LSF Research

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Localisation Opportunities in South Africa's Water and Sanitation Value Chain

LSF
PROUDLY SUPPORTING LOCAL INDUSTRY

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1. EXECUTIVE SUMMARY

1.1 Introduction and objectives

This project has been commissioned by the Localisation Support Fund (LSF) to determine whether there are "opportunities for localisation support in the water sector", where local manufacturing activity could be grown by supporting import replacement and/or the promotion of exports. The specific objectives of the project are to identify and characterise promising areas of intervention and provide guidance for the development of detailed intervention projects where appropriate.

A two-stage approach has been adopted. In the first stage, the subject of this report, the water sector is characterised, the products used in its investments and operations are outlined and areas of potential opportunity for the promotion of local manufacture identified. If specific opportunities identified are considered to offer sufficient potential, a second stage of the project will investigate them in more detail and propose approaches to support their development.

The water sector considered covers more than just public sector provision of water supply and sanitation services and the development and management of the water resources that underpin those services. It includes institutions involved in a wide variety of economic activities, ranging from agriculture and food processing to large industries for which reliable water supplies are essential for production and situations in which the management of wastewaters to avoid environmental damage is mandatory.

National government acts as the trustee of the highly variable and unequally distributed natural resource on which all these activities depend. It has to ensure that there is equitable access to water resources, that their use is ecologically sustainable and reflects both its social and economic values. It must also ensure that services provided using this resource meet Government's Constitutional obligations to ensure access to sufficient water and an environment not harmful to peoples' health and wellbeing.

The sector's complex institutional arrangements present challenges for the promotion of targeted economic interventions such as local manufacturing. However, the size and scope of the sector and the essential nature of its activities assure an ongoing demand for a variety of products and services. This report outlines the sector's diversity of activities and institutions and the manufactured products it uses and considers opportunities for the promotion of increased local manufacture.

In preparing this report, the focus has been to engage with the producers who LSF seeks to support. While the challenges of the 'water sector' institutions have been extensively documented, very little attention has been paid to the industrial underpin that is essential for the sector's success. With this objective, initial engagements were with the various manufacturers' collective bodies and then, often arranged through them, interviews were held with principals in a range of relevant industries, including some on site. In all cases, the responses were positive, and the interviewees identified many concerns that must be addressed if the water sector is to sustain the manufacturing base that it too often takes for granted. To facilitate the process, the interactions were on a confidential basis, and individual sources are therefore only mentioned where they dealt with matters already in the public domain or where the respondents were happy to be identified.

1.1.1 WATER SECTOR ACTIVITIES AND INSTITUTIONS

The management and exploitation of the natural water resource systems at ‘bulk’ scale is primarily undertaken by the Department of Water and Sanitation (DWS). This involves the construction and operation of large infrastructure for multi-year storage and transmission of water. Some municipalities and collective ‘water user associations’ also take water from the natural resource and provide bulk supplies using similar infrastructure, albeit at a smaller scale.

The provision of bulk water services (treated water and the treatment and the disposal of wastewater) is the responsibility of water utilities/boards or is undertaken directly by municipalities designated as water service authorities that have chosen to undertake the water service provider function themselves. They use similar infrastructures to the natural resource management systems, but their storage is to maintain reliable supplies over a period of weeks rather than to manage multi-year climatic variations.

Retail water services, the distribution of treated water and collection and disposal of municipal wastewater is undertaken by municipalities or their appointed water service providers They are responsible for building and operating the networks that supply water to individual users as well as the wastewater systems that collect, transport, treat and then dispose of treated wastewater. Municipalities to contract other public or private sector operators to act as water service providers.

1.1.2 MANUFACTURES USED IN THE WATER SECTOR

A wide range of products and services is used in the water sector of both a capital nature and in operational processes. These include: -

Capital goods: -

- Pumps and motors
- Pipes & fittings, Valves and associated equipment
- Treatment process equipment
- Control systems (switchgear, control panels, monitors etc)

Operating consumables: -

- Treatment chemicals and manufactures to monitor water quality
- Membranes for treatment (an ‘emerging’ consumable)

- Manufactures required for maintaining pump stations and distribution networks.

1.2 Trends in local production and demand

The overarching sectoral determinants of demand for manufactures are outlined, and the market structure and the demand and supply dynamics of individual product families is presented.

1.2.1 SECTOR-WIDE DRIVERS OF DEMAND, CONSTRAINTS AND UNCERTAINTIES

The drivers of demand for water related products are driven, in the first instance, by the demand for water. That is related to: -

- The size of the user population and their associated social institutions;
- The socio-economic status of the different user groups;
- Service levels provided and expected;
- Existing and planned economic activities dependent on water services;
- Efficiency of service providers (notably, managing leaks and commercial losses);
- Efficiency of use (at household, institutional and enterprise level).

1.2.2 SECTOR-WIDE CONSTRAINTS ON AND UNCERTAINTIES ABOUT FUTURE DEMAND

The hard constraints on meeting the demand for water are primarily: -

- The availability, and cost of developing, the natural resource;
- The financial capacities of the user communities; and
- The public finance capabilities.

Substantial uncertainties about future trends which affect demand for water services, and thus requirements for water-related manufactures relate to: -

- Social policies with respect to service access and tariffs;
- Geography and characteristics of settlements;
- Nature of local economic activities and potential for new activities;
- The extent and condition of existing infrastructures;
- Institutional capabilities – for programme implementation & management;
- Institutional coordination – to align bulk supplies with ‘retail’ requirements; and
- Technological choices.

1.2.3 PRODUCT-CENTRED ESTIMATES OF FUTURE DEMAND FROM THE WATER SECTOR

For capital goods manufactures, an assessment of future demand requires knowledge of (or assumptions about) the: -

- current product ‘fleet’ universe;
- life to replacement of the products concerned;
- current deficit (units beyond replacement date) and refurbishment needs; and
- new annual requirements to meet the demands of population growth and improve service levels.

For operational products, estimates are required of: -

- The rate of product use (per volume of water or user population served);
- Likely changes in population and volumes; and
- Potential changes in products and technologies used.

1.2.4 ESTIMATING POTENTIAL FUTURE DEMAND

Order of magnitude estimates of current demand for manufactures provide a baseline from which to extrapolate future demand and reflect potential policy, institutional and financial influences on the scale and ‘quality’ of demand. Monetary values for locally produced goods may reflect business markups which trade data does not. Current sources of supply, their capacities and constraints are identified. These considerations guide the assessment of potential opportunities for local manufacture, whether to meet local demand or to increase exports. The prospects for individual classes of manufacture are considered separately to reflect product-specific factors.

1.2.5 PRODUCT TYPES AND THEIR MARKETS

Pipes

Pipes transport water (fresh, treated or waste) from one location to another. Over 175 000km of pipes are installed in South Africa’s public water sector infrastructure networks. 38 000km are classified as bulk pipelines (transporting water from source to local distribution reservoirs) while the remaining 137 000km are classified as reticulation pipelines (part of networks supplying individual users).

Most of the pipes used are locally manufactured from plastic (PVC & HDPE) and steel. There are some exports to neighbouring countries. The market share of the different materials varies according to the diameter and pressure class of the pipes. PVC has dominated the mid-size diameters (from 125–500mm), while HDPE accounted for the largest proportion of the 500–

1000mm range. Steel dominated the market for pipes larger than 1000mm but only a limited proportion of smaller diameter pipes.

Steel pipes

Steel pipes provide large diameter, high-capacity bulk infrastructure but the market is limited to large scale projects and thus ‘lumpy’. Some projects are in the planning stage but without firm timelines for procurement. The three manufacturers are either idle or operating well below capacity. Operators are pessimistic about future opportunities, and one is considering transferring large diameter production to Mozambique. Manufacturing can be undertaken at users’ locations to reduce logistical challenges, an extreme, if temporary, form of localisation – or emigration.

The industry could presently respond to a demand upsurge, if it is timeously announced and procured but capacity and capabilities cannot be preserved indefinitely. Infrastructure planning should establish long term programmes to avoid boom and bust cycles which are expensive for suppliers and clients and may encourage imports.

Pipes: Plastic – PVC & HDPE

Locally produced PVC and HDPE pipes are widely used for water distribution with the value of the market in 2024 estimated at R2 023 million for PVC and R1 141 million for HDPE. The market shrank by 15% between 2014 and 2019 due to declining demand and has not improved since resulting in excess manufacturing capacity.

PVC capacity utilisation is estimated at around 50 – 55% and SA is a net importer (exports valued at R170 million in 2024 against imports, from Botswana, of R260 million). HDPE pipe exports of over R400 million (in 2024 (mainly to mines in Zambia and DRC) have helped to compensate for weak local markets. Regional trade is reported to be challenged by inconsistent application of SADC trade agreements.

The future market for PVC pipes will depend largely on municipal demand. There is currently sufficient idle capacity to produce pipes to replace 800 to 1200 km annually which will begin to address replacement backlogs.

Raw materials which account for the bulk of production costs have traditionally been supplied by local manufacturers SASOL and SAFRIPOL but they will exit this market in the medium term and pipe manufacturers must import raw materials, adding inventory and supply risk to their costs.

Valves

Valves allow sections of water systems to be isolated for operation and maintenance and other specialist purposes. Valves were manufactured locally in the past, but the cost of local products now greatly exceeds that of imports due to small production scales, high steel costs and declining foundry capacities. Local manufacturers acquired by foreign companies now focus on marketing and service support Some valve repair and refurbishment businesses can still produce specialised or ‘once-off’ products to meet specific needs.

The water sector market for valves will be driven by the rates of growth and replacement of networks and pumping and treatment plant and is estimated to be between 12 000 and 26 000 units annually, valued between R120 and R260 million. The industry association VAMCOSA estimates the value of the local market at around R20 billion of which perhaps only 10% was locally manufactured but since valves are used in many applications outside the water industry and valve imports in 2024 were valued at only R780 million this seems unlikely.

Pumps

Pumps drive the transport of water and wastewater in public networks and specialised pumps are used in treatment processes and to extract underground water. Large pumps were historically manufactured for the water and mining sectors, some of which were exported but, despite DTIC's 2017 designation requiring 70% local content, production has continued to decline due to falling demand aggravated by rises in energy, raw material and other costs and reductions in foundry capacity. Some companies that exited local manufacturing remain engaged in marketing and technical support, but few industry leaders see prospects for re-establishing standalone pump manufacturing although there may be opportunities to include South Africa into regional manufacturing supply chains.

In 2024, the value of pump related imports was between R3,7 billion and R4,9 billion a proportion of which would be for use in the 'water sector'. There is some assembly of imported components, and some equipment is re-exported creating with an accounting surplus in pump equipment trade between South Africa and SADC countries. Submersible borehole pumps constitute a significant proportion of imports. Around 100 000 boreholes are drilled annually which, together with equipment replacement, could present a market worth R800 million annually, a scale that might support some local manufacture.

Treatment plant

Public utilities and private users treat freshwater to be fit for social and economic uses and wastewater so that it does not cause unacceptable impacts on the environment. Water treatment works comprise of a variety of generic mechanical and electrical manufactures which support treatment processes that require specialised equipment. While large treatment plants are custom designed, limiting opportunities for standardisation, the growing market for smaller-scale plants in both private and public sectors may offer opportunities for local manufacture.

The treatment market is driven by requirements for additional water supplies and associated wastewater treatment and the need to rehabilitate and replace old units. While some rapidly growing systems need additional capacity, the medium-term market for clean water treatment is likely to be dominated by rehabilitation and replacement of plant, worth between R728 million and R3 640 million over the next five years. Wastewater treatment is more difficult to predict because much wastewater does not reach treatment plants and less than 70% of existing capacity is used. Pollution from failed collection networks may may focus investment on their rehabilitation rather than treatment upgrading which could cost R8 140 billion over five years.

New opportunities for local manufacture may open in some fast-growing areas where private developers are resorting to package treatment plants because local service providers cannot provide adequate sewage collection (or water distribution) infrastructure for new developments. The value of this market (for drinking water) could reach R470 million annually with similar opportunities for wastewater treatment and a significant potential for further increases.

Water meters

Water meters support revenue collection from water users. The meter market is driven by regular replacement of retail water meters every 8 to 10 years as well as demand from new users. Estimates of residential meter production and sales range from 350 000 to 700 000 annually. The future value of the market will depend on the types of meters used since they are no longer simple mechanical products but can be ‘pre-paid’ transmit data, avoiding errors inherent in physical reading. A minimum estimate assuming mechanical meters and low replacement rates would be R105 million annually; a high estimate assuming 50% ‘smart meters’ could reach R855 million annually.

New meter technologies are being promoted by a National Treasury led intervention with a large smart meters grant and the local companies contracted to supply must consider local production as an element. Strategies to promote local manufacturing may include support to increase local content and/or for export promotion. Partnerships with international corporates may support either or both strategies and some leading global companies are already involved in the programme.

Treatment chemicals – limited opportunities

Some chemicals for water treatment are manufactured locally, lime and hydrochloric acid for pH control and gaseous chlorine for disinfection. Some HTH (calcium hypochlorite) is imported for use in small treatment works that cannot safely manage gaseous chlorine. South Africa used around 2 200 tonnes of the 4 660 tonnes of HTH imported but exported 2 400 tonnes achieving a substantial trade surplus. There may be opportunities to replace imported HTH with onsite production of sodium hypochlorite in small treatment works.

Some ‘coagulant’ products that help to remove fine particles from water are produced locally while others are imported, notably aluminium sulphate of which almost 20% is re-exported to the region. The use of proprietary ‘polyelectrolytes’ is growing but their technical complexities and limited volumes offer limited manufacturing opportunities. Some alternative products may have potential for local manufacture but efforts in the past to promote coagulants based on tannins from tree barks failed and the viability of a proposed coagulant using ‘Acid Mine Drainage’ as a raw material is not yet proven.

1.2.6 PRODUCTS WITH POTENTIAL TO PROMOTE GREATER LOCAL PRODUCTION

The under-utilised manufacturing capacity for pipes and the cost and scale challenges facing the pump and valve industries limits the scope for local manufacture of water-sector related products. However, some opportunities have been identified for individual products and for ‘package’ strategies that could offer new mechanisms for promoting and expanding the use of local manufactures.

Water Meters

The intervention led by National Treasury to promote local production creates immediate opportunities for LSF to engage and support an existing programme. Efforts could be made to increase local content and to support export promotion, perhaps in partnership with international corporates that are already involved.

Submersible pumps - groundwater

The numerically large borehole pump market may offer sufficient scale to support local manufacture. As many as 100 000 new boreholes are drilled annually most of which will be equipped with a pump. Together with replacements, the value of the borehole pump market may be as much as R800 million. Trade data also suggests that some local assembly is already being undertaken, for both local and export markets.

Tannin-based coagulants for water treatment

The potential development benefits from the manufacture of tannin-based products may merit a review of the potential since commercially grown black wattle trees could be introduced where former mining areas are being rehabilitated.

Shade cloth

The use of agricultural ‘shade cloth’ as a water conservation technology could offer opportunities to expand the production and application of an existing industry. South Africa already has advanced research capabilities in this area and the benefit to private sector agriculture is that the water saved may enable farmers to expand their production, which is often constrained by available water allocations.

1.2.7 PACKAGE STRATEGIES AND ‘PRODUCTS AS A SERVICE’

Water sector operations bring together a wide variety of manufactures. An alternative to focusing on single products for localisation might be to take a ‘package’ approach and incentivise equipment providers to use more local components. This would align with the trend of offering ‘product as a service’ solutions using remote management in which equipment suppliers take responsibility for sustaining ongoing operations.

Package treatment plants

The package approach could be trialled in water and wastewater treatment where there is already manufacture of small-scale package treatment plants for institutional and industrial enterprises. The option of ongoing management of the service is also being adopted.

On-site chlorine generation

Another ‘package’ example would use existing technologies for on-site production of hypochlorite solutions for drinking water disinfection and reducing environmental impacts of wastewater discharge, using renewable energy and reducing HTH imports.

Drip Irrigation packs

A further example of a ‘package’ approach is the promotion of ‘irrigation kits’ for small-scale farmers. In neighbouring countries where a South African company is selling ‘starter packs’. There may be opportunities to develop this approach by promoting the use of small-scale drip irrigation through public, private and non-governmental channels as well as supporting its export in the region.

Borehole drilling rigs

While borehole drilling is relatively simple, it requires a variety of equipment to be assembled as a mobile ‘rig’ unit which can then be deployed to the location desired. There are commercial drill rig manufacturers in SA who target a large-scale market as well as sales of imported drilling equipment which is mounted on local trucks for businesses operating at a smaller scale, particularly in rural areas. An earlier proposal for the local ‘manufacture’ of low-end rigs using local materials and equipment to serve this market could be revisited together with a more general ‘package’ approach to promote local content in the drilling rig business.

Other export opportunities

While the focus of localisation tends to focus on supplying the local market, it is evident that in a few of the product sectors, export markets could be further developed.

From merchandising to manufacturing

One approach would be to identify product sectors in which South Africa is already a regular merchandising supplier to the region and develop the merchandising activities to add manufacturing value. A related opportunity would be to identify and develop in a more structured manner South Africa’s participation in regional and global value chains.

Localisation of elements of larger value chains

Since scale of production is a critical determinant of opportunities for the localisation of manufactures, the integration of relevant local activities into wider value chains may offer significant opportunities. The automobile industry shows how South Africa could engage in the manufacture of individual components and contribute to final assembly. The existing merchandising base could provide a platform for such efforts.

2. OVERVIEW AND METHODOLOGY

2.1 INTRODUCTION: THE WATER SECTOR, ITS INSTITUTIONS AND THEIR ACTIVITIES

Before engaging in the detail of the manufactures to be considered for localisation, the opportunities that they present as well as the constraints to their development, it is important to understand the context of the potential users.

This section outlines the structure of the wider water sector. It identifies the principal institutional actors involved, their water related activities and responsibilities and how they interact with each other. It also provides an overview of the flows of water involved in the different activities and the sources and flows of finance that support their supply and use.

In addition to national and regional public entities, there are approximately 150 municipalities that are designated as water services authorities. There are also private institutions that are actively involved in ‘water sector’ activities.

The water sector is sometimes characterised narrowly to consist of the set of public institutions that provides water supply and sanitation services to meet the needs of social and economic users. In South Africa, this includes: -

- the municipalities, the local government institutions that are constitutionally responsible for providing such services, or appointing service providers;
- the Water Boards, regional utilities established by the national Department of Water and Sanitation; and

the National Department of Water and Sanitation which, aside from its responsibilities for regulatory oversight of water services provision, has operational responsibilities for the development, management and protection of the natural resource on which water services provision depends.

This narrow characterisation does not include users of water for other purposes who meet their own local needs (primarily for agriculture but also large industry and energy generation). Nor does it adequately address the management interventions necessary to meet environmental protection requirements, particularly in the disposal of municipal and industrial wastewater.

These additional elements are important for the present review since many ‘non-public’ water sector activities use the same types of manufactured products (for instance: pipes, pumps and chemicals) as the public water services sector. They constitute an important complementary market which may facilitate and support local production, and their requirements are considered as part of this review.

2.2 WATER FUNDING, FLOWS AND THEIR REGULATION

There is no consolidated budget for the ‘water sector’. Each set of institutions has its own financial framework and funds its activities from user charges as well as government budget support and conditional grants. Municipalities provide limited information on the finances of their water-related activities which are just part of their wider responsibilities. For both national and local government, functions are funded through a mix of user charges and a variety of budgetary grants. Intermediate entities, such as the regional water boards and the TCTA are funded by payments from local government and large-scale water users and are able to raise loan finance from the capital markets.
There is limited information about water specific expenditures, particularly at local government level. Even in the metropolitan municipalities (metros), National Treasury (NT) recently reported that

“Municipalities are required to report (in their financial statements) on the revenue from service charges for water and sanitation, and on the water and sanitation debtor position, but were not required, and did not report on expenditure as this related to the water and sanitation business. It was therefore not possible to view the actual financial performance of the water and sanitation business, though municipal budgets were published.”

Although this situation is reported to have improved, financial data is still not easily accessible or reliable. One consequence of this is that payments for water are consolidated into municipalities’ general revenue, only a portion is allocated to water expenditures through municipal budget processes and that portion is often not identified.

Institutions of government and their function

The financial arrangements for the ‘water sector’ address two distinct sets of functions:

The first set involves the development, management, protection and regulation of the natural resource on which all social and economic activities and services depend.

The second set relates to the provision of the water supply and sanitation services which support the domestic needs and social and economic activities of organised communities.

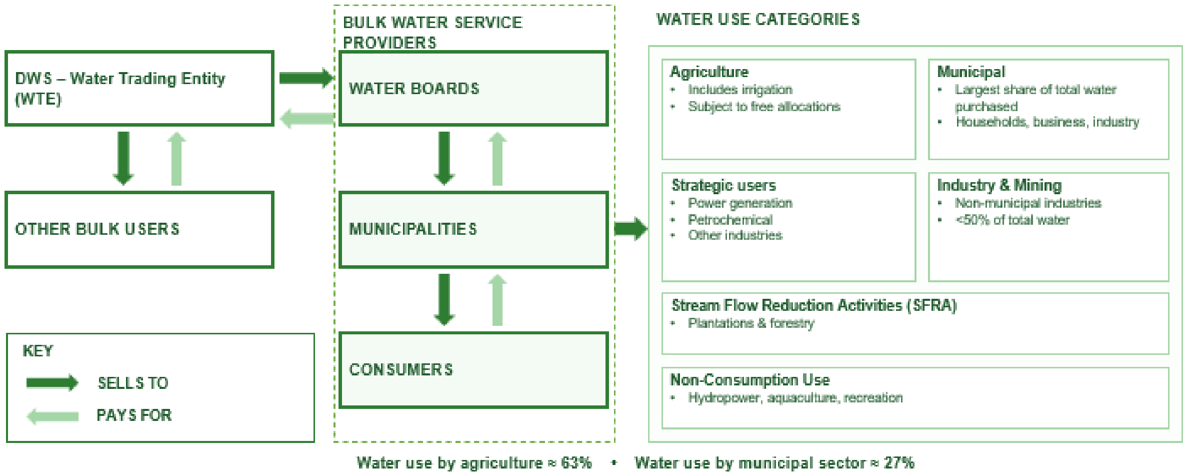
South Africa’s water resources derive from a highly variable and unpredictable climate and are unequally distributed geographically. Reliable bulk water supplies can only be provided using built infrastructures of dams and pipelines to capture and store water and transport it to where it is required to provide services.

This operational activity has been a primary function of the Department of Water and Sanitation (DWS). However, recent legislation provides for it to be undertaken by a new National Water Resources Infrastructure Agency (NWRIA), a state-owned company. Regulatory functions will continue to be undertaken by DWS and subsidiary institutions at a regional scale, including the regulation of large private water users who take water directly from the resource and/or discharge wastewaters to it.

The provision of water supply and sanitation services is the responsibility of those municipalities to which water services powers and functions have been allocated. Municipalities may be supported by regional water boards, statutory utilities, established by the Minister of Water and Sanitation, to render bulk services to municipal water service providers.

The financial flows which underpin these functions are illustrated in figure 1:

Figure 1: Current Flow of Water Tariffs & Payments



Source: SALGA

The Department of Water and Sanitation (DWS)

DWS receives an annual budget determined, allocated and disbursed through the statutory procedures set out in the Public Finance Management Act and related legislation. This includes allocations for the monitoring of water resources, environmental protection and related work as well as policy and regulatory activities.

The DWS also has a 'water trading entity', the core of the future NWRIA (which will also incorporate the TCTA which raises off-budget finance for the Lesotho Highlands Water Project and other economic projects). The trading entity builds, operates and maintains the national water resource infrastructure (dams, canals, pipelines and pump stations). It is funded by user charges although some budgetary funds are allocated for costs deemed to be of a social or environmental nature (such as basic supplies to poor communities and the treatment of acid-mine drainage.

In addition, the Minister has oversight responsibility for autonomous institutions including:

- Water Boards – regional bulk services utilities which are funded by the municipalities and other large users that they supply; and
- Catchment Management Agencies (CMAs) which are funded in part by water users with some regulatory activities funded from the DWS budget.

Municipalities

Municipalities are governed by a separate Municipal Finance Management Act. Water service provision is intended to be funded from user charges supplemented by a mix of budgetary grants to achieve specific social objectives, including the ‘equitable share of revenue’ (an unconditional grant to enable municipalities to fund the operational costs of providing basic services) as well as conditional grants allocated by National Treasury, with DWS and COGTA, to fund the ‘social components’ of capital projects

Private sector and communities of users

Beyond the public sector institutions, a variety of private organisations in industry, commerce and agriculture undertake and fund water sector activities from their own resources. In some agricultural and mining locations, water user associations are collectives of members who fund the development and operation of joint water infrastructure to meet their specific needs.

2.3 MANUFACTURES USED IN THE WATER SECTOR

The diverse family of water sector institutions procures a wide range of products and services to undertake their operations. The objective of this report is to identify opportunities to expand manufacturing activity in South Africa. The starting point for this analysis is thus to identify the principal manufactures used in the sector, considering both those of a capital nature and those used in operational processes.
Capital goods: -

- Bulk materials – cement, aggregate & steel - for dams, canals and tunnels
- Pumps and motors
- Pipes & fittings
- Valves and associated equipment
- Treatment process equipment
- Control systems
- Consumer-side meters

Operating consumables: -

Manufactures required for treating the water

Treatment Chemicals

- Disinfectant chlorine & related products
- Coagulants Al/Fe sulphates & specialised products
- pH control lime and hydrochloric acid

Membranes for treatment (an ‘emerging’ consumable)

- For drinking water, desalination and wastewater treatment applications

Manufactures required for maintaining pump stations and distribution networks

- spares for pipes & fittings,
- spares for pumps, electrical
- specialised tools and instruments
- specialised vehicles

Manufactures to monitor water quality

- e.g. laboratory consumables.

2.4 THE METHODOLOGY FOR DETAILED ANALYSIS

The methodology used addresses the fragmented institutional landscape, limited data and the difficulty of reconciling economic and social demands for water with available financial resources. It recognises that many products are also used by other sectors.
To determine the potential market for water-sector related manufactures, a two-step approach is adopted.

First, the dimensions of the overall 'market', its drivers and trends need to be considered. This includes the size and composition of the market of final users as well as the water flows likely to be associated with serving them (considering both supply and disposal).

Second, the implications of the overall market trends for each product need to be evaluated and the options available to address them must be identified and considered, considering issues that might influence approaches taken to their supply.

There is very little consolidated baseline information available about of the quantities of products used specifically in the water sector and their monetary values. This data gap reflects the diversity of and lack of coordination between, the water sector institutions. Where firm information is lacking, a variety of approaches are used to estimate the current size of the market for the different products and to project likely future demand.

Sector-wide drivers of demand, constraints and uncertainties

The demand for water-related manufactures is determined by the overall volume of water to be supplied and disposed of. This is influenced by broad societal factors which include: -

- Population (including associated social institutions)
- Socio-economic status
- Service levels provided
- Existing and planned economic activities
- Efficiency of service providers (notably, in managing leaks and commercial losses)
- Efficiency of use (at household, institutional and enterprise level)

The hard constraints on meeting this demand are primarily: -

- Financial capacities of the user communities

- Public finance capabilities

Substantial uncertainties about future trends which affect demand for water services, and thus requirements for water-related manufactures relate to: -

- Social policies with respect to service access and tariffs
- The geography and characteristics of settlements
- Extent of and potential for local economic activities
- Institutional capabilities – for programme implementation & management
- Institutional coordination – to ensure that bulk supplies meet ‘retail’ requirements
- Technological choices.

Product-centred drivers of demand, constraints and uncertainties

At the product level, a more focused approach is used. This analysis considers: -

For capital products,

- The product ‘fleet’ universe
- The life to replacement
- The current deficit (units beyond replacement date) and refurbishment needs
- new annual requirements to meet the growth of the user population.

For operational products,

- The rate of product use (per volume of water or user population served)
- The likely growth in volume/population

For both sets of products, an attempt is made to obtain a firm baseline from which extrapolations of future demand can be made. Such extrapolations necessarily take account of policy, institutional and financial influences which influence the scale and ‘quality’ of demand for the product. The current sources of supply are identified together with their capacities and constraints. From these considerations, an assessment is made of potential opportunities for the establishment or expansion of local production, whether to meet local demand or to increase exports.

Evaluating demand: ‘aspirational’, ‘effective’ and ‘commercial’

The evaluation of future demand is a particular challenge for the water sector, and a distinction needs to be made between aspirational demand and effective demand. Water services are both an economic good (when used in a commercial or consumer context) as well as a social good (when used to meet basic social needs). While services for commercial supplies and domestic users in high income communities, can be funded from cost-reflective charges, funding for many social purposes is dependent on public finances and vulnerable to changeable political priorities.

The water sector’s public policy and planning processes have set aspirational targets for the extent and quality of services to be provided. However, these are usually accompanied by a statement of the ‘funding gap’ between the funds available and the funds required for such provision. In the absence of a coherent financial strategy, such demand projections may be ‘aspirational demand’ targets and treated as an optimistic upper bound scenario rather than as a substantiated market demand.

The future demand for water-sector related products that could support local manufacture will be determined by what may be termed the ‘effective demand’, for which funding will be available. The approach taken in this review is thus to make estimates guided by current sector performance, institutional capabilities, policy assumptions and economic outlook.

The ‘effective demand’ includes the requirements of users that have the capacity and willingness to pay for water supply and sanitation services and constitute a significant ‘commercial demand’. This can be characterised and evaluated on a conventional basis. However, some manufacturers interviewed during this project emphasised that they did not supply the public market directly because it was simply too difficult to engage with but relied instead on trading intermediaries.

This marginalisation of the ‘public sector’ market presents a challenge for localisation since it further reduces the size of what is already a small market. As is shown in the detailed analysis below, the private sector undertakes many water sector related activities which go beyond the supply of water and sanitation services and offer opportunities for local manufacture. However, the potential for local manufacture of water related products often depends on the synergy (or lack of it) between the commercial and public markets, which is reflected in the analysis.

The institutional powers and capabilities of local government are thus a critical determinant of the performance of the water sector generally and thus of the opportunities for local manufacture which should be inherent in it. The long-term implications of these issues have been addressed in a recent review of water sector investment requirements to 2050 whose conclusions are considered in more detail below. These issues are illustrated as and where appropriate together with an assessment of measures that are presently underway to address them.

2.5 THE PRINCIPAL MARKETS FOR MANUFACTURES (WATER-SECTOR USERS)

The focus of this report is on public and private institutions for whose activities water-related manufactures are essential. These include institutions whose primary business is the production and distribution of water or the management and disposal of wastewater. It also includes institutions for whose main activities water is either an essential primary input or for which the effective management of water and wastewater is a significant and essential element of their business.

Public sector users of water-related manufactures

Most users whose primary business is in the production and distribution of water are in the public sector. They include the national DWS, regional utilities and municipalities designated as water services providers.

Many other public institutions whose activities depend on access to adequate and reliable supplies of large volumes of water as well as the ability to dispose safely of their wastewaters undertake some ‘self-provision’. They include education and health facilities as well as security related institutions such as the military, police and prison services.

Economic sectors that are extensive users of water-related manufactures

Economic sectors (private and public) that are significant users include:

- Manufacturing industries for which water is an essential input, notably in the food and beverage sectors;
- Mining and manufacturing industries whose activities produce significant quantities of wastewater which must be safely managed and disposed of;

Energy and related industrial companies such as ESKOM (electricity generation) and SASOL (fuel production) which are dependent on reliable water supplies and generate significant wastewater flows;

- Agricultural enterprises which use large quantities of water (for irrigation) or generate significant quantities of wastewater (from poultry and livestock, for instance).

Formal sectoral representative institutions

The different institutional families affect and are represented by a range of organisations. These play an important role in setting the market conditions in the overall water sector and offer channels for engagement and support for the development of localisation opportunities.

In the public sector: -

- The DWS is the custodian of the country's water resources and develops, manages the resources and regulates their allocation and use. It establishes and regulates the 'Water Boards', as well supporting and regulating municipalities and related water services providers. Through its various regulatory functions, DWS also establishes norms and standards that impact upon the specification and use of water manufactures.
- Other branches of national government also have important roles in the water sector’s operations. The National Treasury regulates public processes through which manufactures are procured; COGTA oversees local governments’ overall performance; while DPW, DTIC and their associated agencies, SABS and NRCS set and apply standards for water-related manufactures.
- Municipal interests are represented by SALGA, which is formally constituted as the representative organisation for municipalities in terms of s.163 of the Constitution.
- The regional water utilities or water boards have recently organised themselves into the Association of Water and Sanitation Institutions in South Africa (AWSISA), to support the development of alternative public water service institutions and to prepare to respond to those requirements.

In the private sector: -

- National business organisations either have a formal ‘water desk’ or have taken formal positions on water-related issues, often from an environmental as well as an economic perspective. These include BUSA, BLSA and the NBI. Operation Vulindlela, the government-business collaborative programme organised under the Presidency is also presently considering interventions to address specific water sector challenges.

- In addition, there are also more specialised sectoral organisations bringing together water users for whom water and its management is more or less important.
- Food and beverage industries are particularly active in ensuring reliable water supply and protecting the water environment and participate in related activities through Manufacturers Circle and the Strategic Water Partners Network.
- Mining related industries are organised under the Minerals Council which, in February 2025, highlighted water supply as a critical issue for the sector. Mining companies have also organised specific water related initiatives at a regional level.
- Commercial agriculture, organised by AGRISA, takes a keen interest in water matters. AGRISA's provincial associations engage on specific matters related primarily to the allocation and management of water resource while the national umbrella organisation engages in policy and advocacy.

2.6 ACTIVITIES, INSTITUTIONS AND FINANCIAL FLOWS

The markets for manufactured goods in the water sector depend on the financial ability of the user institutions to procure them. It is thus important to understand the flows of finance through the sector to identify the sources and quantum of funding available and the constraints to its mobilisation and application.

Financial arrangements, flows and effective demand

The complexity of the institutional arrangements and the interfaces between natural resource management and service provision are reflected in the sector's financial flows and affect the potential 'effective demand' for water sector related manufactures. These arrangements are illustrated in the diagrams below.

Figure 2 shows the whole water pricing value chain and the different charges levied through the process from the initial abstraction of water to the final discharge of wastewater;

While the institutional framework and formal responsibilities are well established, there is an emerging crisis due to the failure of municipalities to collect the service charges due to them from the users of water services. This is, in turn, impacting on the financial stability of the other water institutions and has already led to the bankruptcy of two Water Boards.

The large financial deficits that have resulted are often attributed solely to poor performance by the municipal service providers (including poor revenue collection) and an unwillingness of many users to pay. Underlying these problems is also a more fundamental structural problem: in some cases, users and government are simply unable to pay for the desired levels of services. This has important implications for this review since it suggests that a sustainable balance has not yet been achieved between service levels and the ability of users and sector institutions to fund them.

Figures 3 & 4 illustrate the sector's emerging debt crisis which has undermined confidence in the sector. and constrains the 'effective demand' for water sector products.

In a situation in which financial resources are constrained and must be rationed, an evaluation of the effective demand for manufactures must reflect the prioritisation likely to be adopted in the rationing process.

Figure 2: Water pricing value chain

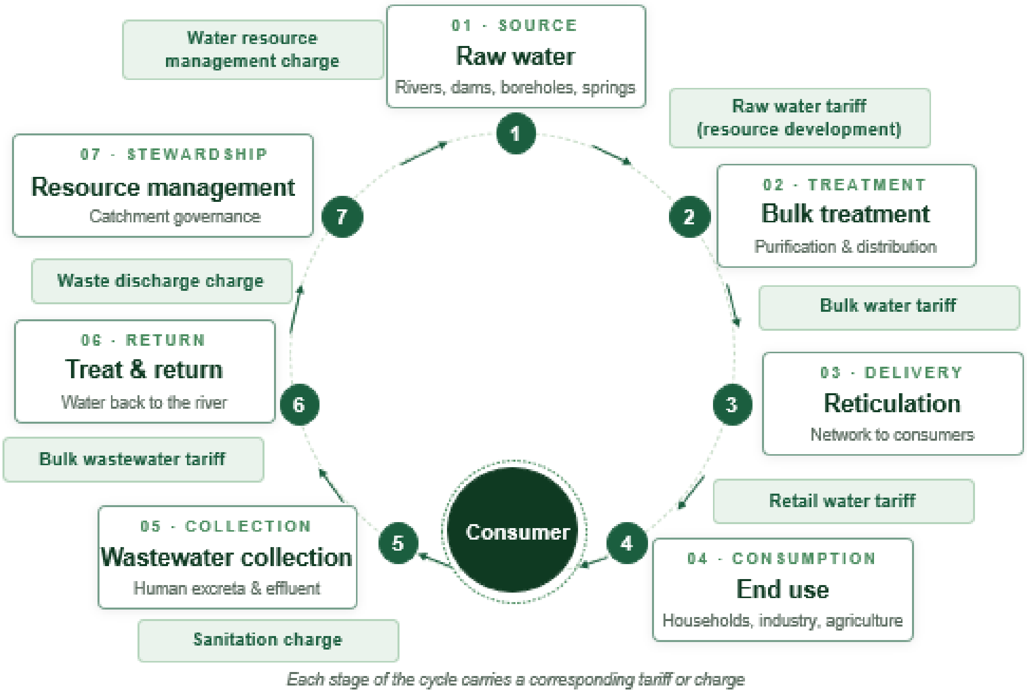
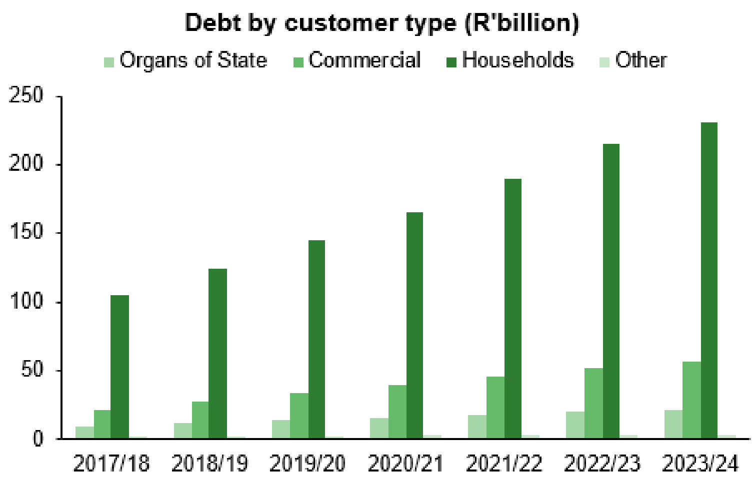


Figure 3: The sector's emerging debt crisis (1)

What municipalities are owed

Municipalities are owed R313 billion*



- Households owe municipalities **R230,5 billion** alone (74% of total debt).
- Municipalities owe **Eskom R58,5 billion.**
- Municipalities owe **Water Boards R18,1 billion.**
- Municipalities owe **DWS (Water Trading Entity) R17,1 billion.**

** Source: National Treasury, 2024*

Figure 4: The sector's emerging debt crisis (2)

What municipalities owe Water Boards

Municipal Debt to Water Boards	
Water Board	**Municipal Debt**
Amatola Water	R 369 million
Vaal Central Water	R 9,1 billion
Lepelle Northern Water	R 623 million
Magalies Water	R 941 million
Overberg Water	R 1,5 million
Rand Water	R 4,8 billion
Umngeni – uThukela Water	R 2,2 billion
Total Municipal Debt (less current)	**R 18,1 billion**

- WTE owed **R17,1 bn (R8,7bn municipalities + R8,4bn Water Boards).**
- Water Boards are owed **R18,1 billion** by municipalities (less current of R4,31 bn).
- Top 17 municipalities owe Water Boards **R16,5 billion alone — 74% of all debt** to Water Boards. Payment challenges are not in all municipalities.

These financial dilemmas have had a substantial impact on the ability and willingness of product suppliers to transact with the local sphere of government. This has led to ad hoc and expensive intermediation by agents who are willing to accept the delays in payment and other risks and costs inherent in providing goods and services to municipalities. This situation is widely recognised to be a substantial obstacle to improving service delivery. Not only does is aggravate inefficiencies generally but, more specifically, it makes it difficult to promote local manufacture and services in the public water sector.

Proposals have been made for a wide-ranging reform of institutional arrangements and financial allocations to address these challenges). However, these interventions face considerable obstacles because they involve changes to the Constitution or voluntary acceptance of regulatory intervention by national government in local government affairs.

Financial requirements to meet current policy goals

A summary of the likely trends in expenditure between various high-level priorities over the next few decades provides further insight into the water sector's priorities and constraints. It suggests that in the next decade, operating expenditures will substantially exceed capital investments while capital investments will be dominated by the need to renew water services infrastructure.

Funding these expenditures is likely to prove challenging. Various recent analyses of the water sector's financial requirements show that, even if users' bills were fully paid, there would still be a substantial funding gap if the sector's present goals are to be met.

The state of water in South African cities report estimates the average annual 'investment need' required between 2023 and 2050, calculated to include both capital and operation requirements, to be between R214 billion and R314 billion (real 2022 Rands) depending on climate conditions and policy options adopted. The 'base case' it uses is R256 billion.

Figure 5: Average Annual Operating Expenditure by Category, 2023–2050

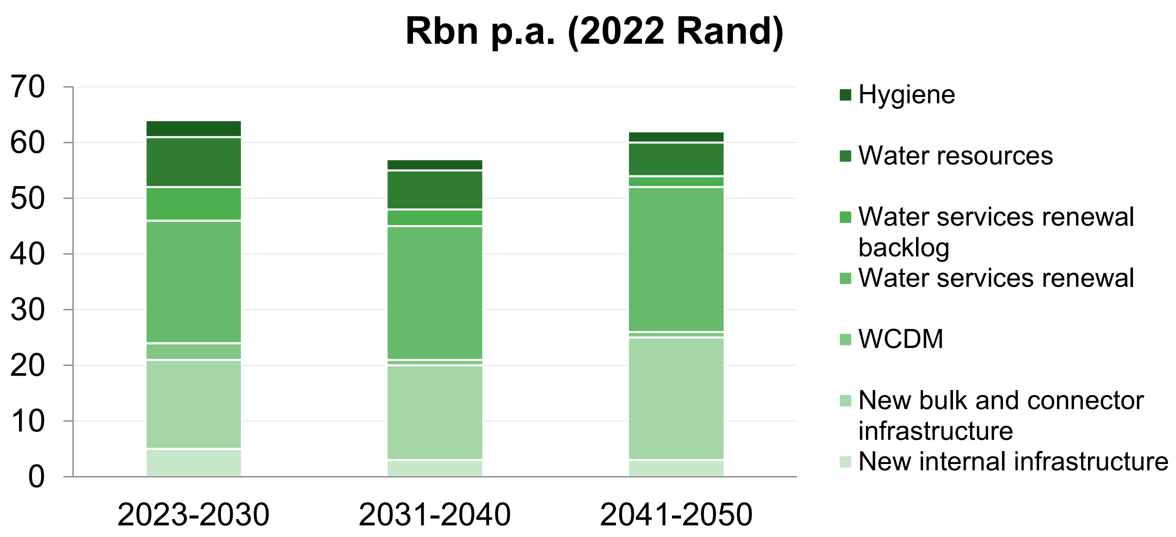
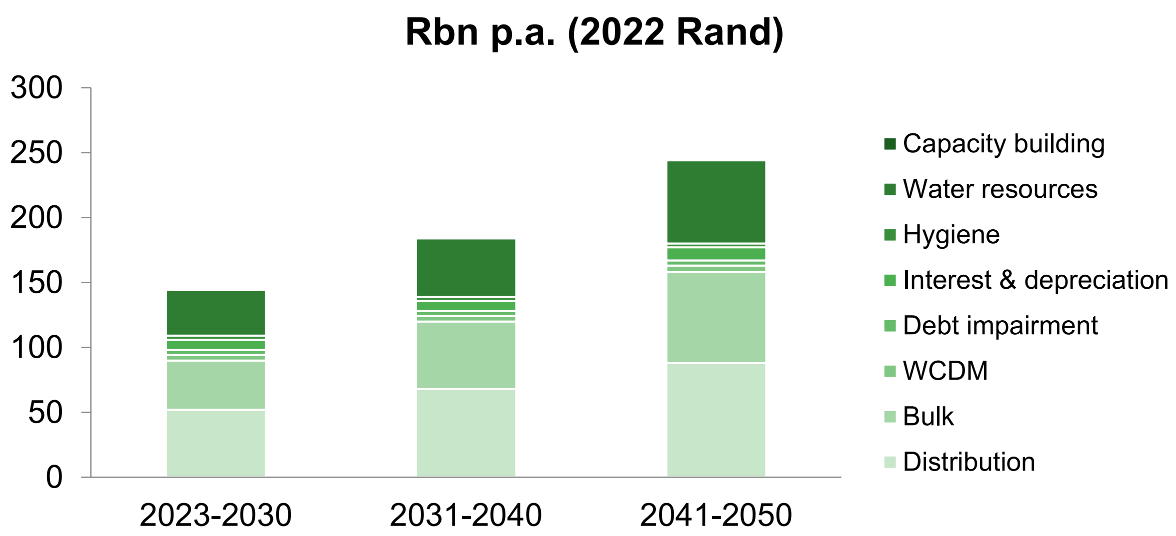


Figure 6: Expected Average Annual Operating Expenditure, 2023–2050



Under these conditions, the ‘funding gap’ (the difference between current levels of investment and what will be required to achieve the NDP goals and SDGs) is estimated to be between R75 billion per annum on average between 2023 and 2050 (36% of the required level of investment) and R149 billion (49% of the required investment) with a base case scenario of R91 billion per annum (37% of the required level of investment).

“The large range in potential investment requirements is driven largely by the sensitivity of the funding required for water resources (as opposed to water services) to exogenous factors and policy choices. The costs of water resource augmentation options such as re-use and desalination are high, particularly their operating costs associated with energy use, and so scenarios that bring these options on earlier can drive up the investment requirements significantly.

For the same reasons, investment requirements for water resources grow more rapidly over time than those for water services, and the share of funding needed that is due to water resources is higher in 2041 to 2050 than it is in 2023 to 2030.

The summary recommendations of the Cities Support Programme report are to:

Improve the management of water services – this would involve introducing Water Operating Licences for WSPs, implementing a nationally coordinated capacity-building and institutional strengthening strategy and incentivizing proper integrated asset management.

(The latter noting that the required capital expenditure needs are dominated by the need for infrastructure renewal)

Reduce water demand by Prioritising water conservation and demand management, improving operational efficiencies in the bulk water supply system; and better managing water resource allocations.

Close the financial gap by Establishing an economic regulator for water services; making appropriate service-level choices; strengthening all links in the revenue value chain; passing the Development Charges legislation; requiring reporting on the allocation of the Equitable Share to services; and mobilising public and private sector investments.

Despite the substantial 'funding gap', the importance of making appropriate service-level choices is mentioned but not highlighted although this is one of the key drivers of (apparently unsustainable) demand. In addition, while the investment backlog is mentioned, the huge deficit in user payments, a major present threat to the sector's financial stability, is not. The report also notes two broader issues that will affect the efficacy of its recommendations - the stagnant economy; and overall leadership and governance of the local government sector – but says that these are beyond its remit.

These conclusions and recommendations provide a sobering perspective on the potential for identifying opportunities for local manufacture in this sector. However, these perspectives must guide the product level analysis that follows, if it is to be useful.

3. MANUFACTURES USED: CATEGORIES, SCALES AND OPPORTUNITIES

3.1 INTRODUCTION – THE ACTIVITIES UNDERTAKEN

The different sets of core services provided by the different families of sector institutions involve quantitatively and qualitatively different sets of activities and demands for manufactured products. While the generic sets of products used are similar, the size and scale of the individual products differ substantially as does the proportion of costs incurred for each product set. As an example, the flow of water from a dam will be controlled by large valves which may each cost over a million rand but represents just a small proportion of overall capital costs. Meanwhile, the thousands of smaller valves in municipal distribution systems may cost as little as R10 000 each but constitute a more substantial proportion of their network costs.

The activities undertaken by each family of institutions include: -

The management and exploitation of the natural water resource systems at a large (often referred to as 'bulk') scale is typically undertaken by DWS. Its mandate is to ensure that supplies derived from the natural resource are reliably available for its large-scale water users. These activities require the construction and operation of very large physical infrastructure for multi-year storage and transmission of water, associated with heavy electromechanical machinery. It engages in water treatment activities to a limited extent, in special cases. The DWS also maintains an extensive monitoring network to track the quantity and quality of water resources as well as to support and guide its operations of the national water infrastructure. In farming areas, some collective 'water user associations' are also involved, taking water from the natural resource and providing bulk supplies to individual agricultural users using similar infrastructure, albeit at a smaller scale.

The provision of bulk water services (treated water and the treatment and, in some cases, the disposal of wastewater) is the responsibility of water utilities/boards in some areas although these activities are often undertaken directly by municipalities that have been designated as water service authorities and have chosen to undertake the water service provider function themselves, as most have done. These institutions use similar pumping and transmission infrastructure to the engineered systems that draw from and manage the natural resources but have a particular focus on the treatment of water to the required quality (for use or for discharge). In addition, their storage and transmission capacity is generally intended to maintain reliable supplies to cover technical interruptions over a period of weeks rather climatic multi-year variations as with water resource infrastructure.

Finally, the retail water services function, the distribution of treated water and collection and adequate disposal of municipal wastewater is undertaken by municipalities that have been designated as water service authorities and chosen to be water service providers.

The municipalities are primarily responsible for building and operating the distribution networks that supply water to individual domestic, institutional and commercial users in their areas as well as the sewer networks that collect wastewater, transport it to treatment works and then dispose of the treated water to the environment. While many undertake some of the bulk functions themselves, others receive the bulk water from institutions such as water boards and may rely on those or similar institutions to treat their waste as well. Given limited municipal capabilities, there is also growing pressure to encourage them to contract private sector operators to act as water service providers.

The scale of the infrastructures providing municipal water services is outlined in documents such as the DWS's Blue Drop Reports (for clean water) and Green Drop (for wastewater). Thus, for the municipalities and water board operations, the Blue Drop 2023 reported that, in the municipalities that reported, there were: -

> "…delivery, treatment, and distribution networks to the end user/ consumer, specifically 958 water supply systems, 1,015 water treatment works (including boreholes and springs), 2,693 pump stations, 37,644 km bulk water supply lines, 136,645 km reticulation pipelines, and 7,159 reservoirs."

For wastewater, the Green Drop (2022) identified

> 850 wastewater treatment works;
>
> 3 211 pump stations; and
>
> 47 449 km of sewer pipeline

(But acknowledged that this was incomplete since, aside from the metros, many municipalities could not provide data, particularly about the extent of pipelines installed.)

There is also a set of large industrial and institutional water users who, in their operations, undertake and extensive range of water treatment, distribution and disposal on a standalone basis, using many of the technologies and products used by the formal water service institutions. The water uses and disposal by these operations is regulated by the DWS in terms of its mandate to regulate the use of water resources.

3.2 CAPITAL VERSUS OPERATIONAL ACTIVITIES AND THEIR REQUIREMENTS

To categorise the goods used in these different activities by the water sector institutions, it is helpful to distinguish between the capital goods that constitute the basic supply infrastructure and the goods that are used to support the operations of the infrastructures and the distribution systems that they support.

Capital goods and their expected lifespans

Many of the capital goods which comprise the infrastructure used by the water sector have a relatively long physical lifespan although different estimates may be used for engineering and financial accounting purposes. Some indicative values are presented below, the wide variations reflecting the different physical environments and materials used.

Table 1: Capital goods and expected lifespans

Capital goods	(expected life)
Major dams, canals and tunnels	50 – 100 years (at least)
Pipes & fittings	20 – 50+ years
Valves and associated equipment	20 - 50 years
Pumps	20 – 50 years
Electric motors and controls	10 – 25 years
Treatment process equipment	20 - 50 years
Meters	5 - 15 years

Most municipal service providers have not sustained the required rate of replacement of old infrastructure. Consequently, “water interruptions are increasing in frequency in South Africa’s metros. A primary cause of this is the low level of pipe replacement. The international benchmark is to replace between 1% and 2% of the network each year, allowing for an average lifespan of a pipe of fifty to one hundred years. However, the rate of replacement is far below that in seven of the eight metros, which is very unsustainable” Similar problems have been observed with water treatment infrastructure.

The consequence is that, in addition to building new infrastructure to cater for growing population and economic demands, and replacing infrastructure as it reaches the end of its useful life, there is also a growing backlog of infrastructure which has passed its useful life and whose deterioration and frequent failures are now creating serious operational challenges and new financial burdens and requires immediate action.

Consumables/Recurrent expenditure manufactures

Operation and maintenance requirements:

- for pipes & fittings, pumps, electrical
- tools, transport
- water meters

Chemicals

- Disinfectant — chlorine & related products
- Coagulants — Al/Fe sulphates & specialised products
- pH control — lime and hydrochloric acid

Membranes

- Used for drinking water, desalination and wastewater treatment applications

3.3 ESTIMATING THE FUTURE SIZE OF THE MARKETS - METHODOLOGY

Alternative scenarios for demand for water sector related manufactures over the next five years, the horizon of this review, may be characterised as reflecting:

- Continued low levels of institutional capability and resource availability;
- Improved performance of a proportion of existing sub-optimally sized institutions;
- A broader consolidation and professionalisation of sector institutions supported by policy reforms.

It is considered unlikely that funding available from government grants or user payments will be significantly increased. That will limit the potential for 'blending' external private financial resources with public funding. Since institutional change is necessarily slow, the binding constraint on demand for manufactures in the public sector will thus be the quality of performance of the institutions currently responsible for service provision.

This report therefore assumes that, for the public sector, the 'low-road' scenario is the most likely in the short/medium term (2 – 5 years). It is nonetheless prudent to consider what early measures can be taken which would provide a foundation for future improvements and, where appropriate, the implications are presented as an optimistic scenario.

The diversity of the water sector institutions and the products used in it means that little consolidated information is available, based on detailed reporting, of the volumes of products used and their values. In the absence of such firm information, the approach taken to gauge the size of the market for the different products, is to estimate current demand and the range of possibilities for its future evolution.

For capital products, this requires consideration of: -

- The product 'fleet' universe
- The life to replacement
- The current deficit (units beyond replacement date) and refurbishment needs
- Annual requirements to meet the growth of the user population
- The service levels to be achieved.

For operational products:

- The rate of product use (per volume of water or user population served)
- The likely growth in volume/population
- Current and future service levels and efficiency of operations.

To quantify treatment plant costs, and particularly the requirement for rehabilitation/refurbishment, an important source has been the (relatively recent) VROOM (Very Rough Order of Magnitude) costings produced as part of the DWS's Blue and Green Drop reports. For other infrastructures, the 2023 State of Water report is also valuable.

3.4 CAPITAL PRODUCTS

In broad terms, many groups of manufactured products are common across water's subsector. Thus, pumps drive liquids through systems of pipes, regulated by valves, controlled and monitored by SCADA (Supervisory Control and Data Acquisition) systems.
In many cases, however, the manufactures are not interchangeable and the requirements for the manufacture of different categories of products within the larger groups may be sufficiently different to reduce substantially the opportunity for agglomerating their manufacture into a single set of similar processes. For the purposes of this review, the focus is thus on either: -

- the subsets of those manufactures, for which the scale of requirements is sufficient to constitute a viable market; and
- those manufactures where sufficient of the subsets can be manufactured within the same production environment to achieve the scale required for commercial viability.

Pipes and fittings - overview

Most of the pipes used in the South African water sector are locally manufactured from plastic (PVC & HDPE) and steel to meet the requirements of the water sector and other users. There are exports to, and some imports from, neighbouring countries.

Pipes are a core component of any water infrastructure which involves the transport of water (fresh, treated or waste) from one location to another. Over 175 000km of pipes are installed in South Africa's public water sector infrastructure networks. Of these 38 000km are classified as bulk pipelines (transporting water from source to local distribution reservoirs) while the remaining 137 000km are classified as reticulation pipelines (part of networks supplying individual users). In addition, the 2022 Green Drop reported that

These pipes are manufactured to a wide range of sizes and specifications using a variety of materials, depending on the specific application and location with different specifications for municipal water supply, wastewater disposal, stormwater drainage and agriculture. In applications beyond the water sector, notably in buildings and industry, similar specifications may be used but the mining, chemicals and energy industries often require specialised materials to resist corrosion and abrasive materials.

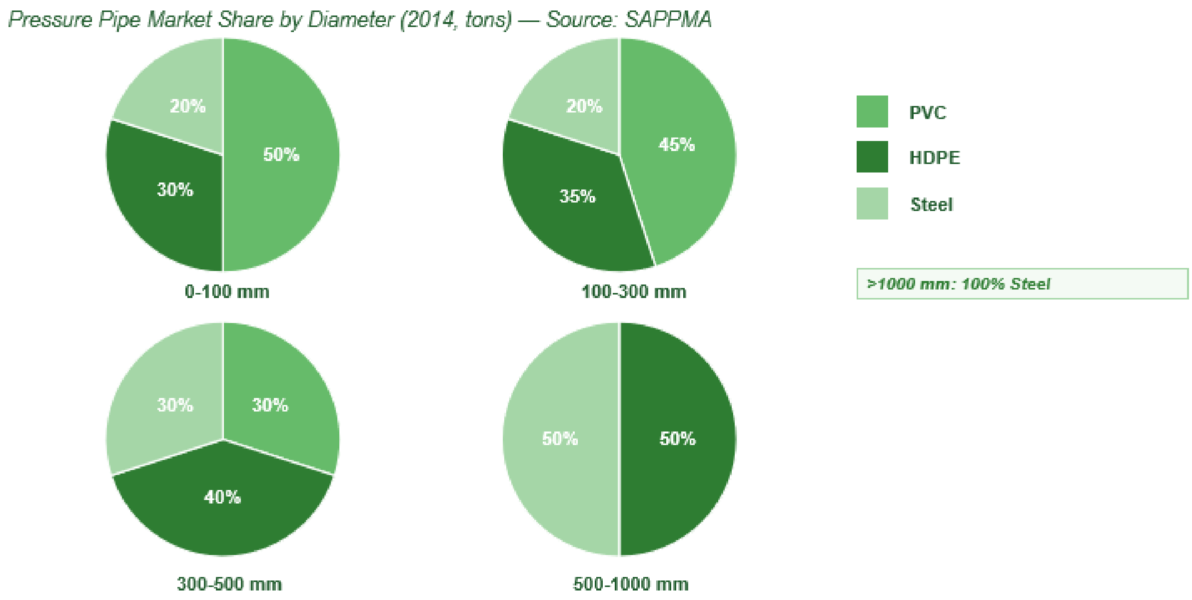
The materials used have changed over the last few decades, reflecting technical developments as well as changing cost structures. A dramatic change has been the disappearance of asbestos cement pipes from the product range, due not to the health concerns that affected other products but due to their deterioration over time. This shift was, in turn, enabled and encouraged by the growing availability, improved specifications and cost advantages of plastic (PVC and HDPE) pipes.

Presently, the market for applications in which pipes are under pressure, is almost entirely divided between steel, PVC and HDPE with the proportion of the different materials varying according to the diameter and pressure class of the pipes (see diagrams). For wastewater sewers and stormwater drains, most of which do not work under pressure, concrete pipes are widely used. Since concrete pipes and associated products are typically locally produced as part of a wider suite of pre-cast concrete manufacturing activities, they are not dealt with further in this report.

Pipe material share:

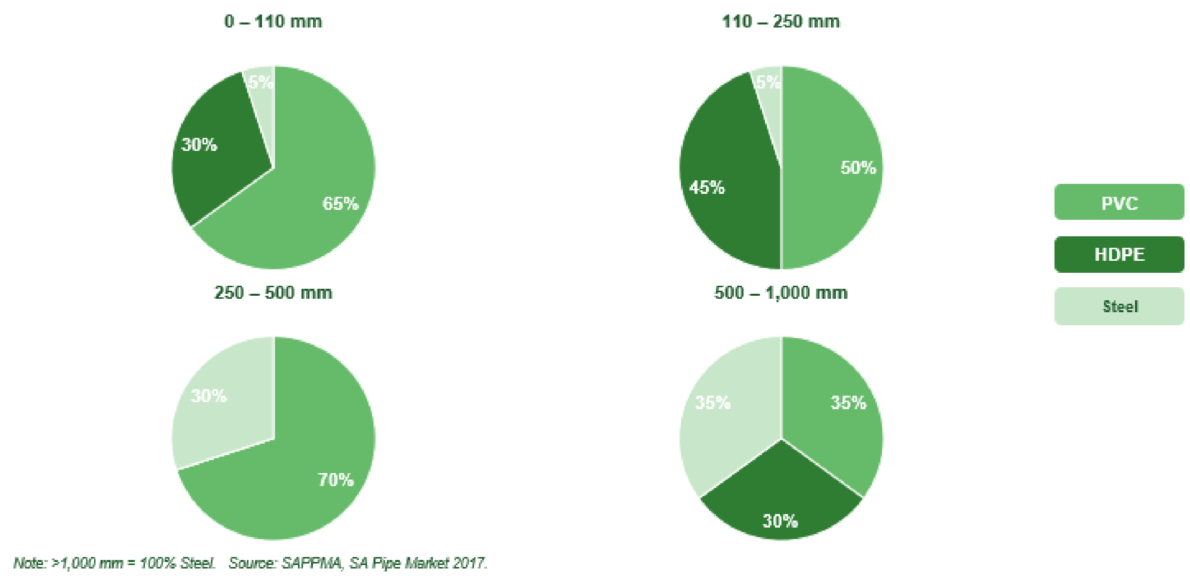
i) by tons of material

Figure 7: Pipe material share by tons of material



ii) by kilometre of pipe

Figure 8: Pressure pipe market share – by kilometre of pipe (2014)



The market dynamics and prospects for individual pipe materials are presented in more detail below. However, the division of the market between the materials provides important context for market analysis. The last data set of materials, mass, length and diameters that has been made publicly available was produced by the South African Plastic Pipe Manufacturers Association (SAPPMA) in 2014 but is still broadly representative.

These diagrams highlight an analytical challenge. Pipe users focus on pipe length as their primary metric since pipes' primary function is to connect two locations in water networks. However, the primary metric for pipe producers is the mass of the raw material that they convert to various types and sizes of pipe.

The pipe market data provided thus provides some important insights since it tabulated both pipe length and pipe mass. It shows that PVC dominated the mid-size diameters (from 125–500mm) accounting for over half of the 11 788 km of pipes in that range. HDPE dominated the small diameters (0-110mm) in the building sector and the 500–1000mm range in industry and mining. Steel only took more than 25% of the market (by length) for pipes over 500mm but dominated the market for pipes larger than 1000mm. In future, it is likely that the distribution of market between different materials will continue to change.

Fittings and accessories

In addition to the pipes themselves, a wide range of complementary fittings and accessories is associated with each pipe type, pressure rating and size. These fittings and accessories are essential components of all piping systems and an important part of the overall pipe market.

Since the design life of a pipe installed for water supply in a normal environment may be as long as 50 years or more, it is not unusual to find a variety of different pipe materials in use in large water supply systems. This can make it difficult to maintain a stock of the fittings and accessories that may be required for the operation and maintenance of the system and requires careful inventory management, supported by specialist merchandisers.

The wide variety of pipe materials and specifications also mitigates against the local manufacture of a full range of fittings and accessories since it is often uneconomic to make small runs of items, particularly for older installations and where the production of the components concerned require specialised techniques, such as injection moulding.

Even with items that can be produced relatively easily, the time taken to manufacture some individual components may substantially raise the cost of production to the point at which it is cheaper to import them. An example is the production of large diameter flanges for which automated manufacture is far cheaper than a manual cut and drill process.

As a result, some local pipe manufacturers reported that they use imported even simple products such as flanges rather than fabricating them locally. However, some pipe manufacturers with merchandising associations were more likely to produce fittings and accessories. They could compare the costs of local production against those of imports and identify opportunities where local production could be profitable.

Pipes – Steel

Description and applications

The main application of steel pipes in the water sector is to provide large diameter, high-capacity bulk infrastructure. Steel pipes are extensively used in water production and distribution systems as well as by many other industries. In the water sector, steel is the material of choice for applications in which large volumes of water (or other liquids) are transported under pressure. Steel pipes can be fabricated in a range of diameters and wall thicknesses and are often the preferred option for larger diameter, higher pressure applications. Raw material for large diameter pipes is usually steel coil which is helically welded. While steel used to be a material of choice across a wide range of sizes, it is being superseded in the smaller diameters by plastics in many water supply applications. It still dominates the market for diameters over 1000mm while smaller diameters are now more often used for building and industrial applications rather than for water services.

Steel is subject to corrosion and requires appropriate protection for the environment in which it is installed as well as the quality of the liquid that it transports. Large diameter steel pipe used in the water industry is always provided with specialised protective coatings both external and internal. In addition, in some applications, a permanent form of cathodic protection is also provided to ensure that the installation performs adequately through its design life. Smaller diameters have traditionally been protected by galvanizing (coating with a protective layer of zinc).

Manufacture & market size

The three manufacturers in South Africa that currently produce the large diameter steel pipes used in bulk water supply at scale face a stagnant market and are pessimistic about their future opportunities. Pipes are produced to meet project specifications which cover the pressure ‘class’ for the specific application for which the pipe will be supplied, the internal and external protective finishes required and the connection system to be adopted. Because of the wide range of specifications, it is not usually appropriate for manufacturers to produce significant quantities of pipe for ‘stock’ although this was done in the past based on supply contracts with water boards.

The water sector market for large diameter pipes is now limited to large scale projects and is thus ‘lumpy’ in nature; although there is also potential demand from mining and industrial users, this tends to be for smaller quantities/shorter lengths. At present, demand is low and plants for large diameter pipe are either idle or operating well below capacity. One plant which also has small diameter lines is operating but is actively considering transferring its large diameter production infrastructure to Mozambique to take advantage of substantially lower (imported) steel costs.

While the three existing manufacturers have factories In Vereeniging and Sasolburg, manufacturing sites for large steel pipes can also be set up close to the users’ location. This can significantly reduce the cost and logistical challenges of transport and may be considered as an extreme, if temporary, form of localisation – or emigration as is being considered by the one company concerned. In the past, there was some export of steel pipes to regional and even international markets but that has also been reduced although it is not clear whether this is the result of a drop in demand, a lack of competitiveness or both.

At present, the industry would be able to respond to any upsurge in demand, provided that it was announced and procured reasonably well in advance. However, the physical capacity and business capabilities cannot be preserved indefinitely if turnover does not return to levels sufficient to sustain the viability of the operations. Infrastructure project planning should consider the need for and benefits of establishing long term supply programmes to avoid boom and bust cycles which are expensive for both suppliers and clients and may force resort to imports.

Pipes: Plastic – PVC & HDPE

Description and applications

Pipes made from plastics are a relatively recent innovation, compared to the use of steel but their use has expanded rapidly. There is currently excess manufacturing capacity for these products in South Africa.

Polyvinyl chloride (PVC) pipes were developed in Germany in the late 1930s but only came into municipal use in the 1950s. Pipes made from polyethylene were introduced in the late 1950s. Although some polyethylenes were first synthesised in the 1890s, it took almost 60 years to produce high density polyethylene (HDPE) compounds that were strong and durable enough to be used for pressure pipes in water supply.

The growth of municipal markets for both products has been slow, worldwide, due to concerns about their durability. Experiences with the slow deterioration of asbestos cement pipes (see below), have highlighted the need for long-term evidence from use in the field practice before a new material is adopted for use in infrastructures that are expected to last for at least 50 years.

Both PVC and HDPE are used to manufacture a variety of pipes and other products for a wide range of purposes in South Africa. Both materials provide, strong, corrosion resistant and relatively light-weight products and, because they are made from widely available coal and oil feedstocks, they have been relatively cheap.

Over the past 40 years, both plastic products have increasingly replaced older pipe materials such as steel and asbestos-cement in water distribution applications. While PVC has been preferred for municipal use, HDPE which also has industrial and mining applications, is more expensive. However, while the market for smaller diameter (200 – 500mm) distribution pipes has been filled by PVC, larger diameters have not been available, and HDPE has found application in those dimensions.

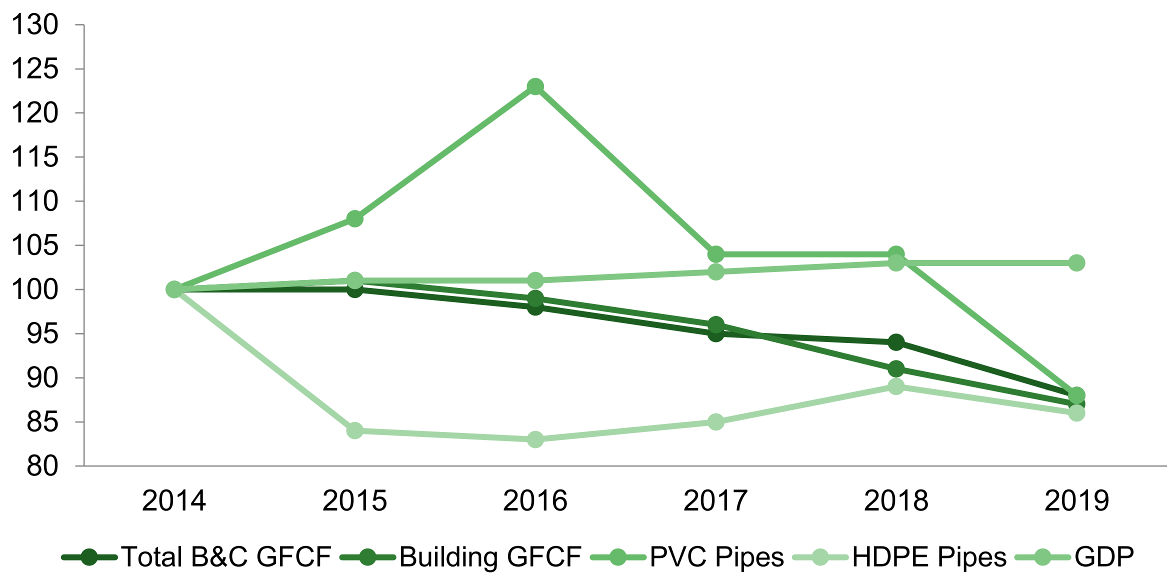
Manufacturing capacity

South Africa currently has excess manufacturing capacity for both PVC and HDPE pipes. The SAPPMA has 12 producer members (including some with owners or associates in neighbouring countries or abroad) as well as a range of associated suppliers of input materials. In 2020, it reported that 4 producers accounted for approximately 60% of PVC market share while 3 producers accounted for approximately 45% of HDPE market share. The most recent publicly available data from SAPPMA showed that

“PVC pipe continues to enjoy the biggest share of the local market, with approximately 78 000 tons currently in use (72 % pressure and 28 % non-pressure). 48 000 tons of HDPE pipes are used in SA (84 % pressure, 4 % non-pressure and 12% telecoms), followed by 220 000 tons of concrete pipe (78 % stormwater and 22 % sewer).”

SAPPMA further reported that, due to a decline in infrastructure and building projects, the pipe market had shrunk by 15% between 2014 and 2019. Although more recent formal data is not available, industry sources suggested that performance has generally not improved in the post-COVID period.

Figure 9: Trends in Pipe Market and Construction Investment, 2014–2019



Fixed investment and pipe market trends

Capacity utilisation by PVC pipe producers is currently estimated by industry sources to be around 50 – 55%. Export opportunities are limited since there is some PVC pipe production in neighbouring countries, including for export to South Africa. While local utilisation of HDPE pipe has also fallen, producers have benefitted from regional exports, primarily for mining applications.

Technological change in domestic plastic pipe manufacture is continuing. This is evidenced by the expansion of capacity and product types currently underway in Richards Bay where Sizabantu , in partnership with the Spanish specialist firm Molecor is installing a new PVC line in their Richards Bay factory. This new installation will be capable of producing lighter and larger PVC pipes (up to 1.3 metres in diameter) which the company believes will begin to displace steel pipe for larger diameter pressure mains as well as concrete in stormwater and sewer applications. The Sizabantu product range (PVC-O) is termed ‘molecularly oriented’ and is manufactured to a different technical standard in a process that uses less raw material and produces a lighter although slightly more expensive pipe.

Market size and trends

The potential size of the market for plastic pipes depends largely on demand from the municipal sector, particularly for PVC products. There is a well-recognised need to replace extensive lengths of existing municipal distribution networks which have reached the end of their working life, as evidenced by a rising volume of leaks and losses. However, this need is not easily translated into predictable effective demand.

The current low utilisation of existing manufacturing capacity, is generally associated with low municipal investment in South Africa, shown in figure 8 above. As already explained, the reasons for this include limited finances attributed in turn to municipal failures to collect water revenues, diversion of some of the revenues collected to other purposes and poor implementation of projects even when funds are available. This situation has been aggravated by policy failures which have allowed levels of service to be provided which substantially exceed their users' ability to pay for them.

Given these challenges, an estimate of the potential municipal demand has been made by considering the funds that might be available for water sector investment if municipal water revenues are ring-fenced, as proposed in current policy reviews. These will continue to be supplemented by government grants including a large conditional grant for metro municipalities to be funded by the World Bank.

If currently idle installed capacity were to be brought online, an additional 50 000 tonnes of PVC pressure pipe could be produced annually, based on recent estimates of utilisation. This would allow for the replacement of between 800 and 1200 km of pipes per year (depending on the size and class of pipes installed). However, at a national level, this would still be less than 1% of the installed network, not fast enough to meet 'normal' replacement schedules or to reduce the accumulated replacement backlog. If the rate of replacement were raised to desirable levels, additional local production capacity would be needed. But this is considered unlikely in the current fiscal environment.

Market dynamics may also be altered by the trend towards the use of large diameter plastic pipes which would allow PVC pipe manufacturers to challenge the dominance of steel in the large diameter segment of the market. However, as the Sizabantu experience shows, large investments are required: the cost of their new line is approximately R250 million.

Other (non-municipal) users

Although the South African municipal market, potentially the dominant user of PVC pipes, has been subdued, private sector demand has been sustained. Aside from the building sector (which is not considered in this analysis) agriculture continues to be a source of demand that is not correlated with the municipal market. The Cape Town based Agrico company, which focuses on the irrigation market, reports that it sells over 3 000 km of PVC a year into its markets (25% of which are outside South Africa, in the SADC region) although mass and diameter is not stated and it will generally be of smaller diameters than those used in municipal distribution.

Raw material supply

A high priority for pipe manufacturers using both PVC and HDPE is to ensure reliable, competitively priced access to the raw materials which account for most of their production costs. The primary raw materials have traditionally been supplied by local polymer manufacturers. PVC is manufactured by SASOL and supplied directly while HDPE is supplied by SAFRIPOL, which produces polyethylene using ethylene feedstock from SASOL, with which it has a direct pipeline connection.

This supply arrangement is not sustainable in the medium to long term since the production plants are already 50 years old and are reaching the end of their lives. SASOL has publicly stated that, while it will maintain production if it is technically and financially feasible, it intends to exit this commodity market which is increasingly competitive and which is not part of SASOL's long term strategy to transition to a more sustainable business model. With the shift from coal to cleaner energy sources, there is no serious suggestion that there may be new entrants into the local manufacture of the basic raw materials.

The plastic pipe manufacturers will thus have to rely on imported raw materials. Most are already importing some raw materials to mitigate risk of reliance on a single supply source and, more strategically, to build relationships with other sources. A complete switch to imports will necessarily complicate their business and, while import prices may be competitive, the need to maintain inventory and manage supply risk will likely increase prices and impact on other commercial arrangements. The emerging external dependence will also make the local market more vulnerable to external supply cycles and to the impacts of factors such as climate change related policies which may constrain the activities of this element of the petrochemicals business and thus access to its products.

Regional trade factors

Market size estimates for plastic pipes must reflect trade, which is already a significant factor in overall market dynamics.

South Africa's 2024 exports of PVC pipe (tariff code 39172000) were valued at R170 million, mostly to SADC countries. The region has limited export potential since there is local production of PVC pipes in Angola, DRC, Zimbabwe and notably Botswana, which exported R260 million worth of PVC piping to South Africa in 2024 from a company which also has South African manufacturing facilities.

Trade is also important in the HDPE pipe market. There has been significant demand from the mining sector in Zambia, DRC, Namibia and Botswana which, between them, imported over R400 million worth of HDPE tube from South Africa in 2024 (under tariff code 3917.2190). These exports helped to mitigate the impact of slow South African demand.

These trades are subject to the same generic challenges that manufacturers of other products face with the design and application of SADC trade agreements. One South African firm reported that their exports to a SADC country were blocked by local preference requirements, even though there is no local production of the goods in question.

Pipes: other - asbestos cement

Asbestos cement (AC) pipes, made from a cement-asbestos fibre composite, became widely used internationally for water supply following their introduction in Italy at the start of the 20th century. In AC pipes, asbestos fibres mixed with cement provide 'tensile' strength which resists bursting pressures.

While AC pipes performed well initially, they began to show long-term deterioration and are no longer installed, due to poor performance and health concerns about the use of asbestos. Nevertheless, in 2008, they still constituted almost 20% of Canada and the USA's pipe networks.

Asbestos cement constituted a significant proportion of South Africa's distribution network. It is now associated with increased frequency of breakages, and its replacement needs to be prioritised. Concern about the health impacts of asbestos contributed to AC being abandoned as a building material although there is no evidence of any health impacts related to the use of AC pipes.

While no longer manufactured, the replacement of these pipes is an important and costly driver of current demand for pipes of other materials. Their history illustrates the reasons for the conservatism of technical administrations which are often criticised for their resistance to the introduction of new products and materials into public network infrastructures.

Pipes: other - glass reinforced plastic (GRP) & Ductile Iron

Ductile iron and GRP are pipe materials that are relatively widely used internationally.
Ductile iron was a technical improvement on traditional cast iron pipes which were cast in moulds. While cast iron was relatively brittle, ductile iron is more resilient and more reliable in high pressure applications. It is claimed to be less vulnerable to corrosion than steel plate and is posed as a competitor to welded steel pipes.

GRP has been extensively promoted for use for larger diameter pressure mains. It has the advantage of being light and resistant to corrosion. It has not been widely adopted in the South African water sector due to concerns about its vulnerability during construction and its durability under field conditions as well as the need for specialist equipment to repair and make service connections to it. However, it has been deployed in limited quantities to address specific site conditions.

Ductile iron production is a comparatively capital-intensive process which is only economic at scales larger than that of the South African or regional market. GRP is manufactured in small quantities in South Africa, mainly for industrial applications due to its corrosion resistance.

In South Africa, both ductile iron and GRP have been designated products that could only be used by the public sector if they are 100% locally manufactured. This restriction ('designation') was intended to support demand and sustain the viability of the local pipe industry which produces a sufficient variety of competitively produced steel and plastic pipes to meet most requirements. Since there is no local production at significant scale and no particular incentive to promote production, both materials were effectively excluded from large-scale use in the public sector.

Pipes: other - Concrete

Concrete pipes are widely used where they do not have to resist high internal pressures but are installed in places like under public roads, where they must be strong enough to manage external impacts. Concrete pipes thus remain important technology in sewer networks where the sewage flows under gravity, but the pipe may be subject to external shocks. Because they

can easily be made in large diameters, concrete pipes are also used for stormwater drains under roads in urban settings. In both sewerage and stormwater drainage, it is also easy to use similar materials to build manhole access.
In certain applications, concrete pipes may require additional protection against corrosion. The simplest method is simply to increase the thickness of the pipe wall to provide a 'sacrificial lining'. Alternative approaches use special corrosion-resistant concrete mixes or the application of internal linings.

In South Africa, concrete pipes for gravity drainage or similar low-pressure applications are manufactured economically at a relatively small scale in pre-cast concrete manufacturing facilities. For use in pressurised systems that are found in water supply, concrete pipes must be reinforced to prevent them from bursting. A few systems have used prestressed steel reinforcing or steel linings to provide this tensile strength. These pipes are now seldom used for new installations. However, organisations like Rand Water have the technical and financial challenge of phasing phase out significant lengths of large diameter line that has reached the end of its useful life.

Pipes: other – clay, for sewerage and stormwater drainage

Traditionally, clay pipes were used for smaller diameter applications in both sewerage and drainage. Since they are heavy and fragile they have largely been replaced by plastic or concrete pipes depending on the diameter and the site concerned.

Valves

Description and applications

Valves are another essential component of water processing, transport and distribution systems. In transport and distribution, valves control the flow of water and enable sections of a pipe or network to be isolated for maintenance and repair without interrupting supply to larger areas than required or requiring large volumes to be drained. In the treatment and production operations, as well as controlling flows through the processes, they also enable components to be isolated for maintenance and operational scheduling purposes.

The principal components of most valves used in the water sector are cast bodies and 'bonnets' and engineered 'gates' and mechanisms. The performance and long-term life of valves is determined by the design, specification of detailed components such as the gate and sealing arrangements, the spindle and opening mechanisms, arrangements to seal the moving parts against leakage and general quality of manufacture.

Two main valve types, butterfly and gate, are used for water flow control purposes. The former are used in applications where there is a need to control flows rather than simply to open or close flow. Butterfly valves are also preferred for larger diameter applications since they require less space and are lighter. For applications such as in distribution networks, where 'pigging' may be required, in which a device is passed along the pipe to clean or inspect its condition, a gate valve which does not obstruct passage would be chosen.

Valves may be opened and closed using manual, electrical or pneumatic mechanisms. Simple manually operated gate valves are appropriate in water networks where they normally be operated in fixed positions for a long period of time. However, their performance after a long period in a fixed position is often problematic (when they jam in position and cannot be operated) which reflects the importance of the detailed specification and execution of the engineered components as well as of operational procedures that regularly 'exercise' the valves. Electromechanically operated valves may suffer from similar problems but, since they can be operated remotely, they may more easily be 'exercised' and tested on a routine basis, which can reduce the risk of 'jamming' or other failures. However, they are more expensive and vulnerable to failures of control mechanisms.

In addition, a wide range of specialist valves are used for specific purposes. These include air release and non-return valves as well as more specialised pressure reduction valves used to maintain set pressure limits in distribution networks.

Manufacturing trends

The production of most routinely used valves is a relatively straightforward mechanical engineering process. A wide variety of valves were manufactured in South Africa in the past for applications in mining and industry as well as the water sector. However, the price of locally manufactured valves now substantially exceeds that of imported products. The price differential can be attributed to the different scales of production with imports from China and India produced in large volumes which far exceed the demand in South Africa or the Southern African region. The price differential is aggravated by the relatively high cost of local steel and declining foundry capacities.

Over the past decade, several local valve makers have been acquired by the local subsidiary of the Danish Group AVK A/S. AVK brands itself as a South African company and has a 'Local Product brochure' to reinforce that message. However, it is a Danish controlled group comprising 108 operating companies and eight associates in 41 countries with factories in China, India, Kazakhstan and Brazil as well as Europe which, since 2010 has focused on acquisitions and large investments worldwide.

In South Africa, the takeover of some of these companies and their downgrading to marketing and service operations rather than manufacturing, marks a retreat from a previous round of localisation, which was documented in 2005. That localisation was attributed to the migration of European engineers to South Africa taking advantage of opportunities to move from valve repairs to manufacturing specialised products to supply to the local mining and industrial markets.

Some new local production has emerged over the past decade, supported by the parallel industry of valve repair and refurbishment which involves many of the production processes required for valve manufacture. When a specific valve product is required to meet a local need, it may be manufactured as a 'once-off' product. Some companies deliberately maintain a mix of refurbishment and the manufacturing of a small range of new valves, which provides resilience to market fluctuations.

Market size – determinants, value and localisation

The potential market for water sector valves will be driven by the rates of growth and replacement of networks and pumping and treatment plant. In public water supply networks, there is a formal recommendation for the placement of valves which aims to facilitate isolation of zones while limiting the are affected:

“In reticulation networks, provide sufficient isolating valves so that no more than four valves need to be closed to isolate a section of the main pipe, and so that the total length of the main included in an isolated section does not exceed a nominal 600 m.”

If followed, this recommendation could result in the use of an average of four valves for every kilometre of new pipeline in dense networks.

In addition, existing valves will need to be replaced as the rehabilitation and replacement of existing network proceeds. At currently projected rates, approximately 1200 km of pipe would be replaced annually, creating a potential market of around 8 000 valves per year. (The additional market for valves in treatment, pumping and transmission applications is more difficult to quantify but is estimated at around half of network requirements taking the total market to about 12 000 units annually).

While the desired quantum of network expansion is not currently being achieved, due to low levels of investment in municipal networks, it does provide an indicator of the potential value of the market. Although the cost of valves varies with type, diameter and pressure rating, the current and potential value of the market can be estimated from public ‘trade prices’. A basic imported 150mm PN16 gate valve meeting SABS664 standards is currently listed at R9 341. Using this as a benchmark, the value of the 12 000 units would be in the order of R120 million per annum. The price for an equivalent locally manufactured valve from the same supplier is R32 900, a ‘local manufacture premium’ of more than treble imported prices. This would raise the potential value of the water sector valve market to around R400 million annually. If an ambitious 30-year replacement cycle could be achieved, the number of units required would rise to around 26 000 annually, with a value of R243 million (imported units) or R860 million (local manufacture).

While price is an important determinant of purchasing decisions, other considerations may influence patterns in the commercial sourcing of valves. For large units, there is often a long lead-time between order and delivery which is further extended when ocean freight is involved. And there may be specific requirements for local engagement and support that require the involvement of technical personnel and facilities.

Local production has been supported by the DTIC designation process, and some classes of valves are subject to tariffs to provide protection for local manufacturers. However, given the price differential, it is not surprising that, despite these protections, the bulk of valves used are imported. A representative of the Valve and Actuator Manufacturers Cluster of South Africa (VAMCOSA) suggested that, in a market whose annual value they estimate at around R20 billion, perhaps only 10% by value of valves installed are locally manufactured.

Since valves are used in many other applications outside the water industry, it is difficult to confirm these estimates, but they appear exaggerated. SARS trade data, which records imports in kgs rather than units, records the import of 3085 tonnes of gate valves valued at R441 million and 2239 tonnes of butterfly valves valued at R339 million in 2024.

VAMCOSA’s estimate of import values is likely based on domestic prices which would be inflated by commercial margins and the local content premium. While variations in the definition, classification and reported versus true values are to be expected, this is still a particularly wide variation. It highlights, however, the relatively small size of the market, the paucity of information about it and the limitations of the producers’ association.

VAMCOSA suggests that the apparent ‘leakage’ of imports into their ‘designated’ market is driven, in part, by merchandising and distributing intermediaries who seek to offer competitively priced products as well as by the reluctance of professional advisors to warn their clients when non-compliant equipment is procured, due to the cost implications.

VAMCOSA also criticised the SABS for travelling to exporting countries to certify their compliance with South African market standards. Although this is SABS’s formal role, it is seen as assisting foreign producers to compete with South African producers. The concern is that this diligence is not mirrored by domestic enforcement of standards.

For local manufacturers, the low volumes associated with a limited technical capacity means that manufacturing processes are relatively unsophisticated. Consequently, some purchasing organisations require separate quality checks to be conducted at different stages of the manufacturing process to assure quality, which further increases production costs, particularly for smaller manufacturers.

Pumps

A large variety of pumping equipment is used in the water sector, differentiated by purpose and scale. The nature of the wider pump market (in which water is a relatively small component), the absence of local manufacturers and the diversity of more specialised products used in other industries make it difficult to extract water sector specific data. The long working life of most large (utility scale) pumping equipment also means that there is a limited flow of relevant market information (though see the ‘submersible’ sub-sector below).

Available evidence is that there is limited manufacture of pumps for the water sector in South Africa although there is some assembly of imported components. The value of pump related imports into South Africa in 2024 is between R3,7 billion and R4,9 billion, a proportion of which will be used in the ‘water sector’ with a small part of that re-exported, likely in modified form after some value-addition.

The different functions, performance requirements and installation locations lead in turn to a range of different product design concepts and configurations.

All pumps require power to operate. This is most often provided by electric motors although, for mobile use or installations far from a grid supply, liquid fuel (diesel/petrol) may be more convenient. Even where the power source is petrol or diesel driven, it may still be appropriate to use it to drive a generator which supplies an electric motor, particularly in submersible pump applications. For some smaller public systems and fixed agricultural purposes and applications, solar power is also increasingly being used.

Motors may be separately mounted (often on a common base) and connected to the pump unit using a coupling or included as part of the pump body, sharing the same shaft (common in smaller units and with borehole or other submersible pumps) and sold as a ‘pumpset’. For maintenance purposes, particularly with larger units, it is convenient for the pump and motor to be joined by a mechanical coupling which allows either pump or motor to be removed separately and replaced as necessary.

However, the detailed analysis of localisation opportunities for motors and other power sources as well as associated control gear is beyond the scope of this review, since they are a component part of many other manufactures.

Description and applications

Fixed and mobile dry mounted pumps

In most water supply systems as well as in industrial and commercial applications, one set of pumping equipment drives the primary transport of large volumes of water, starting with abstraction from the supply source to the treatment facility (where relevant) and thence to user premises or distribution centres.

For public water services, these pumps are usually installed in fixed locations, often in purpose built pumping stations where they can be monitored and controlled. Another set of pumping equipment is used to move water through the treatment processes, where these are required. In addition, in some treatment facilities, small, specialised pumping units may be used to distribute and dose chemical reagents in treatment processes. All these pumps are usually powered by electric motors, which are preferred in many fixed, water service applications, where they are operated for long durations, because of their lower costs and ease of operation and maintenance.

In agricultural applications as well as in water services construction and repair activities, mobile pump sets are used, again, in a variety of configurations depending on the specific application.

Mobile pumps as well as units in fixed installations in remote locations are often powered by diesel or petrol engines. In some cases, renewable energies are used although the pumping of significant volumes of water is an energy intensive activity which limits renewable applications. In renewable energy powered systems, it is necessary to provide either energy or water storage to ensure that water will be available when required and specialised electric motors and control systems may be needed.

Submersible/borehole pumps

Submersible pumps are a significant subset of water pumping equipment. As their description implies, they are used in applications where they are immersed in the liquid to be pumped rather than installed in separate, dry and accessible compartments.

A common application for submersible pumps is to extract groundwater from boreholes, often by private users. Borehole pumps are also used extensively for public water supplies. Multiple such pumps are often installed in ‘well-fields’ for municipal supply where available groundwater resources can support or complement urban supplies while standalone single pumps are used for smaller systems. In agriculture, submersible borehole pumps are sometimes used to supply water directly to irrigation installations as well as to provide water for livestock. There is also extensive and growing use of borehole pumps for domestic supplies in rural areas or where public supplies are unreliable.

Because most groundwater sources can only supply relatively low flows, individual borehole pumps have relatively low capacities but are used in large numbers. They are relatively cheap (most in the range R5 000 – R30 000) and the construction and connection of the boreholes to a power supply and then to point of use is invariably more expensive than the pumps themselves. Consequently, although borehole pumps have an expected life of around ten years, their low cost means that they are treated almost as disposables rather than permanent equipment.

SA's national registry lists 293 000 boreholes and related sites and estimates that between 80 000 and 100 000 new boreholes are drilled every year most of which will be equipped with a pump. This suggests that the value of the borehole pump market sub-sector may be as much as R800 million considering an average unit price of R10 000. 2024 imports of 'submersible pumps' (tariff code 84137025) was R839 million, the unit value of over 60% of which was under R10 000, suggesting that these might have been predominantly borehole pumps.

While small submersible pumps for use in boreholes are the most important group in this sub-set, there are other important specialised applications for submersible pumps. In public water supply systems, where water is abstracted from the natural resource, it may be more practical and resilient to extreme flood events to install a submersible pump in a submerged structure than to build a protective structure next to or above the water source.

Much larger submersible pumps are also used in sewer reticulation networks where similar operational considerations apply, and it is often advisable to install the pump below the liquid level so that no 'suction lift' is required. Where wastewaters to be transported contain a range of solids, submersible pumps may be combined with a 'macerator' which breaks down solid waste to create a slurry, reducing the risk of blockages.

Finally, in construction applications, it is often necessary for operational purposes to use a submersible pump to remove water from deep excavations during construction or repairs. Specialised pumps for such applications must function without blocking in water of variable quality which often contains soil and other solids.

Manufacture & market size

Although the manufacture of pumps was designated by DTIC in 2017, requiring a minimum of 70% local content, local production had already been dramatically reduced and has not recovered. The exit from production was in part a consequence of falling demand (in both mining and utility water investment). The decline was aggravated by the steep rises in energy, raw material and other manufacturing costs and associated reductions in foundry and other technical capacity.

International companies such as KSB and Sulzer used to manufacture large pumps for the water and mining sectors in South Africa, some of which were exported. The very wide range of pump types and 'duties' that they have to perform (flow rates, pressures and fluids to be moved) makes it difficult for a small manufacturer to produce a comprehensive range. In South Africa, a small number of companies remain active in 'niche' product lines, mainly outside the formal 'water sector' under consideration here.

While the major international companies have largely exited local manufacturing, they remain extensively engaged in maintenance and refurbishment in addition to wider technical support. KSB, for instance, has emphasised its commitment to offer services for all makes of equipment, not just their own. (KSB IAR 2024) as has Sulzer and others.

The view of executives in the industry is that there is little prospect of re-establishing a standalone commercial pump manufacturing industry in South Africa. It was however acknowledged that, given the size and potential of the local and regional market, there might be opportunities to include South Africa into a supply chain for regional manufacturing. The continued presence of the large international companies may thus still be strategically important.

Thus, South African-based company APE Pumps is a subsidiary of the Indian WPIL Limited group. Its contribution to the group, according to the WPIL 2024 Annual Report, has been in service, supply and turnkey contracting rather than manufacture: "…. good margin improvement based on restart of after-market business with ESKOM (which) …has renewed focus on improving efficiency at its plants and entered into important long term contracts with our subsidiary APE PUMPS" said the report, noting that APE's competencies "have created large growth opportunities as the country rebuilds its water infrastructure". The South Africa group's income of R248 million yielded a (before tax) profit of R66 million.

Table 2: Grundfos revenue information (DKK million)

Geographical markets

Region	2024	2023
Europe	17 484	18 592
North and South America	7 601	7 260
Asia	6 371	6 878
Middle East/Africa	1 770	1 677
TOTAL	33 226	34 407

Divisions

Division	2024	2023
Commercial Building Services	7 015	6 965
Domestic Building Services	7 889	8 937
Industry	7 909	8 036
Water Utility	5 039	5 150
Other	5 374	5 319
TOTAL	33 226	34 407

Another approach to the challenge of local manufacture has been to promote limited local assembly as 'manufacture'. Thus Grundfos, a Danish company which claims to be the largest pump manufacturer in the world, explicitly states that it operates 'sub-factories' in South Africa. The reality appears to be that it simply allows its distributors to assemble its modular multi-stage pumps to meet customers' requirements. (Repeated requests to meet with local Grundfos management to discuss this and other localisation opportunities drew no response).

"What is a Grundfos Sub-Factory?

The demand for groundwater intake has been growing over the years and will continue to grow, as it is a dependable source for water supply for communities and farms. Which is why Grundfos has local sub-factories in South Africa to make our groundwater solutions more accessible to you.

A sub-factory is an official Grundfos distributor that's been trained and certified by to assemble submersible pumps from a predefined components kit. Grundfos sub-factories follow Grundfos guidelines especially when it comes to quality."

Considerations of partnerships for local manufacture should however be tempered by a recognition that both water and Africa represent just a small proportion of the majors' businesses. As with KSB, the Middle East and Africa region is the smallest by revenue of the Grundfos company's four regions although, in 2023-24 it was the fastest growing region and the European region, by far the largest, was declining. However, pumps for water utilities are the smallest of Grundfos's four product divisions as shown above.

Trade influences on market size

Given the dependence of South Africa on imported equipment, a reasonable estimate of the size of the South African water sector's pump market can be derived from import statistics. The definitions used in SARS/ITC data lack precision since there is an overlap between pump units and parts of pumps as well as pumps for different applications. Further, the value declared for customs will be substantially lower than the final price to the user which will include many other costs as well as commercial margins. Nevertheless, the trade data does provide an order of magnitude guide to the value of the market.
Market size estimate is also complicated by the fact that there is significant export of pumps from South Africa to neighbouring countries. Indeed, in cash terms, there is a trade surplus. Analysis of the import/export data suggests that this surplus likely reflects markups related to further manufacture (to build pumpsets and provide additional power and control gear) as well as to commercial margins and transport costs.

The number of individual pump units imported into South Africa in 2024 (3 134 222) is substantially greater than the number exported (237 700); that in turn may result from the use of tariff code 84137090 which covers both pumps and pump components. It is likely, for instance, that some components imported into South Africa are assembled into more complete units for export to the region (as, for instance, the manufacturer Grundfos suggests – see above).

Table 3: Pumps & related trade balance – ex SARS Trade data

Tariff code 8413xxxx	ZAR million Import to SA	ZAR million Export from SA
7025 submersible	839.2	396.5
7090 other (parts)	1 316.9	1 674.0
8100 pumps	284.4	997.8
Total imports	**2 440.5**	
Total exports		**3 440.4**
Trade balance		**R 999.9**

Source: SARS Trade Data

Taking all these considerations into account, it is estimated that the value of pumps imported into South Africa in 2024 is between R3,7 billion and R4,9 billion, a significant proportion of which will be used in the local 'water sector' with a small proportion re-exported, often in modified form. The trade data further suggest that significant local assembly type operations may be undertaken for both the local and export market. The numerically large borehole pump market, while only perhaps 25% of the market value, may offer sufficient scale to consider for local manufacture.

Treatment plant

Description and applications - overview

Public water utilities construct treatment works where 'raw' freshwater is treated to a quality that is fit for social and economic uses or wastewater is treated so that it does not cause unacceptable impacts when it is discharged back into the environment. Public and private institutions as well as private sector industry and service organisations may also require dedicated on-site treatment capacities, to assure both reliable supplies and regulatory compliance.

These water treatment installations usually comprise of a wide set of manufactures which support the underlying physical, chemical and biological treatment processes. As an example, a simple water purification plant may consist of fixed concrete and/or steel vessels within which a variety of processes may take place including:

- physical screening, to remove large debris from the incoming water
- dosing & mixing of chemicals to initiate flocculation, the production of coagulated particles which can then be removed by a combination of
- physical sedimentation in which larger, heavy particles settle and are removed; and
- filtration using a variety of techniques to remove the remaining small particles.

These processes will require coordination of pumping, flow control, dosing and process monitoring, often through SCADA systems.

- Where the water contains dissolved materials or harmful microbiological organisms that must be removed to meet the required standards, further treatment may include:
    - membrane filtration, ion-exchange or reverse osmosis processes before, as a final stage
    - chemical or ultraviolet disinfection.

Lastly, there is usually residual waste material generated in the various stages of treatment that requires its own final processes before it can be appropriately disposed of.

Manufacture & market size

Each of the processes required for water treatment may require highly specific mechanical equipment including agitators, aerators, chemical mixing and dosing equipment, pumps, valves and connecting piping as well as instrumentation to control operation and monitor performance.

There can be significant standardisation of the mechanical equipment (pumps & motors, piping and valves) used in treatment plants. However, standardisation of process techniques and associated equipment is more difficult since they are designed for the specific requirements of the waters to be treated, including their quality variability.

Given the complexity and options available, treatment plant specification and construction is managed by specialist contractors, often in terms of an Engineering, Procurement, and Construction (EPC) contract, who will source their equipment based on experience and existing relationships. This limits the extent to which treatment equipment can be standardised in support of local manufacture.

However, to the extent that contractors, suppliers and their clients make decisions about the coordination/packaging/selection of components for their treatment plants, there may be an opportunity to promote a ‘package’ approach to the promotion of local manufacture. This could be achieved by incentivising the contractors who supply and build such plants to achieve a specified degree of local content.

While larger water treatment plants for public utilities are typically custom designed by specialist consultants or by EPC contractors, there is also a growing market for smaller-scale plants in both private and public sectors. Opportunities for localisation may be easier to test and implement in this package plant sub-sector, which is discussed below.

Clean water

At an aggregate level, the national market size for clean water treatment installations is determined by the volumes of water to be supplied to users. In conventional plants, the basic treatment plant infrastructure might be expected to have a 50-year lifespan although the mechanical, electrical and control equipment might need to be renewed more frequently - a 20-year life span could reasonably be assumed.

A recent audit of the state of existing water treatment plants covering all public WSAs (Water Supply Authorities) reported that there was

“… a total installed design capacity of 17,373,844 kl/d and a total available design capacity of 16,811,479 kl/d with most of this capacity residing in the macro-sized treatment facilities (>25,000 kl/day).

Collectively, the treatment plants produce 12,217,270 kl/d and distributes 12,289,011 kl/d across the water networks, leaving a spare treatment capacity of 4,594,208 kl/d (27%) to meet additional future demands.”

While this overview suggested that substantial excess capacity exists, this is not evenly distributed and, particularly in some rapidly growing municipalities, treatment capacity is already at its limits. In addition, no estimate was made of the age and likely pace of rehabilitation/replacement for the existing stock.

Based on the Blue Drop report, it may however be concluded that the primary market for municipal drinking water treatment will be to meet the needs of growing populations. However, no firm projection of requirements to meet population growth can be made. It is generally recognised that inefficiencies and losses in the final distribution systems are excessive and need to be reduced. If those efforts are successful, they will curtail the growth in consumption and, in turn, reduce the treatment capacity required over the next decade.

Table 4: Clean water treatment plant – replacement cost estimate

Component	%	Whole system R billion	Treatment proportion: 20%	Treatment proportion: 50%
1. Civil Structures	46%	2,00	0,40	1,00
2. Buildings	3%	0,13	0,03	0,07
3. Pipelines	6%	0,26	0,05	0,13
4. Mechanical Equipment	30%	3,26	0,65	1,63
5. Electrical Equipment	11%	1,20	0,24	0,60
6. Instrumentation	4%	0,43	0,09	0,22
TOTAL	100%	7,28	1,46	3,64

Treatment proportion columns show estimated annual replacement cost (R billion) at 20% and 50% treatment intensity assumptions.

The 'assured' future market for clean water treatment by public utilities is thus likely to be the rehabilitation and replacement of plant that reaches end of life. For the basic, constructed, infrastructure, that would be 2-3% of the existing stock (perhaps 0,5 million kl/day; for the mechanical and electrical installations, with a life of 20 years, that would be 5% of the existing stock (around 1,0 million kl/day).

The cost of those replacements would have to cover between 20% and 50% of the value of current whole system infrastructure (R43 billion - R110 billion). Using Blue Drop estimates, this would translate in annual terms to between R728 million and R3 640 million. Given the backlog in maintenance and replacement, the desirable rate of replacement might initially be as much as double the annual amount, taking the maximum likely annual replacement cost to R7 280 million. An estimated distribution of costs between different equipment categories components is presented above. However, it must be emphasised that these will not easily translate into market for opportunities for specific manufactured products.

Wastewater

In 2022, a similar 'Green Drop' review conducted of wastewater treatment plants provided a different perspective. This survey covered 995 wastewater treatment works operated by a range of public and private agencies as well as 144 municipalities (WSAs). Although coverage by the survey was not complete, its findings were less encouraging. Although the available wastewater treatment capacity was less than half the volume of water supplied into the systems, less than 70% of the treatment capacity was used. There was significant variation between provinces with Gauteng's plants running at 97% capacity and the next highest, Western Cape at just 66% while the North West was at 41%, Limpopo at 43% and Free State at 53%. Meanwhile, the operational performance of the plants was generally poor and many required extensive rehabilitations at an estimated cost of over R8,1 billion.

Despite this poor performance, it may be inappropriate from a policy (and market) perspective to put too great a focus on the performance of treatment plants where much of the wastewater does not arrive at the plant. There is evidence that there are substantial problems of pollution upstream, along the sewer collection networks which arguably pose greater threats to health and the environment than discharges from the wastewater works themselves and should receive priority in the allocation of scarce investment resources.

This perspective is reinforced by the findings of the 2022 Green Drop report that, although the capacity of wastewater plants is significantly less than the volume of clean water fed into the system, much of the wastewater generated by communities does not reach the treatment works. The report noted that: -

“Many municipalities have reported a low usage of their capacity (<50%), which reportedly have been the result of dysfunctional or vandalised sewer networks or pumpstations, whereby the full flow does not reach WWTWs. These spillages often continue for extended periods….. (but) .. the majority of municipalities do not have flow balances to track the wastewater pathway from consumer to treatment plant.”

The Green Drop also found evidence of failure to perform even in newly built plant. Given this background, it is not obvious that a major programme of wastewater plant rehabilitation and expansion will be appropriate until the wastewater collection systems are attended to. This will require adequate institutional and financial capacities and human resources.

While the overarching institutional and operational issues are being resolved, the incentives to invest in further treatment capacity will be limited. In most contexts, it is also unlikely that adequate revenue can be raised to fund such investments from water and sanitation charges. It is more likely that investment will be driven by specific local environmental challenges rather than a structured process to comply with environmental legislation.

Gauteng stands out as the only province in which high-capacity utilisation combined with high environmental sensitivities is likely to prioritise investment (although the improvements required in Ethekwini and Cape Town may also be addressed by investments in wastewater reuse to supplement clean water supplies). On this basis, the VROOM estimate of R3,180 million for Gauteng is taken as the minimum likely expenditure for wastewater treatment investment.

The estimate for future public sector wastewater treatment investment is thus not expected to exceed the R8,142 billion total estimated for ‘VROOM’ level rehabilitation in the 2022 Green Drop report. This rehabilitation will not focus on individual manufactures but rather on addressing the specific defects found in each plant.

A grey area in the water sector is emerging where private developers of residential, commercial and industrial projects are constrained by the inability of the local water service provider to supply adequate water or accept the wastewater for treatment.

There is a growing trend for such developers to be required to provide their own water supplies and wastewater treatment. This is opening up a set of new opportunities for manufacturing associated with the development and deployment of package treatment plants. This is discussed in the section below on “potential manufacturing opportunities: package treatment”.

Package treatment plants

The product

Package plants were initially developed as small, self-contained units designed to perform a full range of water treatment processes, often in isolated areas and/or specific individual users. Because they are fabricated in a purpose-built facility and then transported and installed on site, they can be procured in terms of output performance achieved rather than in terms of construction specifications. They must still provide the range of treatment processes required for the water source or wastewater, but this can be met by a modular approach to specification.

A further feature of current package plant systems which is growing in importance is that their operations can be monitored and supported remotely. This reduces the need to maintain skilled personnel on-site which can be costly and sub-economic in remote locations where the routine duties do not merit full time presence of a qualified operator. The production line approach to manufacture also opens opportunities for standardisation of components which may in turn better support greater localisation.

The application

Package treatment plants are an increasingly popular option in several water supply and wastewater treatment applications. They were initially conceived for private locations remote from formal municipal services and to provide services to relatively small rural communities. More recently, they have been deployed to address limited capacity of existing municipal services which is constraining development of new industry and residential areas in many urban areas. This trend has been accelerated by a fall in the reliability of such services which has prompted a search for ‘backup’ alternatives.

There are situations in which the quality of available ‘raw’ water or the nature of wastewater treatment processes required will not be amenable to a package approach without some initial separate pretreatment, which may require the supply of a ‘pre-treatment’ module. But there is also a significant requirement for units capable of treating ‘raw’ waters of reasonable quality (for instance from groundwater) to high standards for critical applications such as health care facilities and food manufacturers.

The market volume and value

There is no structured information available about the scale of existing installations of what might be characterised as ‘package treatment plants’. By their nature, package plants enable the distribution rather than centralisation of treatment processes and enable provision by individual large users rather than by a mandated public authority. The present focus on container size units limits the unit capacity but 250 – 300kl/day installations are being supplied, and capacity can be increased by simply adding additional modules.

The potential future market volume will be determined by the proportion of new residential, commercial and industrial users who are anticipated to occupy newly developed areas which could be served by package plants. This must be estimated as a proportion of the total water and sanitation requirements of these new users. In addition, where existing public facilities are reaching the end of their life and need to be replaced, a modular package plants approach may provide a useful strategy for meeting this requirement, again, for a proportion of the requirements.

While there is increasing use of package plants, there is yet insufficient evidence of the scope and appetite for such solutions. Its potential is thus assessed by considering relatively conservative levels of adoption. For the estimates made below, it is assumed that package approaches will be adopted to serve 25% of new populations and 10% of infrastructure replacement. Since the rate of industrial/institutional application is even more difficult to assess, the conservative assumption will be made that those applications will be supported by the capacity calculated for household services.

A first order estimate of the potential value of these markets has been made using data from the Public Infrastructure Unit Cost Guideline (2021) edition with costs escalated to 2025 through the application of the Mechanical and electrical engineering input price indices

On this basis, the value of the potential market for water treatment package plant equipment (for drinking water) has been estimated to be R470 million annually. If the decentralised, package plant solution proves to be successful, the value could increase substantially. In 2024, the R955 million declared value of imports of “goods for filtering or purifying water”. Not all of this would have been package plants (the average unit costs suggest that it included many small, cheap items, perhaps of household filter nature). However, imports for which the declared value of each unit was over R50 000 were worth R270 million, providing some confirmation of the order of magnitude.

These estimates do not take account of the operating costs. Operation might be undertaken directly by the client, in which case the costs would be to their account. However, where the provision of the package plant is undertaken on a supply and operate basis, the value of the business is increased accordingly. Where package plants are being installed to treat local groundwaters and provide backup to unreliable public supplies, manufacturers have produced impressive cost comparisons showing that a rapid return on investment can be achieved by replacing what have become expensive public supplies although, as with retail electricity, this may result in tariff policy changes.

Existing suppliers and producers and extent of local content

There are several relatively small manufacturers serving this market and there is no formal association that can provide information about their current output or the size and condition of the current fleet of package plants installed. In order to assess the current local content, it may be assumed that the bulk of the mechanical and electrical equipment (pumps, motors, filtration units) as well as the chemical dosing, monitoring and control devices are imported but that much of the connecting materials (cables, pipes) as well as the frames on which the equipment is mounted) are locally fabricated.

Designating the market

Since the market for treatment packages is presently primarily in the private sector, the introduction of a designation-type process may not be appropriate since it might simply discourage producers from entering the public sector market.

An alternative approach would be to assess the current levels of local manufacturing content and to work with the industry to use that as a benchmark which could be improved. Once adequate capacity is developed, that benchmark could be adopted as a policy tool and, if public sector demand grows, a designation policy or other incentive could be considered. This would enable targets to be set which could be increased incrementally over time, in step with the private sector's performance.

Existing and planned support to the industry and its customers

The primary support for this sector is the general support to municipalities for the improvement and expansion of their water supply and sanitation systems. Package plants have been adopted as an important component or response strategies in several high priority, high profile cases, such as the supply of water to the Hammanskraal area of Tshwane. Package plants have been reviewed by researchers whose analysis has provided the cost curve functions used in this report. This work has confirmed that they can be cost-efficient options.

Further opportunities to promote local manufacture

The constraints that are being faced by a range of water users across the country is prompting substantial interest in package plants as a useful option for areas where services are capacity constrained. There are thus opportunities for greater local production, and this increased scale might in turn promote opportunities for increasing the proportion of local manufactures in the completed units. The convenience of package solutions may also support an expansion of export sales, which are already a feature of the sector.

Strategies to increase local manufacturing content in this product area may include:

- Promotion of cooperation within the package plant industry to address policy issues;
- Work to determine the existing levels of local manufacture in package plants;
- Action to develop opportunities identified for increasing the use of local manufactures;
- Design of regulatory measures to incentivise an increase in local content; and
- Support for export promotion.

Partnerships with international corporates may further support these strategies, taking advantage of South Africa's access to the SADC markets.

Consumer water meters

Description and applications

The metering of flow is a critical element in the overall management of a water supply service. At the user level, water meters have been described as the cash registers for municipal systems' which provides the basis for determining water use, invoicing it and revenue collection, which is generally volume related. It is vital for financial management that they record accurately the amount of water supplied through them. But meter readings are also a primary interface between suppliers and users, and efficient, reliable readings contribute to good relationships between the utility and its customers.
Metering at a larger scale in the outflows of reservoirs and the entry to network supply zones also provides critical operational information about trends in the performance of the overall water distribution system. One important performance indicator is the proportion of 'non-revenue water' in the overall system. This metric provides information about losses and leaks in the system but can only be assessed if there is adequate monitoring of flows in the network and from the network to identified users.

While the water meter was initially an entirely mechanical product that recorded the volume of water that flowed through it this has changed dramatically. Applications at a system level have long supported remote monitoring and control of distribution systems. However, at a retail user scale, recent functional developments have included ‘pre-paid meters’ which can control flows according to pre-programmed norms and ‘smart’ meters which can transmit data to remote readers without the need for a dial or counter to be physically read.

An emerging technology is that of ‘walk/drive-by’ meters that transmit data to a remote reader. This both speeds up the reading process and, in principle, should be more accurate than physical reading of meters which may be installed in difficult to access locations. It also avoids many of the errors inherent in the physical readings of meters which are often installed in difficult to access locations and in the transfer of physical data to computerised accounting systems.

The market volume and value

In terms of volume and value, the water meters installed at the premises of individual water users to monitor and measure the volumes of water supplied require significant expenditures. This affects mainly urban domestic, institutional and commercial users although large scale users of raw water such as farmers and large industries that take their water directly from the resource or a bulk supply are required to install metering equipment.

Meter reading accuracy tends to decline with age, since the mechanical components wear and record less accurately, usually under- rather than over-recording. Consequently, regular replacement of meter is required. In South Africa, it has been good practice to replace retail water meters every 8 to 10 years although this has often not been followed. However, because of the financial implications, accurate measurement of water use is a requirement for both suppliers and users and there is thus an incentive to maintain an efficient population of meters.

This requires either a regular cycle of removal and calibration or simply a commitment to replace meters after they have reached a determined life span. The market for meters is thus defined by the requirement to replace a proportion of the population on a regular basis in addition to the supply of meters to meet the demand from new users.

It is theoretically possible to quantify the high-volume market for household and small commercial meters since this is determined by the number of users served, the average life to replacement of the equipment and the increase in the number of connected and metered users. Given the uncertainty about the parameters, estimates of residential meters production and sales provided by industry experts range from 350 000 to 700 000 annual.

The value of the market depends on the types of meters installed and the extent to which the basic mechanical meters currently in use are replaced by higher end ‘smart’ meters. Using the estimated costs of mechanical meters (R300–R500 each) or smart/prepaid meters (R1200–R2500+ each), a bare minimum estimate (low replacement rates and basic mechanical meter) would be R105 million annually while a realistic high estimate (with 50% each of mechanical and ‘smart meters) could reach R855 million annually or more.

Provision must also be made for new households to be connected each year. it is likely that no more than half of new households (+/-200 000 annually) would be connected to an individual meter with the balance sharing a connection with other households.

3.5 GOODS FOR OPERATIONAL REQUIREMENTS

The provision of public water supplies through extensive supply networks across different topographies and settlement types is a substantial operational activity. Associated with the physical challenges of operating and maintaining the installed infrastructure, there is an administrative infrastructure of monitoring, measuring and billing occupants for the water that they have used and regulating their use in terms of local and national policies.
The operational requirements for manufactures can thus be divided into

- manufactures required for the maintenance of the installed infrastructures
- manufactures required for treating the water
- manufactures required to monitor and measure the water supplied

The tools and spare parts required to maintain the installed infrastructure will usually be like those used for the initial installation. While they may be procured and budgeted for separately, they will usually come from the same sources and do not represent a significant separate set of manufactures.

The consumable manufactures used in the treatment of water are primarily an operational expense. These manufactures are primarily the chemical products used in treatment processes as well as consumable materials (for instance filter media) that needs to be regularly replaced.

Maintenance requirements:

The operations of water systems inevitably involve significant spending on maintenance and repair. Manufactures involved include:

- Pipes & fittings;
- Pumps and motors;
- Other electrical control and monitoring equipment;
- Tools and machinery for repairs; and
- Specialised vehicles and general transport.

It is recognised that maintenance is inadequately performed in many public systems, leading to early equipment failures and poor services. To address this, National Treasury has introduced a requirement for a significant proportion of budgets to be spent on maintenance (8% is a widely recommended figure). However, even where that budget is allocated, the quality of spending is often poor with repairs poorly executed and failing soon after completion and high labour charges due to excessive reliance on overtime.

Chemicals

A wide range of chemical products are used in the treatment of water from different sources for different applications as well as for the purification of wastewaters before discharge. The main treatment processes undertaken are

- coagulation, flocculation and filtration to remove solids and undesirable solubles;
- pH control; and

- Disinfection.

In addition, a variety of specialist processes may be used to address specific challenges such as algal growth, odours and specific soluble contaminants.

Market data on the volumes and values of the principal chemical products used in the water sector is limited and significant quantities of the products are used in non-water related activities. Some companies, notably AECI, have already decided to spin off their water-related subsidiaries while, for others, such as Omnia's Protea Chemicals, the contribution of chemicals generally and water chemicals has been small in relation to sectors such as mining and agriculture.

Looking into the future, the South African chemicals industry has a strong incentive to shift its focus away from the bulk 'commodity chemicals' that are used in water treatment where margins are low and where it is often not competitive with a range of alternative sources. The margins on newer, more complex water treatment chemical products are invariably higher. As important, they are more demanding of the user support services that can help to promote products. While the South African water sector's relatively small market size may mitigate against the higher-margin specialised products, this may have a perverse effect of encouraging manufacturers to promote greater reliance on the newer products, even where users might be better served by continuing to use the older and often still cost-effective products.

Need for strategic interventions in the chemicals markets

The commodity nature of the production of some primary water treatment chemicals, and the specialised proprietary nature of others such as the polyelectrolyte products, offers limited opportunities for designation or localisation. However, this should not distract from the strategic importance of inputs such as disinfectant chemicals for which some regulatory protection may be necessary to ensure reliability of supply.

Coagulants and flocculants

Description and applications

Coagulants and flocculants are used in the treatment of water from natural sources to remove dispersed fine particles of solid materials which manifest muddy, cloudy or 'turbid' qualities. They do this primarily by neutralising the electrical charges on the particles which keep them apart and then promoting the formation of clumps of or 'flocs' which can be removed by a combination of settlement and filtration processes.

The chemicals most used for these processes were salts of iron or aluminium, commonly aluminium or ferric sulphate or related products. When added to water as relatively dilute solutions, these clump together (coagulate) with the particles in the raw water to create flocs some of which may settle in a sedimentation tank or be removed by filtration process. A new generation of polyelectrolyte products is gradually replacing the traditional 'alum' in this process.

In addition to the polyelectrolytes, there is also a reasonably well-developed set of niche organic coagulant products based on extracts of tannins derived from tree barks. These have been marketed in number of countries (Brazil, Spain, Australia) where they have been used as coagulants in water treatment on a small scale but with reasonable success. There has also been limited production in South Africa which may have some potential since it may be possible to increase raw material production in areas of the country where former mining areas are being rehabilitated. This will be dealt with in more detail in the 'opportunities' section below.

Manufacture & market size

Aluminium and ferric sulphate are commodity chemicals, produced in large quantities and relatively cheap. The polyelectrolytes are generally more expensive not least because, by their nature, they can be produced as 'proprietary' rather than 'generic' products although the variations are also intended to address different treatment requirements. Some of the competition issues involved were raised at the Competition Commission when Protea chemicals acquired 'Zetachem', a specialised company serving primarily the water treatment industry. Protea had itself been taken over by Omnia, a larger conglomerate, in 2003.

NCP-Chlorchem is a dominant manufacturer and supplier of water treatment chemicals including chlorine and a range of poly-electrolyte coagulants. As a privately owned company, it provides limited information about its activities and specifically what it manufactures as opposed to importing and/or distributing. Like other companies, NCP-Chlorchem offers support services to guide the use of its products: -

"The Specialities division has a team of technical experts who will undertake all the necessary investigations and trials to ensure that you obtain the most effective treatment solutions. To ensure the best results are achieved optimum product dosage and ideal plant conditions are required".

The size of the market for these treatment chemicals is determined by the volume and quality of the 'raw' water to be treated which can vary dramatically between seasons and across wet and dry years and even from day to day. A typical dosage range for different water conditions is shown in Figure 11.

The value of the market is influenced by the extent to which specialised products are required and utilised. The use of the latter is often supported by suppliers to guide the application of the products which are generally more expensive than the 'traditional' commodity chemicals.

The class of 'polyelectrolytes' used in water is not distinguished in trade data which reports the import of almost 66 000 tonnes of diverse polyelectrolytes at an average cost of R32.76 per kg. Similarly, ferric sulphate is not distinguished in the trade data from a range of other sulphates although substantial quantities are reported to be produced in South Africa which has local access to the raw materials required but which, as a low volume bulk chemical, does not present significant business opportunities.

Table 5: Flocculant dosage for different conditions

Amount (g/m^3)	Crystallised alum	Ferric Chloride (pure)
Surface water (flocculation over filter)	3 – 10	1,5 – 4
Settling:		
Lightly loaded water	15 – 20	6 – 12
Very turbid water	60 – 150	25 – 60
Highly coloured water	100 – 250	25 – 60
Wastewater		
Raw water	40 – 300	16 – 120
Tertiary treatment	10 – 60	4 – 25

As with other manufactures, South Africa exports a significant quantity of aluminium sulphate to countries in Southern Africa at a substantial premium to the price paid for its bulk imports.

Coagulants

aluminium sulphate	**Imports**	10 828 tonnes	R46 512 318	R 4,30/kg
aluminium sulphate	**Exports**	1 766 tonnes	R41 million	R23,21/kg

As with other manufactures, South Africa exports a significant quantity of aluminium sulphate to countries in Southern Africa at a substantial premium to the price paid for its bulk imports.

Disinfection

Description and applications

A critical objective of public water supply is to ensure that the water produced and distributed is safe to drink and use for other purposes. Water abstracted from natural sources often contains a variety of viruses, bacteria and other infectious agents as well as potentially harmful as well as undesirable chemical compounds. The disposal of wastewater is often a significant source of water pollution so it is also important to ensure that treated wastewater does not contain dangerous levels of potentially harmful infectious agents as well as to reduce the organic pollutants that can negatively impact on the environment.

At water supply treatment works, in addition to removing a substantial proportion of potentially harmful material, water is disinfected before being sent into the distribution system. However, there remains a risk of contamination in the distribution system, through leaks into pipes or when foreign material enters during repairs and maintenance. To address this, enough disinfectant product, usually based on chlorine or chlorine compounds, is added to the water at very low concentrations (one or two parts per million). This ‘residual’ disinfection ensures that any new biological pollutant that enters the system is neutralised.

In wastewater treatment works, it is also common practice to disinfect treated wastewater before discharge into the environment to reduce risks to people who may encounter it. This is particularly important when downstream water may be used for industrial, agricultural or recreational purposes.

Products used for such disinfection include gaseous chlorine, chlorine-based compounds such as hypochlorites of sodium and calcium (which are also widely used for swimming poor disinfection) as well as some more specialised products such chlorine dioxide, ozone and ammonia-based combinations. In specific applications, ultraviolet light can be used for initial disinfection but has no 'residual' effect which renders its use unhelpful in large water supply distribution systems. It also has limited application in wastewaters which may still be relatively turbid/cloudy.

While gaseous chlorine is the cheapest option, it is a hazardous product whose transport and use poses serious risks to workers and the wider community and whose application in treatment requires specialised equipment.

Manufacture & Market Size

Gaseous chlorine is produced in large quantities by three companies in South Africa, SASOL, Mondi and NCP-Chlorchem. The bulk of 225 000 tonnes of chlorine gas production is used for purposes other than water treatment. NCP-Chlorchem (90 000 tonnes) is the main supplier to the water industry and supplies industrial, paper and other chemical markets. SASOL (120 000 tons) produces primarily as a feedstock for vinyl chloride manufacture to supply the plastics industry although some has been made available in the past for water treatment. Finally, Mondi (15 000 tonnes), the smallest of the three, produces primarily for its own pulp and paper manufacture.

Table 6: South Africa trade in disinfection chemicals

Chlorine gas — principally exports to neighbouring countries				
Chlorine	**Exports**	10 828 tonnes	R46 512 318	R43,00/kg
Chlorine	**Imports**	1 766 tonnes	R41 million	R23,21/kg
Calcium hypochlorite (HTH) — while SA is an importer in volume, it is an exporter in value				
Calcium hypochlorite (HTH)	**Imports**	3 134 tonnes	R70,5 million	R22,50/kg
Calcium hypochlorite (HTH)	**Exports**	2 639 tonnes	R122 million	R46,45/kg

While gaseous chlorine is the disinfection product, alternatives used in water treatment include two hypochlorite compounds. Sodium hypochlorite is generally manufactured in bulk by electrolysis of salt and distributed as a concentrated solution with a 'shelf-life' of just a few days. Some is produced in the Western Cape and distributed locally. It can also be produced 'on-site' and dosed directly into the treatment process, offering an opportunity for local localised production (more detail provided below). Calcium hypochlorite is widely sold as a formulated powder product (under the proprietary brand HTH) that is much more stable. While it is significantly more expensive than gaseous chlorine and sodium hypochlorite, it is easier to transport and use and is thus popular for both smaller drinking water plants as well as for domestic use (notably, in swimming pools).

Some calcium hypochlorite was manufactured locally but there is no evidence that production has continued after commercial disputes over patent infringements but current trade data shows that South Africa is a trader rather than a manufacturer. While the country was the 4th largest exporter in the world in 2024 earning US$7,243 million from the sale of 2 400 tonnes into the Southern African region, it imported 4 660 tonnes at a cost of US$5,960 suggesting a net local market of just over 2 200 tonnes.

The overall size of the domestic market for water disinfection is determined by the volumes and quality of the water treated. To achieve drinking water quality, approximately 3 parts per million (ppm) would usually be sufficient on an annual basis. In South Africa, perhaps 5,5 Mm3 of water is treated for municipal and industrial use annually which would require around 16 500 tonnes of chlorine equivalent from the different products used.

For wastewater disinfection, the requirement is higher and may range between 5 and 20 ppm since the water is likely to contain higher levels of organic material. Using an average water consumption figure (which includes water treated but ‘lost’ in the system) and assuming only 25% of water supplied from the source is returned as treated wastewater, a further 8 500 tons of chlorine or chlorine equivalent may be required, bringing the total requirement for the municipal water sector to 25 000 tonnes annually. This is well within the range of current production capacities.

pH Control

Description And Applications

The control of acidity/alkalinity (expressed in chemistry as the pH of the liquid concerned) contributes to the efficiency of the water treatment process. The pH of the water produced also affects the performance and life of pipeline materials and the equipment of water users. If water is too ‘acid’, it can provoke corrosion of pipelines and equipment and, if too alkaline, may lead to deposits of ‘scale’ which reduce the capacity of pipelines and affect the performance of users’ equipment.

Slaked lime (calcium hydroxide) is extensively used in the water sector to control the pH levels of water both to optimise treatment processes as well as to adjust to appropriate levels for final supply. It is also used in the treatment of mine water wastes, notably to neutralise acid mine drainage effluents.

Manufacture & Market Size

pH levels are controlled by the addition of products such as derivatives of ‘lime’ (to increase alkalinity) or acids such as hydrochloric acid (to increase acidity). The amounts required vary significantly, depending on the nature of the waters treated.

Both these products are widely available bulk chemicals which are produced for many purposes by a range of local manufacturers and are relatively cheap. Slaked lime (calcium hydroxide) is produced locally by companies such as Afrimat but, as a low value bulk chemical, represents a small proportion of the company’s total sales.

Membranes

Description & Applications

A group of consumables used in water treatment that is growing in importance are the diverse membrane products used in advanced filtration and associated reverse osmosis (RO) technologies. These are filter-type products used in engineered systems to remove a range of very small particles, including bacteria and even viruses. At the limit, they can also remove dissolved pollutants like heavy metals, organic compounds and pesticides as well as common salt - as in desalination where the reverse osmosis process was first successfully employed on a large scale.

Initially, the RO technologies used for basic desalination required very high pressures and thus had high energy consumption). Other membrane technologies were used for low volume, specialised, industrial and medical applications. These ranged from concentrating the quantity of a desirable product (ranging from fruit juices to milk proteins) as well as removing harmful products from bodily fluids (as in kidney dialysis) and separating components (as in blood bank procedures).

However, as the technology has developed and improved in efficiency and cost, the use of membrane type filters has become increasingly widespread. In particular, the membrane systems are now categorised by their ability to achieve a much wider range of process objectives. Thus microfiltration, ultrafiltration, nanofiltration and reverse osmosis are designed to remove different sizes of solid particle and even large organic molecules that may be in suspension or, in the case of reverse osmosis, to remove ions at the atomic scale.

The design and manufacture of the finer grades of membrane and their assembly into operational cartridges remains complex with a limited number of specialised manufacturers internationally and scale and technology producing high barriers to entry. In addition, as a wider set of applications is now served, involving larger volumes, greater technical attention is being given to energy usage and operating efficiencies to extend the life cycle of the units and further reduce costs.

This has seen membrane related technologies beginning to replace the traditional reagent-based processes, particularly in privately owned facilities which have specific quality requirements as opposed to the public providers who supply water to a wide range of users. The response to this demand has been the development of package plant assemblies which are well suited to the use of cartridge-based membrane systems. There may also be potential for this technology to expand into the public utility space although, at present, membrane filtration is more often used as a final ‘polishing’ process to remove specific pollutants.

Manufacture & Market Size

The manufacture of the different forms of membrane is a highly specialised activity and is currently undertaken by a relatively small number of global companies. The market for membranes is growing rapidly, supported by the reduction in the energy requirements due to improvements in membrane design, which have reduced operating costs.

The scale and complexity of membrane manufacture offer very few opportunities for small markets such as South Africa. There may be opportunities as the market grows for participation in ancillary products, such as the manufacture and assembly of the capsules in which membranes are mounted or even for the manufacture of filter cartridges by precision winding of the membranes onto a central tube. A South African company patented a particular technique which was piloted in use by a Singaporean company but, after a commercial dispute, appears to have seen no further development.

Many producers of small package treatment plants are already using membrane filtration and greater standardisation in this market may offer an opportunity for local production. The market size for membrane cartridges is dependent not just on the growth of the number of units installed but also on the quality of their operation. Although many of the filters are rated for a three-year life, this may be substantially reduced if operational routines are not properly followed. There are also claims that significantly longer lifetimes can be achieved through careful management.

The market size for membrane assemblies will depend not just on the continued uptake by small individual users but also on the extent to which the technology is adopted in larger volume public utility type operations. This is addressed in more detail below (section on potential manufacturing opportunities: package treatment). A step change in demand may also occur with the development of desalination plants at coastal sites and wastewater reclamation projects elsewhere since these use related technologies.

Some membrane promotors claim that it can entirely replace traditional treatment technologies. However, many of the plants currently in operation use groundwater which is already usually of reasonable quality or relatively clean surface sources. It thus cannot be expected that membranes alone will be able to handle poorer quality, more variable waters from surface sources. In these cases, there may be a need for additional pre-treatment which could create further opportunities for manufacture.

There is, however, growing use in the private sector of membrane technologies for water treatment which may open a set of opportunities to support local manufacture of the package plants that are being promoted (see below)

4. RECOMMENDATIONS AND CRITERIA FOR FURTHER INVESTIGATION

The initial objective of this review has been to identify specific opportunities to promote local manufacturing activity. Some opportunities have been identified and are presented below. However, it is evident that the current institutional arrangements in the water sector are often not conducive to product-based intervention. The fragmentation of the core public water sector institutions and their operational autonomy have substantially weakened delivery performance; in the context of the present project, this fragmented autonomy also limits the scope for sector wide innovation in support of interventions to promote local manufacture.
One consequence of current poor performance is that there is growing pressure for fundamental institutional reform of the municipal water sector. This reform could create an environment more conducive to the adoption of approaches that would be more supportive of local manufacture. In addition to the identification of opportunities for the expansion of the manufacture of individual products, this concluding section also identifies several areas in which, if reforms proceed, a more programmatic approach might achieve the same objectives, more successfully.

4.1 CRITERIA FOR PRIORITISATION

The manufactures for further detailed investigation must be selected on the basis that they offer an opportunity to contribute to meeting the LSF's objectives. These objectives include the potential to:-

- increase manufacturing activity in South Africa
- contribute to job creation, directly or indirectly
- address national development priorities and support priority development programmes
- substitute imported manufactures or expand the export of local manufactures

Aside from these general attributes, evidence of potential to proceed is also an important consideration. This must include sufficient information about: -

- existing and potential demand
- potential competitiveness with external sources of supply
- knowledge of and access to potential new/expanded markets
- existing technical and production capabilities
- existing business and finance capabilities.

In cases of manufactures for which there is clear potential demand, but where specific existing capabilities are limited, consideration is given to the interventions that would be required to mobilise the required capabilities.

The prioritisation process thus starts with consideration of the broad context before focusing on the individual manufactures that have been considered for further investigation.

Prioritisation - context

A wide range of manufactured products which are used within the wider water sector have been identified. Their origins and the processes of their manufacture have been investigated and estimates made of the scale of current production. On the ‘demand side’, the volumes currently used locally have been quantified as far as possible together with the volumes of export and import trade. Based on available information, order of magnitude estimates has been made of the current value of the markets for the various manufactures considered.

During this process, many examples were found of products whose local manufacture had decreased or ended completely over the past decade, for a variety of reasons. Related to this, several cases were identified where large organisations had ‘spun off’ or otherwise disposed of their water sector related manufactures businesses while others are in the process of doing so.

It has also been evident that, in some cases where local manufacturing was started or expanded, new local entrants had a technical background and often came to manufacturing from the private or parastatal sectors where their knowledge and connections facilitated their initial entry to the markets and they focused on smaller and more customised market segments as in the valves examples ,.

Further, in some areas, manufacturing is undertaken by organisations whose primary activity is merchandising and distribution. In these cases, the experience and insights gained through providing services to the users of the manufactures contributed substantially to the maintenance and expansion of their markets as well as enabling them to identify the potential for new products.

An emerging potential localisation strategy arises from the identification of a range of ‘packaged products’ (package treatment plants, specialised on-site chemical processes, borehole rigs) where local manufacture involves the assembly of both local and imported inputs. It is considered that this type of product merits inclusion in the review.

Another strategy that emerges is to review the experience of organisations that exited local manufacture perhaps after being acquired by international companies to be used as service-based marketing channels. In these cases, there may be potential for re-engagement with such entities to become part of larger manufacturing value chains. This would follow the example of the motor vehicle industry which has won significant export market share, albeit at some cost to local consumers.

It must also be considered whether localisation is, or can be, supported by standard setting and enforcement processes. Standard setting processes can support localisation, if they are carefully and strategically managed. But, too often, poorly conceived standards constrain local manufacturers while poor enforcement enables non-compliant competition from imports.

In discussions with a variety of informants with specialised industry knowledge, perspectives were gained about the broader policy and economic environment that affected decisions about the viability and profitability of local manufacture, the risks and the possible mitigations.

Against this background, several dominant considerations emerged that determine the perceived opportunities for existing water sector manufacturing and future expansion:

- the unpredictability, instability and institutional weakness of the public 'water sector' at local government level;
- the existence of market segments (private sector and export) which could help to buffer variable and unpredictable public sector demand;
- pricing of raw materials;
- the impact (or lack thereof) of attempts to promote local manufactures by
- 'designations' in the public sector and
- tariffs and related policy instruments for the rest.
- the changing trading environment with respect to SACU, SADC was a growing concern and important determinant of the viability of local manufacture
- the ACFTA was seen as offering useful opportunities, in the longer term.

Aside from the formal regulatory and economic issues, there were recurrent concerns about the evident mismatch between the policy objectives for local manufacturing support and the capacities of the institutions responsible for promoting and regulating trade.

Against this background, the study has also identified critical policy choices that have to be made which substantially impact on the potential for local manufacturing across a range of the sub-sectors considered. While not part of the formal ToR, it is suggested that these issues may merit further consideration.

Prioritisation – potential overarching interventions

Given the background above, opportunities for localisation will be substantially influenced by the overall investment climate for water sector related manufacturing industry.

Water sector development programmes

The present moment is propitious since actions to improve the performance of the public water sector have been identified as a national priority. It has been recognised that significant investment will be required to enable the sector to be recuperated and a foundation laid for future expansions, which have already been identified.

A range of estimates have been made for the expenditure that will be required to address the backlog of investment and to meet future investment requirements. However, the upper end estimates are ambitious and fail to acknowledge the funding constraints that will be faced. In terms of current policy which is that the development and operations of the public water sector should generally be funded from user payments for services provided.

There are substantial exceptions to this policy. Specifically, it is recognised that the cost of essential social provision cannot be met from user payments since at least half of all South African households live at or below the poverty line. Recuperation and expansion of services to this large community will only be possible with fiscal support which immediately constrains the rate of spend that is achievable in the medium term (0 – 5 years).

A separate set of constraints must be addressed to mobilise the investments required to support the public services required to meet the needs of to higher income households as well as economic and institutional water users. These services are currently provided almost entirely by municipal institutions which, in many cases, are facing severe financial challenges and will need substantial reform. Again, this is an intervention that has been prioritised at national level, but which is likely to take some years to implement which limits the financial resources that will be available in the interim.

The financial fragility of local government is already impacting on the financial sustainability of the water boards. These regional utilities are often the intermediary between the natural water resource and the municipal service providers on whose payments they depend for their funding. They have been increasingly alarmed by the financial failure of their municipal customers and are preparing for an expanded role to support local service provision. However, in doing so, they must avoid the risks inherent in exposing themselves to the same political pressures that have undermined municipal performance.

The implication is that, while the water sector has a high political priority, the resources available to give effect to this priority are severely constrained. Interventions to promote local manufacture to support public water sector programmes should thus be careful to avoid excessive optimism in dimensioning potential future demand.

Regulatory support for local manufacture –standards, designations and trade policy

While development strategies for the water sector offer obvious opportunities for the promotion of localisation, there is also a set of more generic regulatory interventions that could make a substantial contribution. These must be designed and implemented as a coordinated package if they are to have positive impacts and avoid perverse outcomes.

Standards regime

One area of potential intervention is in the simplification and enforcement of the national standards regime. Technical standards have two purposes, one overt the other well recognised but more subtle.

The overt purpose of formal standards is to provide a well-defined foundation which enables the users to procure products without extensive case-by-case investigation to confirm that they are adequate for the intended application. In this regard, standards perform an invaluable economic service, dramatically reducing the transaction costs and risks inherent in purchases. They reduce the need for users to undertake the onerous task of drawing up precise specifications for each product that they wish to procure. And they provide manufacturers with a framework to guide their own internal quality control, against which they can also compare their performance with their competitors.

The covert purpose of standards is to support local interests (often producers but also traders) by imposing conditions on imports. The motivation for such conditions is often to support local production and can be extremely effective. However, it is well recognised that ‘non-tariff-barriers’ can also impose significant costs on the countries that erect them. They can be and are often captured by local interests who use them to extract higher profits from their local markets. During the current study, examples have been presented where non-tariff measures are being used by traders in local and export markets to ensure that trade (and profit margins) are channelled through them, even for products that are not locally manufactured.

Designations,

In some industries, even where local production has been protected by designation, there is reported to be widespread leakage of imported manufactures into supply chains, to the detriment of local manufacturers. While this leakage is widely attributed to the role of trading and distribution intermediaries, purchasers of such material benefit from the substantial price differentials between international and local production and both clients and their professional advisors are reluctant to draw attention to apparent infringements of designation rules.

The role of the intermediaries is further incentivised by the weaknesses of local public institutions, particularly the municipalities, which impose very high transaction costs on suppliers, leading manufacturers to prefer to engage through intermediaries. Designation is only likely to be effective where the industry benefitting can monitor market behaviour and identifying efforts to bypass the rules. This is turn requires that the regulatory agencies themselves are able and willing to intervene when infringements are brought to their attention.

Tariffs and trade policy the regulatory framework - Current challenges

Instances have been identified in which there appears to be a disconnect between trade policy and local manufacturing incentives. This is a particular challenge regarding trade with non-SACU SADC members.

Specifically, the current regulatory framework allows products manufactured using cheap imported raw materials to compete with South African/SACU manufacturers who are required to use more expensive locally produced inputs. A few examples were presented of this and the management of one large engineering company presented detailed data to explain why his company is seriously considering moving its manufacturing capacity to a neighbouring country in order to remain competitive.

There are also situations in which SADC partners are failing to enforce SADC FTA rules. Specifically, they are enabling local rent-seeking by blocking entry of products into their countries, allegedly to promote local production, even when there is no local manufacturing capacity. It is implied that this is to enable local entrepreneurs to monetise trading opportunities with partners of their choice.

Sector norms and standards

Sector norms and standards are a powerful instrument for providing greater coherence and coordination cross a diverse set of institutions. However, the impact of these instruments depends on both the quality of the initial regulatory framework and the effective promotion and oversight of its implementation.

Two sets of norms and standards are of importance for the promotion of local manufacture.

The first are the standards related to the quality of water produced, the quality of the water resource and processes of water management. While the South African National Standard

Drinking Water Quality (SANS 241: 2024) sets the acceptable quality limits for water supplied for human consumption, they are not recommendations for the quality goals that should be used by providers. For design guidance, it is more useful to refer to guidelines such as those of the World Health Organisation which seek to indicate the range of qualities that are safe and reflect the preferences of water users.

DWS currently guides the water services sector through a set of Compulsory National Standards, promulgated as regulations in terms of the section 9 of the Water Services Act (Act 108 of 1997) in 2002. A revised set of regulations was drafted in 2017 and has been under review since then but has not yet been promulgated because it is too prescriptive, aspirational and detailed to be practically applicable for its purpose.

The second, and more important, group of standards are the norms and standards governing the manufactures themselves. These norms and standards may both create conditions to support local manufacture (by weeding out cheap, sub-standard imported products) but may also create a framework through which competitive imported products that meet standards can come into the market.

Multiple issues are raised:

- appropriateness of standards to SA and regional markets
- enforcement or lack of it
- use and abuse as trade barriers

Some of these are addressed in the sections on the individual products.

4.2 POTENTIAL MANUFACTURING ACTIVITIES

The preceding information and analysis explain why the manufacturing to support the water sector has declined and how the universe of opportunities for localisation of manufacture for the water sector is significantly constrained. In particular, the potential markets for manufactures such as pumps and valves, which are already challenging, do not offer substantial opportunities in current circumstances given the extent of cheap alternative sources from high volume low-cost Asian producers.

For other manufactures, notably the pipes that are the ‘transmission lines’ for the water sector, the market is generally too uncertain (in quantum) and unreliable (in commercial terms) to warrant substantial new investment while existing capacity is not fully utilised and there is as yet no clear pathway to resolve the market’s institutional blockages. It would only be productive to review these sectors if there are clear, supportive policy interventions that will underpin better prospects.

Notwithstanding these concerns, some products have been identified which meet the criteria for prioritisation and where there appears to be potential to promote greater localisation of manufacture. While these represent only a small proportion of the potential market for water sector manufactures, they benefit from specific assurances either because of a large component of private customers or because they are already the target of specific and active public intervention. There are also some speculative opportunities that are included because they could have wider development implications and might offer opportunities for public private collaboration.

In this selection, an attempt has been made to maintain a distinction between manufactures that are of a capital nature and those that could be considered primarily for use during routine operations of water systems. This distinction is not absolute: The rehabilitation of infrastructure could itself be an operational requirement. But rehabilitation overlaps with the more desirable situation in which capital works are implemented either to serve an expansion of the system to meet the needs of an expanding user population OR as part of routine end-of-life replacements.

Water Meters – opportunities

Perhaps the strongest opportunity identified is to support the local manufacture of water meters. For reasons described in the section above on operational products, water meters are currently a highly strategic product which is essential to achieving the goal of increasing revenue collection from users of municipal water services. New meter technologies are designed to facilitate the reading and recording process and interface it with the relevant billing systems.

An important limitation is that, precisely because they have been identified as strategic, they are already the subject of an intensive intervention led by National Treasury to promote their effective use. This may leave limited scope for an LSF intervention but may also provide valuable insights into the approaches that may be useful with other products.

Existing suppliers and producers and extent of local content

Seven local companies have been awarded a transversal tender to provide meters and associated goods and services (see below)

Designating the market

Because of the critical role in generating financial flows for local government water suppliers, National Treasury has taken a keen interest in the installation of meters and is currently providing financial support for provided support to procure and install them. Since meters are installed by public utilities, they have been an obvious target for the promotion of local content in general and designation in particular. National Treasury had already issued an ‘instruction on residential electricity meters’ in 2014. After Preferential Procurement Regulations were introduced in 2017, the instruction was cancelled and electricity meters were designated immediately. Water meters were designated for the first time, a month later in June 2017. In that designation, the local content for water meters was set at 40% with details of the material to be sourced and assembly operations to be undertaken in South Africa expressly defined:

- Printed circuit board sourcing (if applicable)
- PC Board population (if applicable)
- Sourcing of connection cables (if applicable)
- Sourcing of meter box, meter body, valves and indicator covers
- Assembly of counter
- Assembly of indicator
- Final meter assembly.

A distinction was made between ‘post-paid meters’ which simply record consumption and ‘pre-paid meters’ which record consumption but also interrupt it when a supply threshold is reached was set at the same amount (40%). For residential water meters, the threshold for local production and content is set at 40% for both pre-paid and post-paid meters. No explicit designation appears yet to have been made for ‘smart’ meters with remote-reading functionality although this important innovation should be encouraged, with or without associated flow control mechanisms.

Existing and planned support to the metering industry and its customers

There is an active and ongoing programme to promote the effective functioning of the industry of which local production is an element. The overall programme includes the award of a transversal tender to 7 local companies (African Metering Solutions, Cigicell Pty Ltd & Utilities World (JV), Conlog (Pty) Ltd , Isandiso Pipelines & Engineering, Landis + Gyr (Pty) Ltd, MTN (Pty) Ltd and Vodacom (Pty) Limited.) for the supply of smart meters and the provision of associated equipment and services to enable their application. It is supported by the Smart Meters Grant included in the Division of Revenue Act 2025 to support municipal procurement with allocations for 2025/26 of R650 million; 2026/27: R800 million; and 2027/28: R836 million (for both water and electricity applications). The outcomes intended include installation of a variety of meter types, the number installed, the reduction in technical losses achieved through their use and the improvement in revenue collection achieved.

Further opportunities to promote local meter manufacture

The innovations that are being introduced and promoted offer opportunities for greater local production to introduce the new products into the domestic market as well as to increase export sales. The companies already involved range from the subsidiaries of large international manufacturers, national telecoms partners and smaller local companies.

Strategies to increase local manufacturing content may include:

- A requirement to increase local content
- Support for export promotion.

Partnerships with international corporates may support either or both strategies. Some are already involved in the participating companies.

Treatment chemicals – developmental considerations

The production of drinking water and the processing of wastewater for disposal both use substantial quantities of the variety of chemical products, as already described. While most of the products considered are either low value ‘commodity chemicals’ or specialised proprietary products, there are some items that may have potential for the present project and may be worth reviewing in more detail.

Two considerations should guide the identification of potential candidates:

Is there potential for ‘circular economy’ or ‘developmental’ type interventions where production of a water treatment chemical could be linked to broader development objectives? And could interventions help to prepare for the emerging retrenchment in the large scale South African chemicals industry which could impact negatively on the water sector?

In relation to the latter issue, the shift in the industry's focus from low margin bulk 'commodity chemicals' to more complex, specialised higher margin products might have a perverse effect. Many water service providers depend on advice and support from their chemical suppliers. With the relatively small local market discouraging local production, the industry may only support its more expensive proprietary products, when older but still cost-effective products might better serve users.

Potential local coagulants

One potential set of products to be explored are coagulant agents based on tannins derived from tree barks. Such products are already marketed in Brazil, Spain and Australia and are used as water treatment coagulants with reasonable success. There has been limited production in South Africa based on the use of commercially grown black wattle trees under the tradename Floccotan and more recently 'Lucent'. While the tannin extracts produced are mostly sold into the leather tanning business, there remains an interest in their potential for water treatment. The specific attraction may be the potential to increase raw material production in areas of the country where former mining areas are being rehabilitated.

A similar 'developmental' example is a proposal to develop a coagulant using Acid Mine Drainage as a raw material (thereby reducing water pollution while producing a useful reagent). However, since this has only been demonstrated at a laboratory scale, it is perhaps too far from pilot scale trials to be considered as an LSF initiative.

Potential 'package scale' treatment opportunities – on-site chlorine generation

While the scale and integration of chemical production does not readily lend itself to small-scale production of 'niche' products to serve the relatively water treatment market. However, there may be circumstances in which support for a process rather than a product may be more useful. An example is presented below in the context of support for generic 'package' type innovations. This involves the on-site production of hypochlorite solutions for disinfecting waters that have been treated either for drinking water use or to meet environmental requirements for wastewater discharge.

Shade cloth

Some manufacturing interventions may have substantial impact on the water sector even if they are not promoted as 'water sector' products. One example is the production of shade cloth for agriculture. While the use of this product is growing rapidly as a mechanism to provide a controlled climate for high value field and tree crops and protect them from adverse weather events, it can also substantially reduce crop water use. Since agriculture is by far the largest user of water resources, any reduction in water use would have a positive impact on the wider sector.

South Africa already has a significant shade cloth manufacturing industry and produces a variety of grades tailored to have specific effects on the proportion and wavelength of incident sunlight that reaches various crops. There is also a growing technical literature on the application of these technologies to influence plant water use and their impact on crop yield which have demonstrated significant water savings. Since the South African private sector already has advanced agricultural research capabilities in this area, (see, for instance) this may be a potential area for further investigation. The benefit to private sector agriculture is that the water saved may enable farmers to expand their production, which is often constrained by available water allocations.

Further strategic opportunities

While the first-round requirement is for a review of the individual manufactures whose local production might be a target for LSF intervention, there is potential for a wider perspective.

The multiple processes that constitute the water sector's operations often involve plant and processes that themselves bring together a wide variety of manufactures. It is therefore suggested that, rather than seeking to identify single products such as a pumps or flanges, an alternative approach may be to review the overall packages of equipment used for specific operations and consider how interventions in production and procurement could achieve the goal of increasing local manufacture. Such an approach would allow the manufacturers themselves to identify opportunities for increased localisation of individual components which they could incorporate into the overall package.

Drip Irrigation packs

One simple example of an opportunity that could have significant social impact as well as supporting more efficient, effective and equitable use of water would be the promotion of basic irrigation technology interventions. In water scarce regions, there has been a widespread adoption of water efficient irrigation technologies. However, these have generally been led by larger scale commercial farmers who have the capital and knowledge to apply them, and it has been noted in engagements with practitioners that there has been limited uptake by South Africa's small-scale farmers.

In neighbouring countries there has been considerable interest in such technologies. Indeed, one South African company has exported a significant volume of drip irrigation 'starter packs'. This company has confirmed that there is limited interest in the product locally.

While manufacture cannot occur in the absence of a market, the fact that these products are already being produced locally suggests that there may be opportunities to expand manufacture by promoting the use of small-scale drip irrigation through public, private and non-governmental channels as well as to expand take-up of the approach in the wider region.

Borehole drilling rigs

There is widespread (and growing) interest in and use of boreholes as a source of backup water supply in domestic and commercial settings. At a larger scale, boreholes are also drilled to abstract groundwater at a utility scale where adequate reserves are present. While borehole drilling is a relatively simple process, it requires a variety of equipment to be assembled as a mobile 'rig' unit which can then be deployed to the location desired.

According to industry sources, there are five (5) commercial drill rig manufacturers in SA who target what has essentially been a commercial market. There has however been a growth in activity at the entry level, driven by local public water supply failures. During the Cape Town Day Zero crisis, there was a rapid expansion of wellpoint installations (low yielding relatively shallow wells installed in soft ground by 'jetting' a stream of water to open space for a pipe) which has continued as an alternative source, particularly for household gardens. In other parts of the country, there has been an influx of Chinese and Indian drilling equipment which is mounted on local trucks, targeted primarily at new entrants into the drilling business, at the lower end of the market, particularly in rural areas.

While existing practitioners are concerned about the competition from the low rates charged (as well as the quality of the work done), it does appear that there has been little attention to the development of a well-designed and specified drilling rig product for this growing market segment. In 2020, a TIPS report commissioned to respond to the need for post-Covid economic boost outlined a proposal for the local ‘manufacture’ of a low-end rig assembled from largely locally available materials and equipment to serve this market. It may be appropriate to revisit this proposal as well as to consider whether a generic ‘package’ approach to the promotion of local content use may be relevant.

‘Package’ products and trends towards products as a service

The package solutions identified above are part of a confluence between the parallel trends of ‘packaging’ solutions to provide entire functions, the evolution of remotely managed technical operations and the promotion of the ‘product as a service’ concepts in which an external equipment supplier is paid to take responsibility for sustaining its ongoing operation. These trends offer an opportunity to promote localisation through a focus on the contents of the manufactures that make up the ‘packages’ rather than on the individual components of the package.

Package treatment plants

One market in which this approach could be trialled is presented in detail under the treatment section (above) to provide a practical example of the approach. This is the manufacture of small-scale package treatment plants produced to meet the needs of institutional and industrial enterprises for reliable supplies of water that meet specific quality standards. There is growing demand for such products, particularly in institutions such as health care and tourism facilities as well as food manufacturing in areas where municipal supplies are unreliable.

Decentralised chlorine generation

A more specialised opportunity for localisation is the manufacture of equipment for the on-site production of chlorine compounds for disinfection of drinking water and discharges from wastewater treatment plants. This would replace the use of imported HTH hypochlorites and create opportunities for equipment manufacture and, potentially, for ‘product as a service’ businesses.

While gaseous chlorine is the cheapest disinfection product it is dangerous the equipment required to inject it into the process stream is expensive and relatively fragile, making it inappropriate in many smaller treatments works with limited qualified operators. Powdered calcium hypochlorite (HTH) is easier to handle and dose, in smaller works but it is imported, is substantially more expensive and, because of its use for swimming pool disinfection, it is also vulnerable to pilferage.

An alternative disinfectant is sodium hypochlorite which can be generated by electrolysis of a brine (NaCl) solution. While sodium hypochlorite solution has a limited shelf life, it can be generated at a treatment site as required. The advent of cheap solar power has also substantially reduced the cost of the electricity required and, because the solution can be stored for a few days, energy storage is not required. On-site production also reduces transport and inventory costs. This system can be a relatively self-sufficient operation, requiring just reasonable quality salt, water and a source of electricity. The logistics and associated costs are thus far less than for other disinfection products.

Although the equipment required is relatively standardised and reliable, there is a de facto backup if the catalysis process fails. The electrolytically produced hypochlorite can be substituted in the dosing cycle with a with a calcium hypochlorite solution offering a robust solution for remote locations with limited services.

A large variety of hypochlorite generators is available on the international market, but further research would be required to provide reliable costings and specifications appropriate for South African applications. The manufacture of the generator requires a specialised catalytic reactor, power supply, associated pumping and flow equipment and control and monitoring apparatus together with reagent and product storage tanks. Some suppliers recommend provision for water softening pre-treatment to extend catalyst life.

Current HTH imports are 3143 tonnes with declared value of R70,5 million (R0,224/kg). The current price of HTH in wholesale trade units (25kg) is approximately R0,50/kg, valuing the total market at R141million. If 50% of HTH imports could be diverted to local production, the market would be worth R70 million annually.

Aside from the replacement of imported HTH with local production, the further goal of a hypochlorite programme would be to promote local manufacture of the units rather than just the product. The opportunity would be to develop a line of generators, backed by a remote servicing capability to support the many dispersed treatment works in the more rural and remote parts of the country.

That would require the identification of potential partners and an appropriate business model which might involve some form of incentive to municipalities to adopt the service. One model would be for units to be installed and operated as a ‘product as a service’ operation, like arrangements for the supply of chlorine dioxide already in place in the food industry.

Aside from reducing the volumes of HTH currently imported into South Africa, the domestic development of a generator solution would be of interest to the neighbouring countries that at present rely on HTH imports from South Africa, adding to export opportunities.

Other export opportunities

While the focus of localisation tends to focus on supplying the local market, it is evident that in several of the product sectors, export markets could be further developed.

One approach would be to identify product sectors in which South Africa is already a regular merchandising supplier to the region and develop the merchandising activities to add manufacturing value. A related opportunity would be to identify and develop in a more structured manner South Africa’s participation in regional and global value chains.

Localisation of elements of larger value chains

This review has confirmed that scale of production is a critical determinant of opportunities for the localisation of manufactures. For a country like South Africa, with a relatively small economy an important opportunity to engage in manufacturing will be through the integration of relevant local activities into a wider value chain.

The existing example of the automobile industry is the dominant domestic example of how South Africa can engage in the manufacture of some individual components and contribute to their assembly into a final product, that involves a wide range of suppliers. Similar approaches are increasingly common across a wide range of manufacturing processes, from mobile phones to garments. A UNIDO review of the opportunities for global value chain (GVC) participation outlines some of the considerations involved:

Countries that decide to participate in GVCs as a vehicle for growth and development must plan their strategy accordingly. GVC strategy can be divided into three main components.

The first is seeking integration into GVCs. This often involves identification of suitable tasks and activities within a targeted industry. Regardless of whether FDI is used to achieve GVC integration, countries must have reached a minimum threshold in terms of local skills and infrastructure to participate in GVCs.

The second component entails improving a country’s GVC participation once GVC integration has been successfully achieved. This typically requires efforts to improve the absorptive capacities of locally owned firms, the efficiency of local supply networks and the quality of the workforce.

The third component focuses on pursuing sustainable development outcomes from GVC participation in terms of equitable distribution and environmental protection.

In South Africa’s case, further considerations will address: -

Scale: can the country demand for the manufacture support a national industry or could a sufficient export market enable the necessary scale to be reached;

Technical capabilities: does the country have (or is it able to recruit) the capabilities required to promote such manufacturing? and

Financial and marketing capabilities: - could the country assemble the finance and marketing capabilities to support a standalone manufacturing effort.

A final dimension that attracts limited attention is the potential for the establishment of regional value chains. For manufactures where scale requirements are less onerous, there may be opportunities for countries to participate in different elements of the manufacturing processes. To promote such approaches, evaluations will have to be made of the structure of national incentives and the coherence of the design and application of trade agreements. These issues lie beyond the scope of this review but may help to support the overall objectives of localisation (and regional development) in the longer term.

4.3 ADDENDA

Annexure 1: Sector procurement arrangements.

Procurement in the public sector is closely regulated. The DWS and other national departments must comply with the relevant legislation, starting with the Public Finance Management Act (PFMA) and then guided by a more detailed set of legislation, recently updated by the approval of the Public Procurement Act (Act No. 28 of 2024). This legislation includes provisions intended not just to regulate the financial procedures and ensure value for money but also to achieve other policy objectives.

Municipalities are governed by a separate (though related) local government financial framework, set out in the Municipal Finance Management Act (56 of 2003) and its associated regulations. Due to serious challenges in the management of municipal finances and the precarious financial position of many individual municipalities, there is close oversight by National Treasury of municipal finances. The allocation and management of grant finance is another channel through which municipal oversight is promoted. The intensity of regulation and oversight is sometimes cited as a reason for the poor outcomes of municipal programmes which emphasise compliance rather than performance

Water Boards and related SOEs have greater flexibility and are guided by the general requirements of the PFMA. However, since each SOE is autonomous, their procurement processes are not necessarily compatible which will not assist the development of standardised approaches to promote localisation. While the primary concern of manufacturers who supply the SOEs has been the visibility of their future requirements, this has served to illustrate the different approaches taken by different entities. This may be an area in which the national DWS can provide guidance.

LSF

PROUDLY SUPPORTING LOCAL INDUSTRY

Prepared by Professor Mike Muller