Municipal Works

Regulations made under section 116 of the NWA allow DWS to charge for recreation and all other activities and use of DWS and national government-owned works. If municipalities own their own dams, they are required to be licensed and get authorisation for water uses as per section 21 uses.

The NWA or other legislation does not allow for DWS to charge the municipality or anyone else using the municipal facilities for activities separate to the water uses. As such it appears that DWS cannot charge for recreation on municipally owned dams. It would fall to the municipality to apply this, supported by bylaws. This will require further legal clarification.

6.3 WATER USE ACTIVITIES

6.3.1 Types of Activities

Presented in Table 6-3 below are the range of recreation activities under consideration.

Table 6-3: Types of activities for recreation

No.	Use	Type	Excl.	Cost	Current Charge	Potential Charge Basis
1.	**Individuals swimming in rivers for recreation**	River	Y Sch 1	Authorisation & Catchment Management	N	N
2.	**Group organised swimming (not for profit)**	River	Y Sch 1	Authorisation & Catchment Management	N	P
3.	**Group organised kayak commercial e.g. *Dusi Canoe Marathon**	River	N	Authorisation & Catchment Management	N	Y
4.	**Individuals swimming in dam- government works**	DWS Dam	N	Authorisation & O&M	Y	Y
5.	**Group organised swim in dam – government works- Midmar Mile**	DWS Dam	N	Authorisation & O&M	Y	Y
6.	**Private boating or fishing on dam- government works**	DWS Dam	N	Authorisation & O&M	P	Y
7.	**Private boating or fishing on river**	River	Y Sch 1	Authorisation & Catchment Management	N	N
8.	**Recreation club not for profit activities on river – e.g. rowing clubs**	River	Y Sch 1	Authorisation & Catchment Management	N	N
9.	**Group organised boating or fishing on river – Commercial e.g. barges**	River	N	Authorisation & Catchment Management	N	Y
10.	**Individual swimming, boating or fishing in private dam**	Private Dam	Y Sch 1	Authorisation	N	N
11.	**Commercial recreation activities on private dam.**	Private Dam	N	Authorisation	N	N
12.	**Private boating, wind-surfing, or fishing**	Estuary		Treat same as river activity	N	N
13.	**Utilising of land surrounding government works: braai, picnic, hiking, accessing boats etc**	DWS Land	N	Authorisation & O&M	Y	Y

*** with commercial activities need to show activity is for profit. If charge but not for profit. E.g. unlikely to be able to charge clubs for internal club activities. Only if non club members are invited and charged for profit**

6.3.2 WARMS Registrations

WARMS licensing information received for recreational water use is summarised in Table 6-4 below. Recreation 'licensing' is not a separate form of water use under this system. It is effectively a 'Yes/No' tick-box on the DW760 and DW762 forms

used for abstraction and water storage respectively. In these cases, the water can be primarily abstracted or stored for agricultural/ irrigation purposes, but have this box ticked if the intention is to also use the water for recreation. Importantly, what is defined as recreation is not clear on these forms. There is also no reference to Schedule 1 use from a recreational perspective. Recent review of the WARMS data indicates that there are no registrations under section 21(k) for recreational use. This may be due to the fact that in registering for the consumptive use, and in "ticking the box" for recreation, users understood there was no requirement to register under section 21(k). This has to be tested. From the WARMS data there are currently 168 registrations of abstraction and 486 for storage.

Table 6-4: Summary of WARMS data for recreation

Form	Type	Use	Number of Registrations	Registered cubic metres per year	Gross Storage Capacity (cubic metres)
DW760	Abstraction	Sec 21 a	168	6,3 Million	N/a
DW762	Storage	Sec 21 b	486	N/a	5,4 Billion

There are no registrations in the system for well-known recreation dams such as Hartbeespoort Dam or Midmar Dam, for example. There are also no registrations of the land-lease users who were provided as examples for this study by DWS. As such the WARMS data is seen as inaccurate as a method to determine commercial recreation activities in South Africa and cannot be used as a basis of calculation in this study.

In effect, this may be a case where additional guidance is needed to ensure that applicants for water use authorisations (for example, under section 21 (a) for water abstraction) that have "ticked" recreational use, are automatically also required to complete the forms for section 21 (k) for recreational use. These forms then require the applicant to indicate activities that will be undertaken, including:

- Angling Competitions
- Aviation
- Commercial Pleasure Cruises
- Commercial River Rafting
- Floating Accommodation
- Hovercraft Operations
- Power Boat Racing (including jet skis)
- Sailing Regattas
- Water Skiing Competitions
- Other (specify below)

Against each of these activities, the applicant is required to indicate the frequency of use (continuous or daily), the number of craft and the number of people.

6.4 CURRENT RECREATION ACTIVITIES

The recreation sector for water use in South Africa is well-established and mature. Various arrangements are in place, some for many years. In the past DWS has seldom directly been involved as a public interface for recreational activities. In general, there have been different arrangements in place with intermediaries interacting with the public.

6.4.1 Land vs Water Lease

Currently, in practice, there is generally no separation between the 'lease' of the land adjacent to water and the leasing of the water surface itself. In cases where land is leased, the use of the water surface adjacent to the land is presumed. It is common practice of the lease/ownership to be based on the land coordinates.

At the same time, land adjacent to the water surface is valued by a valuator with an unencumbered view and some use of the water surface being automatically included in the value of the land. At this juncture, it appears impractical to separate these as the value of land is always significantly based on the location and, in this instance, should consider proximity to a water body.

In the future, it could be considered to include that the adjacent water surface will not be developed. (i.e. will not be considered for floating solar, aquaculture etc.). This would then ensure that there is exclusive use of the adjacent water surface for the lease period and that no other developments on the water surface would be allowed. This can be seen as an opportunity cost and forms part of the leasing criteria.

From the perspective of an NCC, it would be challenging to charge one on adjacent land without the land lease being for exclusive use. It would also be difficult to determine the value of the land without the water surface and its use. It is, however, practical to consider a percentage of the value of the property to relate to adjacent water view and use.

6.4.2 Concessions

DWS has concessions in place in some cases, and these may need to be further reviewed going forward.

6.4.3 Dam Management Contracts

DWS does have Dam Management Contracts in place. In certain cases these are with water boards that manage the dam and associated recreational activities, including charging the public for the use of such facilities.

6.4.4 Land Leases

DWS does enter into land leases with private parties who then run commercial businesses of recreational activities. These leases are generally less than 10 years and use a standard format that changes from time to time. Four examples of such leases were received from DWS as examples and are summarised in Table 6-5, below.

Table 6-5: Land lease for recreational purposes received

No	Lessee	Rental Basis
1.	Caribbean Beach Club	Monthly rental determined by Independent Property Evaluator
2.	Sunshine Cruises	Monthly rental determined by Independent Property Evaluator, appointed to determine market related fees based on the activities and use of the property
3.	Hartbeespoort Adventure Academy	Monthly rental determined by Independent Property Evaluator, appointed to determine market related fees based on the activities and use of the property
4.	Boaters World	Page excluded

These leases include the following relevant principles and clauses:

- In the purpose to lease, the list includes recreational acitivites, giving public access to the dam and specifically boating.
- The lessee visitors may perform water sports on the dam.
- The lessee must obtain prior approval from the lessor to host or manage any event on the property or the relevant water course.
- The lessee must obtain written approval from DWS to operate any Commercial Vessel (passenger vessel, commercial fishing vessel, letting of any other vessel/ house boat / canoe / kayak to the public etc, pontoon "party" vehicles).

These leases do in some instances indicate that "All water uses in terms of section 21 of the National Water Act (Act no. 36 of 1998) must be undertaken with a valid water use authorisation unless permissible under Schedule 1 (Reasonable domestic use, excluding commercial benefits)". The leases include the land and the use of the water surface of the dam subject to national safety regulations and licenses. In one lease agreement, the activities listed include a range of land-based activities as well as boating, access to the dam for swimming, rowing, canoeing and fishing (with a valid permit issued by the relevant Authority which is not DWS), water skiing, and any other auxiliary form of water sport as zoned for this dam.

The current rental paid is calculated including this use of the water surface, therefore, it would not be possible with the existing lease agreements to charge separately for the water use. This would require renegotiation of the agreement. Although this water use could theoretically be charged / leased separately, it would equally reduce the value and rental for the land. Therefore, separately renting the water surface would not necessarily increase the overall revenue for DWS and would significantly increase the administrative burden. As such the current system and method does appear appropriate.

The leases do exclude commercial vessel activities as well as the hosting of any event on the property or water body, with these needing specific authorisation. These can be considered as an opportunity for introducing a NCC, being charged separately from the land lease.

6.4.5 Commercial Recreation with Public Access

In certain cases, people can access dams and rivers that are not government-owned through public or private access. In these cases, there is a separation of ownership between the adjacent land and water surface. While this applies to the larger rivers such as the Vaal, Orange, uMngeni and others, it is possibly most significant within estuaries where these recreational activities are linked to coastal tourism. In these cases, commercial activities taking place on the water surface or events can clearly also be charged.

6.5 PROPOSED NCC CHARGE PRINCIPLES AND OPTIONS

6.5.1 Proposed NCC Charge Principles

a) Entrance and utilisation of land surrounding government works to be charged (to be confirmed if this is considered a NCC or outside scope) In many activities it is difficult to separate the time on the surface of the water (water use) versus the accessing and utilisation of surrounding land in conjunction. The land use can be charged on a rental or access basis.

b) Commercial activities on rivers (and equivalent) that are not subject to Schedule 1 and can be charged on the user pays principle (especially relevant when rivers are accessed via private land)

Clarifying the underlying principle of *cost-recovery* versus *cost contribution* is important in determining a cost methodology. International examples tend towards cost contribution.

Therefore, the principle is that users should make a reasonable contribution to management and conservation costs. This would mean that the costs would need to be fair, affordable, proportionate to activity impact, not a barrier to access, and enough to help fund management and conservation.

The Pricing Strategy notes the fees should provide for costs associated with issuing the required water use authorisations, monitoring adherence to the conditions of the authorisations, and contributing to the operation and maintenance of the scheme to provide access to the water. This will require an understanding of what direct and indirect O&M costs are being billed through infrastructure charges as supported by NWA section 56(2) (b) (iv).

International experience shows a mixture of fees to recoup some costs associated with managing the resource. These include:

- Access fees
- Boat launch fees
- Mooring and Jetty fees
- Navigation/ boating licences
- Fishing licences
- Commercial operator permits
- Environmental levy

It is important to understand the extent to which these costs are recovered through existing concessions/agreements. These may vary between the types of organisations e.g. nature conservation agencies vs Msinsi Holdings vs Theewaters Sport Club.

6.5.2 Proposed NCC Charge Options

Options for the structuring of NCC charges for recreational water use are tabulated in Table 6-6.

Table 6-6: Proposed Charges for Recreation

No	Category	Potential Category	Potential Charge
1.	**Government Works**	d) Events – 50 of more people e) Land-Lease f) Concessions and Intermediaries	d) Per person charge e) Percentage of Market land lease value for NCC f) To charge and collect a per person or per car fee
2.	**Non-Government Waterworks: Rivers, estuaries etc**	c) Commercial use of rivers etc d) Event 50 of more people	c) Approach SAMSA for per craft charge d) Register and charge by CMA

6.6 NCC CHARGE ASSESSESSMENT

The recent release of the new proposed regulations for the management and control of government waterworks and surrounding state-owned land (Notice No. 7002), dated 16 January 2026, has significance and does provide clarity on key aspects that support the development of an NCC charge. The draft regulations further strengthen some of the definitions, including:

- "**commercial activities**" means activities utilising the water stored or land upon which the government waterworks are situated for revenue generation, including organised sporting and tourism activities as well as events.
- "**event**" means organised exhibitions, competitions, sporting, entertainment, educational, recreational, religious, cultural, or similar activities hosted at a government waterwork that exceeds more than 50 persons (participants and or spectators). Also includes commercial photography, film production and advertising activities.
- "**event organiser**" means any person, Club, or State land user who plans, is in charge of, manages, supervises or holds an event or sponsorship rights to an event or in any manner controls or has a material interest in the hosting of an event.
- "**recreational water use**" means the use of government waterworks for recreational purposes and includes all activities that require the use of state-owned land, including the surface of water for—
  a) Events, including but not limited to sport, tourism and leisure.
  b) Personal use including, but not limited to, subsistence fishing, religious and cultural practices.
  c) Activities which contribute to the general health, well-being and skills development of individuals and society.
  d) Tourism activities but not limited to nature conservation, camping and hiking.

They provide clarity that recreational water use, in effect, is inherently linked to the land surrounding the government waterworks, provide a numeric threshold as to what constitutes an event, outline responsibility/ accountability for such events, and lastly provide an improved definition of recreational water use (where previous definitions incorporated aspects that were potentially vague).

6.6.1 Cost Determination

Current Charges

- There are many concessions and land lease agreements in place at government works. These concessions may be in terms of land and water use combined.

The charge will therefore provide for costs associated with:

- *issuing the required water-use authorisation*
- *monitoring adherence to the conditions of the water-use authorisations*
- *contribution to the operations and maintenance of the scheme to provide access to the water*
- *Water Resource Management Costs*
- *operations and maintenance costs of government works*

Tourism Levy

South Africa has a voluntary tourism levy with funds used for marketing South African tourism. The introduction of a NCC for water use for commercial recreation may be considered similar to a tourism levy, although clear differentiation can be made as it is a contribution to the cost of management of the water body. If an NCC is to be implemented that is related to the numbers of individuals performing water recreation activities, it is recommended for there to be consultation with the Department of Tourism.

6.6.2 Salient points from the Working group

The introduction of clearer definitions in the recent Government Gazette (as noted above) is more supportive of a practical application of an NCC charge for recreational activities. This stems from clarity as to what constitutes a commercial event (noting that individual/ personal use is covered under Schedule 1 of the NWA), that there is an inextricable linkage between the water body and the surrounding land (this land having value due to its location next to the water body), and the principle of thresholds as to what can be determined as an "event" (noting that notification of such events is required).

It was therefore agreed that, aligned with this, the principle of applying an NCC charge to access and utilise the water body (mostly government waterworks) and the adjacent land is principally current and aligned to the recent draft regulation. The use of a block charge related to the number of people having access to the surrounding land and water surface would therefore be pragmatic. This would then require the concessionaire or intermediary to register as a section 21(k) user.

It was noted that there is considerable recreational activity in larger rivers and estuaries, however, while these principles could still be applied, the ownership of land surrounding these watercourses is often private and municipal. It would therefore be more complex to apply these principles. However, the role of the CMA would be important here. Having them collect revenue based on these principles would be more pragmatic and would provide revenue to support their role in monitoring and managing these differing watercourses. There is potential to enter into discussions with the South African Maritime Safety Authority (SAMSA) regarding an additional amount to be added to the licence fee they charge for the registration of inland craft and boats. However, it may be pragmatic to enter into discussion with SAMSA at a later stage.

6.6.3 Charge Collection Options

This would be dependent on the nature of the charges levied and the supporting institutional arrangements. Charges for recreational water use should potentially be collected by the lessee or concessionaires and paid to the DWS, with the assumption that these funds would be used to support the management of government works. Charges linked to rivers, estuaries and wetlands could potentially be collected by the local water management institution, primarily the CMA. Noting the scale of the revised Water Management Areas, the CMA may delegate this (with some form of service fee) to a local-level institution on contract. However, the associated regulation of this does raise some questions.

6.6.4 Adjacent Land Leases

These are recommended to continue as currently implemented.

6.6.5 Commercial Events and Commercial Crafts

Commercial Events

Commercial events at government dams require written permission from DWS. This is normally performed by the relevant Area Manager and issued by the relevant Director: Infrastructure Operations. As part of this permission, the relevant tariff can be charged and collected directly by DWS. Alternatively, concessionaires and land lease holders at government works could be required to register a section 21 (k) water use which would be non-consumptive in nature. Besides the licensing fee, DWS could explore two options:

- **Annual Charge**: Upon registration, the concessionaire/land lease holder would be billed an annual fee for non-consumptive water use. This could be based on a percentage of the lease agreement.
- **Events Charge**: Noting the new draft regulations provide a definition as to what constitutes an event, charges could be levied for such events. These would be collected by the concessionaire/land lease holder and then paid to the Department. Large events on rivers/ estuaries would require the event holder (intermediary) to register for a section 21(k) licence and pay the requisite fee.
- **Combination**: A combination of these could be applied.

Commercial Craft

DWS, with CMAs, could introduce a license for water craft for freshwater use. This could be administered separately, based on the craft's capacity. The SAMSA mandate includes inland waters. It requires the license of craft to ensure safety standards. The option could be explored for there to be a tariff or fee that forms part of SAMSA fees that is collected by SAMSA but paid over to DWS for the NCC.

6.6.6 Market vs Cost Based Pricing for Recreation

Cost-based pricing strategies are not appropriate for recreation charges. Calculating the actual cost of recreation is not possible as it cannot be differentiated from the costs associated with the works or catchment management, separate from other activities. Furthermore, this could result in higher charges discouraging recreation and as such, a market-related charge is more appropriate. Intermediaries and agencies are often responsible for the management of the land around the

dam and maintain picnic and other facilities for recreation. These intermediaries collect revenue from those making use of these facilities based on a market-related price.

6.6.7 Assessment of Short-listed Charge Options

The advantages and disadvantages of the shortlisted charge options are assessed in Table 6-7, below.

Table 6-7: Assessment of potential charge options

No	Draft Charge	Advantages	Disadvantages
1.	**Events – 50 or More People:** per person charge	• Aligned with draft regulations on Government works • Will include all events	• Large administration overhead • Should require a water use registration which would fill the database with small often once off licenses • Revenue low for the level of effort in administration
2.	**NCC based on land-lease rental:** NCC a % of land-lease rental	• Aligns with current land-leases • Easy to administer and calculate	• Effectively increasing the cost of land-lease, which was independently determined by a valuator. • Only covers those with land-lease • Doesn't consider the number of actual people visiting.
3.	**Government works per person fee –** a fee per person or car	• Clear link between number of visitors (use) and charge • Charge could be collected by intermediatory reducing administration burden for DWS	• What require detailed records of every visitor as basis of charge • Unclear how section 21 f applications would work in this situation
4.	**Commercial use in rivers or works:** SAMSA Craft Charge	• This would clearly cover barges and cruise operators whether in works or rivers • Fee would be set on capacity of craft • SAMSA could assist with collection using existing procedures and systems.	• SAMSA needing to collect revenue that is not theirs or within their mandate • Does not relate to a registration on the actual water use • Only covers the craft, does not include those visiting dams or making use of water in other ways.
5.	**Charge on intermediators with registered water use:** based on per visitor	• Reduced administration as charges to intermediaries not the end users. Most dams have intermediaries in place • Can require intermediaries to register a section 21 f use, resulting in appropriate licensing and records	• Significant administration burden on intermediaries • Intermediaries often charge separately for boats, cars, people etc which could create confusion • Verification of numbers to calculate invoice to intermediaries • Requires separate system for events
6.	**Charge on intermediators with registered water use:** based on	• Reduced administration as charges to intermediaries not the end users. Most dams have intermediaries in place	• Increased administration burden on intermediaries • Intermediaries often charge separately for boats, cars, people etc which could create confusion •

No	Draft Charge	Advantages	Disadvantages
	no of visitors per year in blocks	• Can require intermediaries to register a section 21 f use, resulting in appropriate licensing and records • Easier verification for invoicing as blocks determine charge so less emphasis on determining every visitor • Events can be considered in the same way	

6.7 NCC CHARGE RECOMMENDATIONS

6.7.1 Recommended NCC Charge Principles

The final charge principles for the NCC for recreation are as follows:

- Recreation water use (sec 21k), with the exception of schedule 1, requires registration.
- The commercial use of government works water surface or surrounding land and rivers will be charged.
- Schedule 1, reasonable domestic use, is exempt.
- Commercial use charges will be based on the number of visitors each year.
- Market-related pricing is used (cost-contribution).
- Blocks to be used to simplify administration and categorisation of the activity.
- Where there is also a relevant land lease, the license requirements and charge to be included in the lease.
- Events are handled in the same way based on the number of people attending the event in each year (participating, organising and or supporting).

6.7.2 Recommended NCC Charge

The NCC for recreation will be based on the number of visitors to government works, water surface and surrounding land as well as rivers. Individuals, visiting in their personal capacities, with activities arranged by themselves, for themselves will be exempt in line with Schedule 1.

Intermediaries, those arranging activities or supplying facilities will be required to register a section 21k water use following the appropriate process. The charge will be triggered by the section 21k authorisation. Blocks will be used to categorise into different levels of use and charge accordingly. The charge will be billed in advance annually based on the registered recreation use. (Consideration was given to billing in arrears based on actual figures provided by intermediaries but this would be an increased administration burden likely to delay billing).

Intermediaries are required to keep records of the number of people/ visitors using their facilities. This is on a per person per visit basis on entry and exit (if multiple exits and entries in a single day this is counted as 1).

In the case of events, event organisers (the intermediaries) must count the total number of people attending per day.

In the case of clubs like fishing, boating or sailing, the number people visiting (members or non-members) are counted each day.

The guideline base charge for the license combined with a R10 per person per visit contribution. This is the NCC element which would form part of the overall amount charged by intermediaries. This guides the charges per block.

6.7.3 Determination of Pricing Structure

An example of how these charges would be calculated is outlined in Table 6-8.

Table 6-8: Example calculations of NCC charge

No.	Activity Description	Visitors per Day	No. Days per year	Total Visits per Year	NCC	Comments
1	Smaller: Picnic and Boating Area	30	104	3120	R42 500	Expected weekends mainly
2	Larger: Picnic and Boating Area	75	120	9000	R80 000	Weekends and holidays
3	Barges and Cruises	40	78	3120	R42 500	Expected Fri-Sun half the year
4	Clubs: Fishing and Sailing	100	26	2600	R42 500	Majority members every weekend in warmer months
5	Major Event (Midmar Mile, Dusi)	12000	2	24000	R220 000	12000 entries over 2 days and estimated 12000 supporters
6	Accommodation	40	257	10280	R90 000	12 accommodation units, with average of 3.3 people with 70% occupancy
7	Small Traditional Ceremony	60	1	60	R0	

6.7.4 NCC Tariff Blocks for Recreation

Revenue blocks for the recreational NCC charge are proposed in Table 6-9.

Table 6-9: Potential recreational water use charge

No	Number of Visitors per year	Annual Charge (excl. VAT)	Billing Cycle	Comment
1.	**0 -500**	Exempt	Annual in advance	Small scale, cost mainly for annual monitoring
2.	**500-1000**	R12 500	Annual in advance	
3.	**1000-2500**	R22 500	Annual in advance	
4.	**2500 - 5000**	R42 500	Annual in advance	
5.	**5000 – 10 000**	R80 000	Annual in advance	

No	Number of Visitors per year	Annual Charge (excl. VAT)	Billing Cycle	Comment
6.	**For each 1000 or part thereof above 10 000**	R10 000	Annual in advance	
	A year is from 1st April each year to 31st of March			
	Escalation: These amounts escalate annually on 1st April by PPI			
	Base Charge Review Period: Base charges are to be reviewed and reset in line with market pricing every 10 years			
	In the case of overnight accommodation, the number of people per night is counted			
	Multiple visits by the same person in a single day are counted as one visit			

Limited Revenue Projection

Without appropriate recreation registrations available in the WARMS database or elsewhere, appropriate revenue projections cannot be done. A limited projection can be done based on the 140 large dams noted in the 2004 DWS policy. Based on the R10 NCC charge and the 140 large dams the conservative projected revenue is included in Table 6-10 below.

Table 6-10: Initial revenue projection

No.	Activity Description	NCC	No. of Dams	Projection	Comments
1	Smaller: Picnic and Boating Area	R42 500	48	R2 040 000	50% of Dams having picnic and boating with 60% smaller and 40% larger
2	Larger: Picnic and Boating Area	R80 000	32	R2 560 000	
3	Barges and Cruises	R42 500	50	R2 125 000	Expected on only 20% more popular dams but some to have more than one operator
4	Clubs: Fishing and Sailing	R42 500	100	R4 250 000	Expected at less than half the dams but those are likely to have more than one club
5	Major Event (Midmar Mile, Dusi)	R200 000	2	R440 000	12000 entries over 2 days, estimated 12000 supporters
6	Standard Event	R22 500	70	R1 575 000	One standard event at half of the dams each year
7	Accommodation on Works or Rivers	R90 000	50	R4 500 000	50 accommodation establishment on dams and rivers combined
Total Potential Revenue				**R17 490 000**	**Per Annum**
***based on 140 large dams noted in the 2004 policy**					

6.7.5 Administration and Revenue Collection

Administration and revenue collection will depend on the location of the recreation activity. These fall into two categories covered in turn below:

- Recreation in government works (land lease, concessions etc.)
- Recreation in rivers

Recreation in Government Works (land lease, concessions etc)

Recreation activities in government works will require section 21(k) registration which will include an estimated number of visitors each year. In some cases, there will be concession agreements and land leases, which will include a portion of the land adjacent to the works. In future agreements these should include reference to the NCC and licence requirements of the NCC. DWS will invoice the relevant registered entities annually in April at the determined charge rate.

Recreation in Rivers

Recreation activities in rivers will be invoiced by the relevant CMA for the area each year in April based on the relevant registered entities at the determined charge rate.

Incorrect Registrations and Non-compliance

The NCC for recreation requires the registration of a section 21K water use, which includes registering for the relevant category of the number of visitors per year. The NCC charge in then billed in advance each year for the registered category of the number of visitors per year. The registered intermediary is required to keep appropriate records in order to determine the actual number of visitors in a given period. The actual number of visitors in a year could fall into a different category from the registered use.

The actual number of visitors category could be higher, equating to a under registration and lower NCC charge than should have occurred. Alternatively, the actual number of visitors could be less and fall in a lower category and thus higher NCC charge than should have occurred. There is an option to invoice the additional amount or refund the 'overcharge' at the end of each year. The additional administration burden in order to do this is not justifiable based on the likely value of such discrepancies and as such is not recommended.

Periodic compliance auditing of the registered number of visitors compared to the actual number of visitors was also considered. Again, the administrative burden and cost of this is greater than the likely value and as such is not recommended.

Registered intermediaries are required to compare their actual number of visitors with their registered number of visitor categories annually and ensure they do not have more visitors than registered for. Intermediaries are to ensure they update their registration annually if they are not in compliance with the number of visitors registered.

Consideration was given to fines, fees and penalties for non-compliance to the registered number of visitors. It was determined that having a separate mechanism for non-compliance of this nature is inappropriate. It was deemed that section 151 of the NWA would apply to this charge in a similar manner to other DWS-related charges and non-compliances.

7 Implementation Readiness Considerations

7.1 DATA AND SYSTEM READINESS

In undertaking this study, a range of different datasets were trawled through. Whilst there is a range of data on the DWS data portals, much of this was not relevant to the study. Accessing data and information was equally a challenge, with different pieces of information sitting in different directorates, without a way to easily access and consolidate the information. Going forward, to implement the NCC seamlessly, the following recommendations are made:

7.1.1 Clear Definitions

In undertaking the study, it was clear that there were certain definitions and principles that were unique to the NCC, but also there were some words that had different and specific meanings under the NCC banner. It is important that these are clearly defined and communicated, not only within DWS but also across impacted sectors and their stakeholders.

- Ensure stakeholders understand the definitions of aquaculture and fill out the relevant forms correctly.
- Clear definitions of recreation including domestic versus commercial and the understanding of both the applicability of Schedule 1 and section 21k. This should be on the relevant registration forms and clearly understood by all parties.
- Clear indication of water uses for hydropower activities for non-consumptive use.
- Undertake an update of WARMS data for NCC-related sectors, aligned with the amendments/definitions above.
- Consider a separate license and registration for water recreational use that does not include any other water use.

7.1.2 Water Use Licencing

- **Licence readiness**
    - There is no true renewable energy data in WARMS. This should be included in WARMS and should include information on design capacity and the category/type of renewable energy.
    - More standardised information should be collected when licensing. For example, kW/h production capacity, square metres of coverage of solar panels and flow speed of water for run-of-river systems.
    - Aquaculture should have its own section, with clearer guidelines. Information such as the type of aquaculture (land-based or open-water), species farmed, expected annual production etc. should be included in future registrations of the activity.

7.1.3 WARMS Database

Based on the above licensing improvements, there will be a need to clean the current data in WARMS, aligned with the NCC definitions. In the case of aquaculture, the current data in WARMS is misleading, as it indicates more aquaculture activity than is occurring, creating confusion about the size of the industry. In many cases, if fish are simply placed in private dams, this has been marked as aquaculture. This does not meet the definition required.

7.1.4 Systems Integration and Billing

With data relevant to NCC being hosted in different directorates within DWS, it will be important to consider how this is consolidated and integrated to ensure seamless analysis and ultimately, generation of a valid invoice. The mapping of data and information across the different directorates will also help to build capacity and a common understanding around the implementation of the NCC.

For billing, invoicing is strictly linked to a registration (or authorisation), which is also attached to the property where the water use(s) are carried out. If a registered water user is engaging in abstraction/waste related activities and subsequently is also authorised for non-consumptive water use on the same property, then the WRM Charge and the non-consumptive use charge may be combined for easier administration. However, should the abstraction/waste related activities occur at a different location from the non-consumptive use, this will require a separate invoice for the WRMC and NCC.

The current arrangement is that the Directorate: Billing Management, through the auspices Chief Directorate: Revenue Management, is assisting the newly established CMAs and Operational Clusters with the billing and invoicing. However, once these water management institutions have developed processes and systems to undertake the full scope of the revenue management (i.e. billing and debt management), this responsibility will shift.

7.2 SECTOR AND STAKEHOLDER READINESS

Initially, this study was meant to undertake more in-depth consultations. However, with the trawling of data revealing a number of areas that require strengthening, it was premature at this stage. Even though the study did engage sector working groups, these were introductory in nature and could not delve into the nitty-gritties required, noting the status of data, information and maturity of sectors.

It is strongly recommended that there is continued dialogue with the affected sectors to build a common understanding as well as ensure buy-in for when the NCC implementation is ready.

7.3 DWS INSTITUTIONAL READINESS

It has already been highlighted that, to achieve appropriate data and information levels, the licensing elements may need to be reviewed in order to support the NCC. The WARMS should be updated and aligned to the NCC licence conditions. The NCC elements in WARMS must also be aligned to link with the billing system (SAP in the first instance), such that the registration database becomes the information base upon which invoices are raised or at least differentiated, should the charges be included as part of the overall WRM charges.

Understanding the specific roles and responsibilities, and the mapping of relevant directorates within DWS and the regions and catchments will also be important. This will need to be followed by building and ensuring sufficient capacity to implement the NCC.

Proposed Tariff Blocks have been developed and will require further engagement and buy-in from the impacted sectors. It will be important for DWS and CMAs to fully understand how the NCC is differentiated from any existing charge in the

Pricing Strategy. This is not a duplication of any charge, rather a rightful attribution of costs to those that are benefiting from the resource and its infrastructure and not financially contributing.

7.4 IMPLEMENTATION ACTIVITIES BY DWS

7.4.1 Cost of implementing the NCC

With the addition of the NCC in the Pricing Strategy, the cost of implementing the NCC should be determined and the attribution of those costs between the CMA and the DWS should be understood. Costs associated with invoicing, collection, monitoring, etc., increase administrative demand and, hence, the operating costs of the CMA and/or DWS. This is also important to understand the benefit of charging. There should be some savings and efficiencies achieved if this is a line item under the WRM charge.

7.4.2 Inclusion in Water Resources Planning

With the inclusion of the NCC as an additional instrument in the Pricing Strategy, it will be relevant throughout the WRM planning cycle to: Plan - Do/Implement – Check - Act/Review. Management of the resource takes place within the context of water resources planning, including the development of a Catchment Management Strategy (CMS) and a Water Resources Management Plan (WRMP). The CMS is a participatory and consensus-seeking process undertaken at the Water Management Area (WMA) level and defines the objectives of water resource management within the WMA. It will be important going forward that the NCC elements are also included in these tools.

A critical element to think through is monitoring and reporting on the NCC – both self-monitoring mechanisms and department-specific mechanisms should be considered. This is also important information to assess the overall impact of the NCC charges and to determine if they are aligned with the overarching principles established in the Pricing Strategy.

7.4.3 Phased-roll out

When the Department and sectors are ready to implement the NCC, a revised tariff table will need to be generated in consultation with stakeholders. Part of this will be to determine the phasing in of the NCC and considerations around thresholds for exclusion/participation should be considered – i.e. linked to profit generation from users or quantity of the charge being recovered through a Cost-Benefit Analysis. This will also help the Department to understand the administrative burden versus the cost-recovery potential.

Part of the phasing-in of the system should also consider a ramping-up of charges over a period of time to allow water users to prepare appropriately for the implementation of the charge. This could also be seen as goodwill on behalf of the Department and allow for greater buy-in and uptake of the NCC charge in the long term.

The phasing in approach should also be used as an opportunity for lesson-learning in order to strengthen the approach and charges over time.

7.5 LOOKING TO THE FUTURE

During the course of this study, the following research questions were identified that fell beyond the scope and timeframe of this project. Presented below is a list of additional research that will help strengthen the NCC charges and its roll-out.

- ✓ A socio-economic and regulatory impact assessment on the existing sectors that are impacted by the pricing strategy. This will be useful information for engaging stakeholders further on the impact of this charge mechanism on their bottom line.
- ✓ What sectors, beyond aquaculture, energy generation and recreation, could also be considered for NCC?
- ✓ Once the data and systems are finalised to be conducive to NCC implementation and there is a track record of data, revenue projections should be updated.
- ✓ Once the data and systems are finalised to be conducive to NCC implementation, an NCC pilot project should be undertaken to support implementation readiness. This should include the issuing of dummy invoices to water users to prepare them and the Department for the process as well as an update of the NCC implementation guidelines.
- ✓ As the markets mature for the NCC-related sectors/subsectors, and there is a track record of data, a review of the market-related values should be undertaken to ensure that the NCC charges remain relevant and comply with the principles of the charges.

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APPENDIX A Reflections from the 2022 Draft Pricing Strategy

A. Aquaculture

"There are various non-consumptive uses of water resources where these non-consumptive uses result in water resource management costs. The pricing strategy needs to provide for these costs to be recovered. Examples of non-consumptive use include ***aquaculture****, generation of renewable energy using water resources (such as hydropower and floating solar), and recreational use of water resources. The charge will provide for costs associated with issuing the required water-use authorisation; monitoring adherence to the conditions of the water-use authorisations; and a contribution to the operations and maintenance of the scheme to provide access to the water (e.g. operating and maintaining a canal in which a user has located a generator)" DWS 2024: 23 Revised Pricing Strategy.* The revised pricing strategy refers to aquaculture as an example of non-consumptive charge. In fact, certain types of aquaculture are non-consumptive in nature and other types are consumptive in nature.

B. Energy Generation

The Draft V3 of 2022 of the pricing strategy included a detailed section on hydropower that was later removed after consultation before the finalisation of the document. This does provide a starting point and previous thinking:
"Hydropower is a critical renewable energy source. There is further potential to develop at least small hydropower plants with capacities ranging from 1 to 15 MW (megawatt),which generate approximately 446 000 MWh/annum.
Water used in hydropower generation is non-consumptive, apart from possible increase in evaporation, and it is therefore necessary that appropriate pricing mechanisms are applied to support viability of these schemes. This pricing strategy therefore proposed that charges for hydropower generation should be based on c/kWh (cent per kilowatt hour) of energy generated and a fixed charge based on kW installed, instead of the cent p er cubic metre of water use charged f or r aw water abstraction, which is n either practical or applicable. Micro hydropower includes all applications with an installed capacity of less than 1 MW and is considered for self or own use only. These applications will be exempt with no charge applicable. Systems with a capacity between 1 MW and 20 MW are considered commercial applications and the charges below will apply:

Table A: Commercial hydropower plant charges

Table 5: Commercial hydropower plant charges

	Scenario A	Scenario B
	Hydropower plant integrated within DWS's infrastructure at the dam	Hydropower plant developed downstream of DWS's infrastructure and downstream of the dam wall
Fixed charge	R10.00 / kW per annum	R5.00 / kW per annum
Variable charge	R0.01 / kWh	R0.01 / kWh

Costs would be increased annually by PPI.

Large hydropower that have been installed on National Infrastructure form part of long term mutually beneficial agreements between DWS and the owner / operator of these schemes as these were mostly joint developments of the dams and associated infrastructure. These collaboration agreements spell out the rules to be applied and will remain in place as is.

New large-scale hydropower (i.e. >20 MW) may be negotiated between the Department and the owner / operator of such plant on a similar basis as the existing collaboration agreements, or in the absence of these, the small-scale hydropower charges should apply."

Public Consultation Draft Pricing Strategy

DWS provided comments register from public consultation sessions as well as 18 written submissions. The items that related to Hydropower have been extracted and included below. There were no comments on solar (floating) or aquaculture to date. DWS has indicated in meetings that the using kw production as base of charge as proposed in the 2022 draft was not received favourably and an alternate will be preferred.

Table B: Summary of public consultation inputs from 2022

Type	Comments
Hydro	Mines circulates water within their shafts to generate electricity, shouldn't that be regarded as part of altering rivers streams? The Department needs to clarify the hydropower that will be charged it must also have various options some these activities do not trigger altering the river.
	why hydropower is included in the Pricing Strategy for raw water use charges?
	The department should consider the energy crisis being faced by the country and how hydropower is meant to assist us with clean renewable energy. The power generation does not have a major impact on the water resource, and the infrastructure used is mostly readily available so there should not be a price burden on the hydro generators from its infancy. The charge can only be considered once new dams have been built.
Hydro	With hydropower for energy, will users be charged for water that is running through the system and if that water stopped the water channel for six months, will they still be charged. If the user takes the water for hydropower purpose and give it back to the department, will the charge apply.
Hydro	Should the Department not subsidise hydropower given the current power generation.

Table C: Relevant written comments received

Submitter	Comment
P D Pyke Pr Eng	General automatic price increases based only on the CPI as per p34 para 3.6 and for Hydropower p26 para 3.2.6 without any further justification are dangerous and highly inflationary. They will cause tariffs to become unaffordable in a short period of time.
Hanke du Toit Hoof Uitvoerende Beampte/	Page 11, "Non – consumptive water use", we are of the opinion that these water uses should not be charge, especially water uses like small and localized hydro power generation. Page 16, "Hydro Power Charge" It would seem as if the reality of our power/energy disaster are not taken into account. We should put incentives in place and remove barriers to speed up renewable energy development. This charge is unrealistic.
Berg River Main Irrigation Board	The use of government waterworks to generate hydropower is supported. WUAs can play an active role in developing and managing hydropower plants from infrastructure. This can improve the energy supply and viability of scheme operation. In cases where water is released from dams for WUA and infrastructure charges are already paid for the taking of water, and no additional water is released for hydropower, the necessity of an additional charge for hydropower must be reassessed. More information needs to be made available to assess projects and possible levying of charges in this regard.

C. Recreation

The 2022 draft revised pricing strategy did include the potential for a recreational non-consumptive charge. DWS provided comments register from public consultation sessions as well as 18 written submissions. There is only one reference to recreation, which occurred during the public consultations and is captured as:*" How to control recreational water and ensure there is a charge for the activity."* As such this does not give much direction and no real comment was received during consultation.