

BULK SCALE INDUSTRIAL EFFLUENT REUSE POTENTIAL IN SOUTH AFRICA

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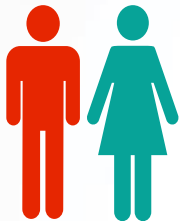
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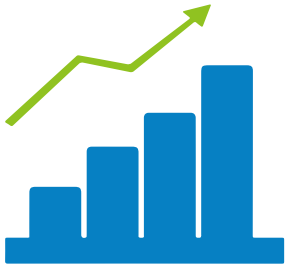
Introduction



Population Growth



Water scarcity



Increased Pollution



Climate Change



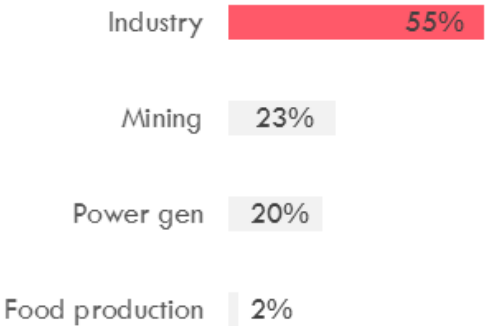
Rationale



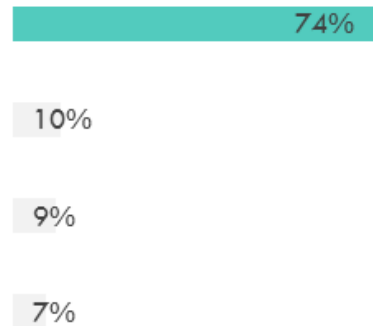
17%
anticipated
water deficit

14%
wastewater
reused

Water use



Effluent produced



Introduction

Water reuse objectives (US EPA, 2019)



Water Security

Sustainable access to an adequate quantity or acceptable quality water



Water Sustainability

Clean water for humans and ecosystems



Water Resilience

Ability to adapt or withstand the effects of rapid hydrologic change or a natural disaster

Legislative framework

South Africa has extensive and comprehensive laws and guidelines regarding water use, reuse applications and effluent discharge.

Water Services Act

In line with the NWA and the WSA, (Act 108 of 1997) water conservation (WC) and demand management (WDM) is an important step in promoting water use efficiency and viewed as a useful tool in achieving Integrated Water Resource Management (IWRM)

NEMA

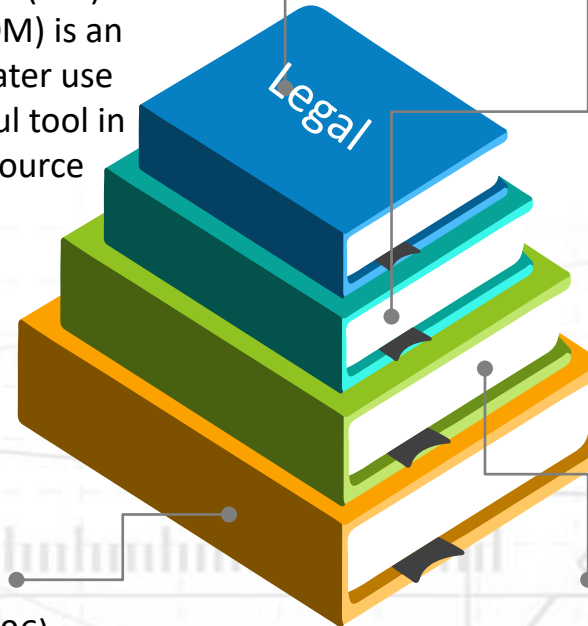
Reuse of effluent in the country requires environmental authorization in terms of the National Environmental Management Act (Act 107 of 1998)

Constitution of RSA

The Constitution, (Act 108 of 1996) guarantees every person in the country the right of access to water and the right to an environment that is not harmful to their health or wellbeing now and in the future.

National Water Act

The main legislation that governs water use and the discharge thereof in South Africa is the National Water Act (Act 36 of 1998).



Drivers for Industrial Water Use



Industrial and population growth

South Africa's population is growing exponentially, and together with urbanisation, there is an increased need for power generation.



Freshwater costs

The cost of clean, fresh water is continually increasing, and is impacting all provinces of South Africa.



Regulatory requirements

Water use and discharge in South Africa needs to be registered and users need to obtain a water use license. Discharge regulations are in place that include volume and quality restrictions.



Social responsibility

Industry and the public have a social responsibility to protect the environment. Negative publicity around industry's water use will have an impact on a company's sales/growth.



Discharge costs

Sewer and wastewater costs have increased at a higher rate than fresh water costs.



Water scarcity

South Africa is a water scarce country and many regions are susceptible to drought. Additionally, some industrial plants have limited access to clean/ fresh water.



Wastewater processing limitations

On-site industrial wastewater treatment capacities have not increased proportionally with production. Industry strive to meet higher flows with limited operational resources.

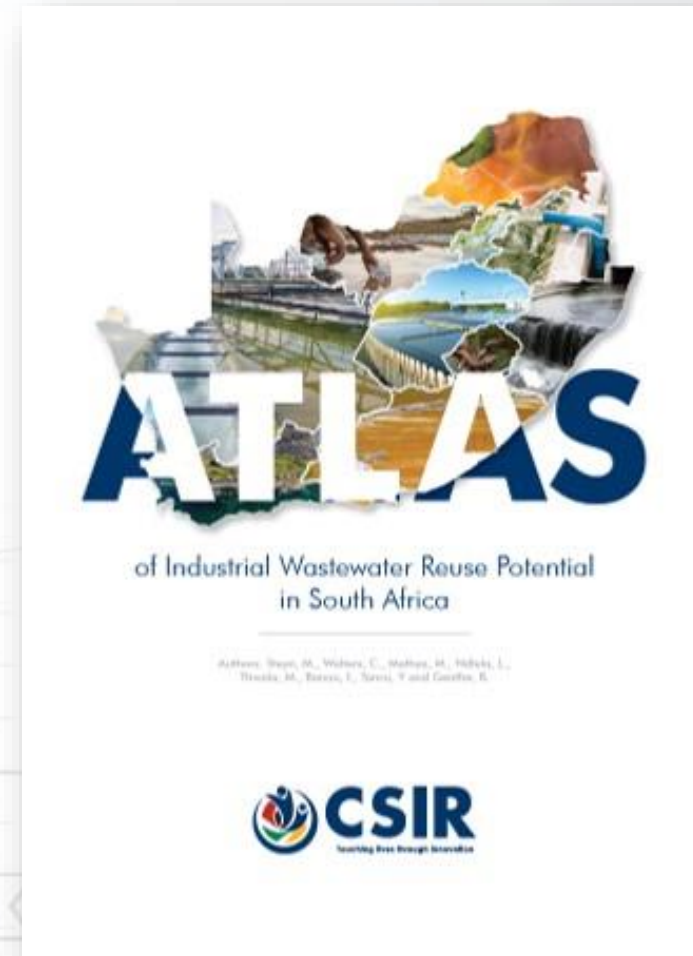


Sustainability efforts

Industry strive towards sustainability by implementing economically sound programs and procedures to minimize a plant's negative environmental impact while conserving energy and natural resources.

Atlas of Industrial Wastewater Reuse Potential

1. Define water reuse and discuss the drivers of industrial reuse
2. Summarise the legislation underpinning industrial water reuse
3. Provide examples of existing industrial reuse projects/activities
4. Describe “fitness for use” and the typical wastewater effluent quality for different industries
5. Identify barriers to industrial effluent reuse
6. Map the largest consumers of water and effluent producers at a national and provincial level.



INDUSTRIES

WATER USE

EFFLUENT

Atlas of Industrial Wastewater Reuse Potential



> Water use from a national perspective....

Water intensive industries are largely represented by the agriculture sector, most of which is used in irrigation.



> Water use from a national perspective....

Second to agriculture is water supply services.



> Water use from a national perspective....

Water use for mining is the highest in Mpumalanga, followed by Gauteng, North West, Northern Cape, Limpopo.



Water use from a national perspective....

Mpumalanga has the highest water withdrawals, followed by the Free State, Eastern Cape and Gauteng provinces.

Atlas of Industrial Wastewater Reuse Potential



> Effluent production from a national perspective...

The highest effluent produced is registered by urban/ domestic (sewage treatment works).



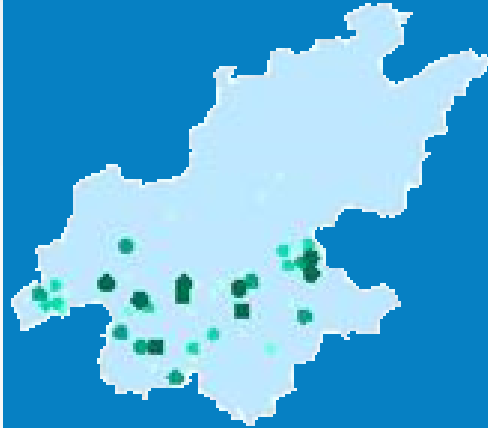
> Effluent production from a national perspective...

The second highest industry is represented by mining (recorded in all provinces except the Western Cape).



Effluent reuse represents the largest opportunity for water savings in the sector.

Atlas of Industrial Wastewater Reuse Potential



> Effluent production at provincial level...

Discharging wastewater effluent is associated with urban areas and industry.

Gauteng is the highest ranked province in terms of discharging wastewater.



> Effluent production at provincial level...

Mpumalanga ranked second in terms of discharge volumes, respectively.



The provinces registering the lowest effluent volumes included Limpopo and Northern Cape provinces.

Development of a Decision Support System

- A DSS tool was developed which will enable municipal and industry partners, and water quality managers to make informed decisions for possible reuse options.
- It aims to directly assist by linking industrial effluent volumes and quality to fitness for use, with specific industries
- The tool will enable engineers and industry partners to collaborate to identify and employ treatment technologies and capabilities.



Development of a Decision Support System

START

Input

The input sheet contains the measured parameter values for industrial effluent.

Industry Match

The input values (effluent parameters) were matched against industry standards. The industry was regarded as a match where the maximum number of parameters were met.

User Match

Once the input data (measured effluent parameters) was matched to specific industries, they were then matched to specific water users within those industries.

Bioassays

The final step of the DSS was identifying the various bioassays available for each industry water user for effluent testing.

RESULT



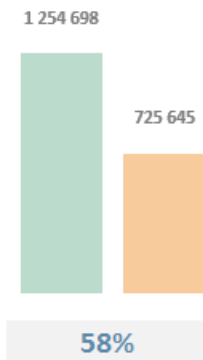
Development of a Decision Support System

A DECISION SUPPORT SYSTEM FOR BULK WATER REUSE POTENTIAL

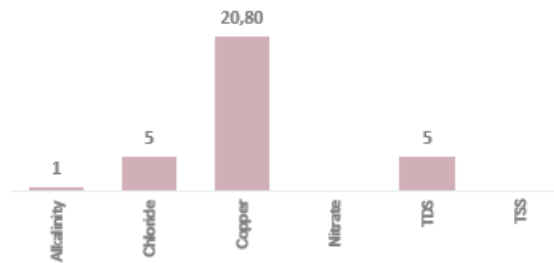
Customer Details

PROVINCE			
Gauteng			
CUSTOMER NAME	LATITUDE	LONGITUDE	MUNICIPALITY
User 1	-26,42500	27,68611	WEST RAND DISTRICT MUNICIPALITY
WATER USE SECTOR	WASTE-GENERATING SECTOR		
INDUSTRY (URBAN)	INDUSTRY		

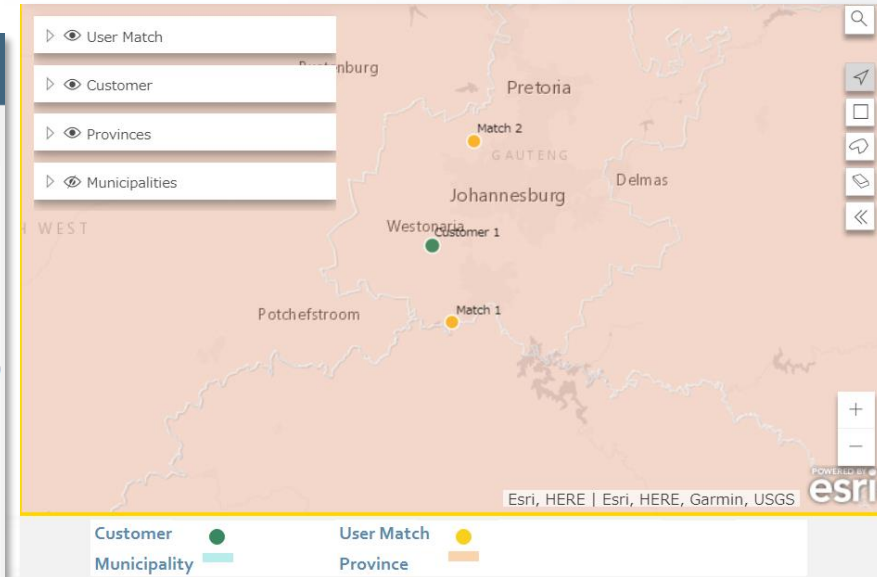
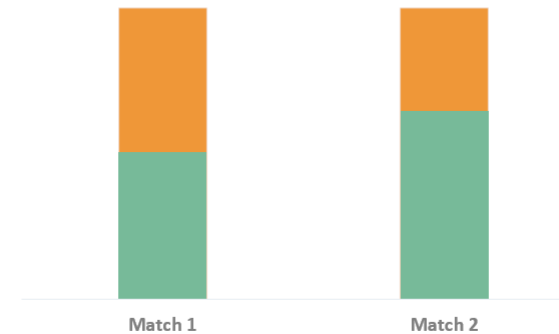
Registered volume vs effluent produced



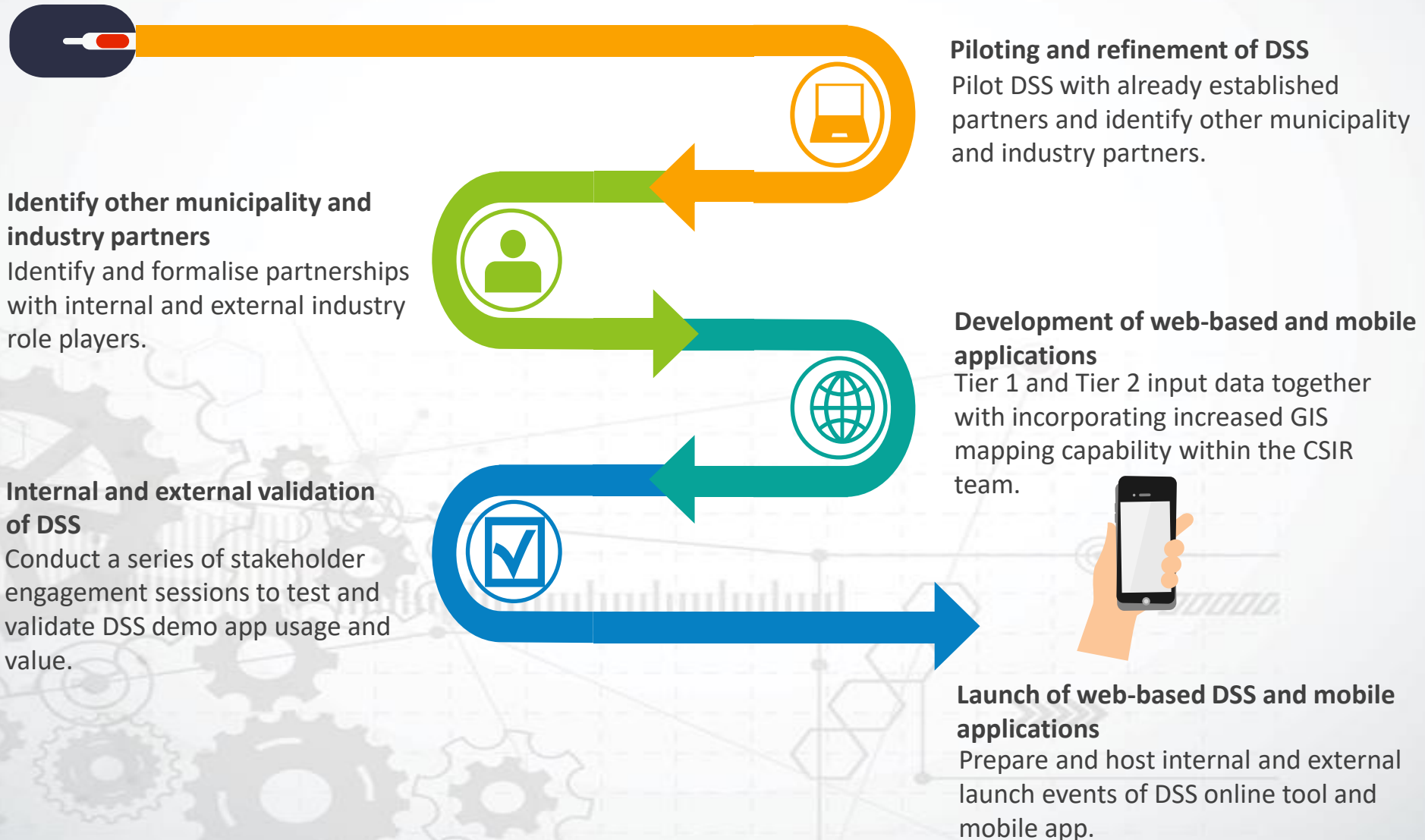
Effluent quality



Effluent produced by users matched vs customer registered volume



Plan for Impact



Way forward



- Garbage IN = Garbage OUT
- Water consumption and effluent data needed; fitness for use
- Partner to create best DSS
- User-friendly system

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INDUSTRY



Thank You

Q & A