Presentation to the Portfolio Committee on water an sanitation

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CSIR mandate

"The objects of the CSIR are, through **directed** and particularly **multi-disciplinary research** and **technological innovation,** to foster, in the national interest and in fields which in its opinion should receive preference**, industrial and scientific development**, either by itself or **in co-operation with principals from the private or public sectors,** and thereby to contribute to the **improvement of the quality of life** of the people of the Republic, and to perform any other functions that may be assigned to the CSIR by or under this Act."

(Scientific Research Council Act 46 of 1988, amended by Act 71 of 1990)

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The CSIR at a glance

- The CSIR is a science council, classified as a national government business enterprise
- The CSIR's Executive Authority is the Minister of the Department of Science and Technology

In numbers:

- **70 years in 2015**
- **2411 total staff**
- **1692 scientists**
- **310 doctoral qualifications**
- **+/- R2.15 bn total operating income**

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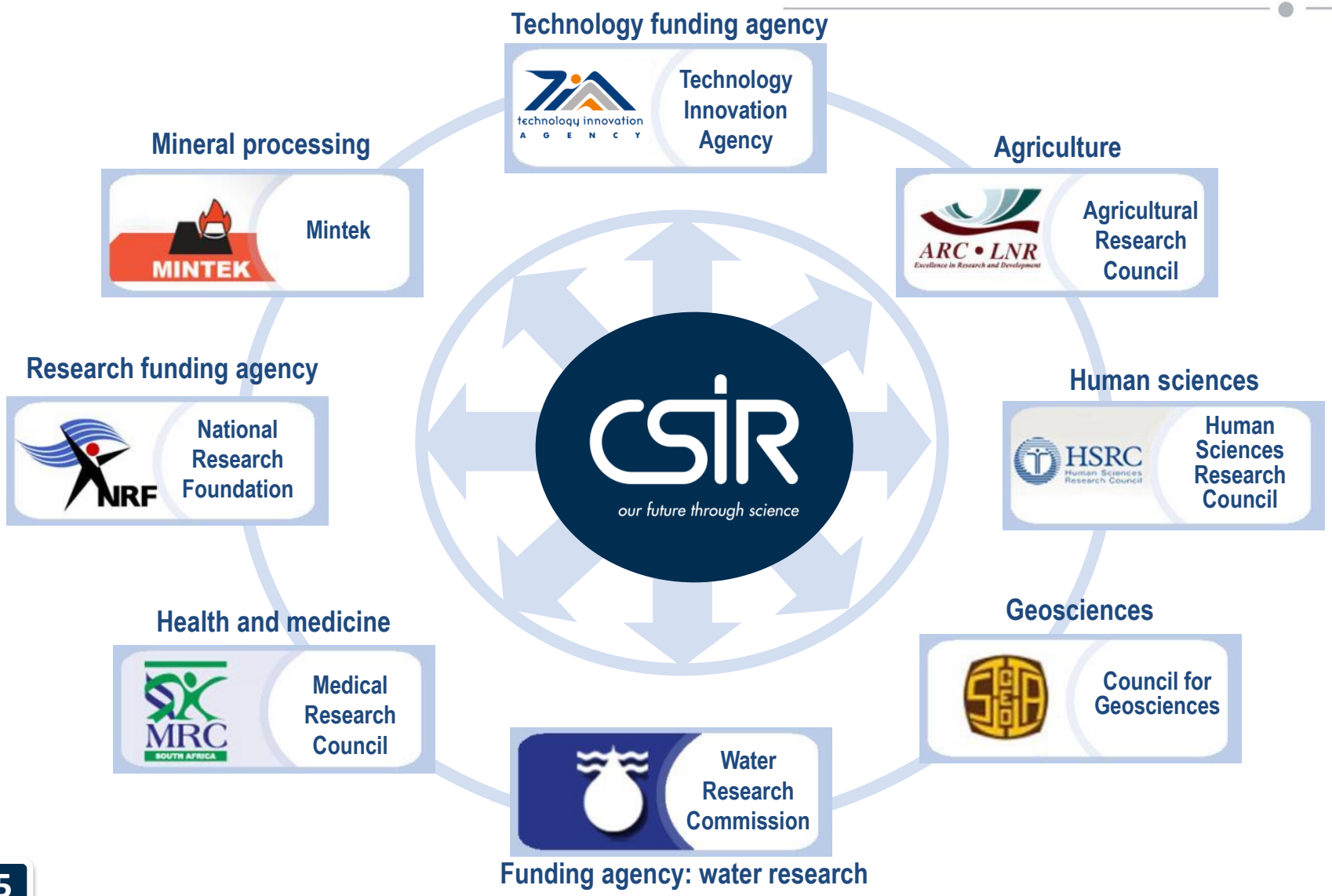
The CSIR interacts with other public research institutions



CSIR – NRE unit

- Assess and monitor the state of the natural environment
- Support planning and decision making process regarding natural resource utilization
- Design and implement technologies for water, pollution and waste solutions
- The CSIR water flagship
  - A focused effort to contribute to the equitable, efficient and sustainable use of water to ensure that the country attains its growth and development aspirations
  - Develop novel technology to mitigate the impact of wastewater treatment works on ecosystems and human health
- CSIR also involved in research on:
  - Water infrastructure development
  - Integrated panning and demand management for water
  - Monitoring, evaluation and compliance
  - Water policy, regulation and governance

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Summary of brief

The CSIR was asked to comment on the following:

- Provide an overview of water resource management in SA
- Present the water balance (supply and demand) of SA
- Comment on efficiency vs equity vs effectiveness vs sustainability
- Interpret the role of water for the NDP 2030 vision

I will try and speak to these points within a context of a discussion aimed to improve alignment between water resource management and the principles of a Green Economy.

Watering a Green Economy

A **Green Economy** requires a holistic approach towards policy decision-making processes, which not only integrate and balance environmental, social and economic priorities, but also considers the consequences of interlinked policies within a systems-based context. For water it means:

- The need for decoupling: a continued drive to increase water-use effectiveness and efficiency, in its broadest sense is part of the transitioning process.
- The need for social buy-in to facilitate societal transition: improved water stewardship through changing perceptions about, and utilisation of, water.
- Account for poverty, inequality and unemployment: acknowledge legacies of the past and the fact that the playing fields are not level by being sensitive to different contexts and adopting strategies which account for these differences.
- Innovation: creative solutions are required from both technological and social perspectives.

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But, water is a challenging resource to manage…

- Apart from being essential to all life forms, water is one of several primary inputs in all sectors of an economy and is, therefore, a crucial resource with huge political significance and long political-economic history.
- Resource scarcity and conflicting interests leads to huge trade-offs being at stake when allocation decisions are made.
- This creates a platform for the development of complex and often emotional issues.
- Methods being used to make trade-offs must be robust and fair.

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Where does our water come from?

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Water resource management in SA

- South Africa has a fairly well developed water supply infrastructure, which has created a perceived sense of water security, BUT it has also created a lack of appreciation for this strategic resource.
- The political events during the past 20 years in South Africa have seen major objective-related adjustments leading to changes in the organisational structure of governance:
  - A pertinent thrust towards decentralisation of management in an effort to improve efficiency.
  - Changing towards an integrated approach to water management has increased public participation in water management.
  - Dependency, sustainability, efficiency and equity emerged as central concepts
  - A systems-based approach and an expanded decision-making context for strategic water management is starting to emerge.

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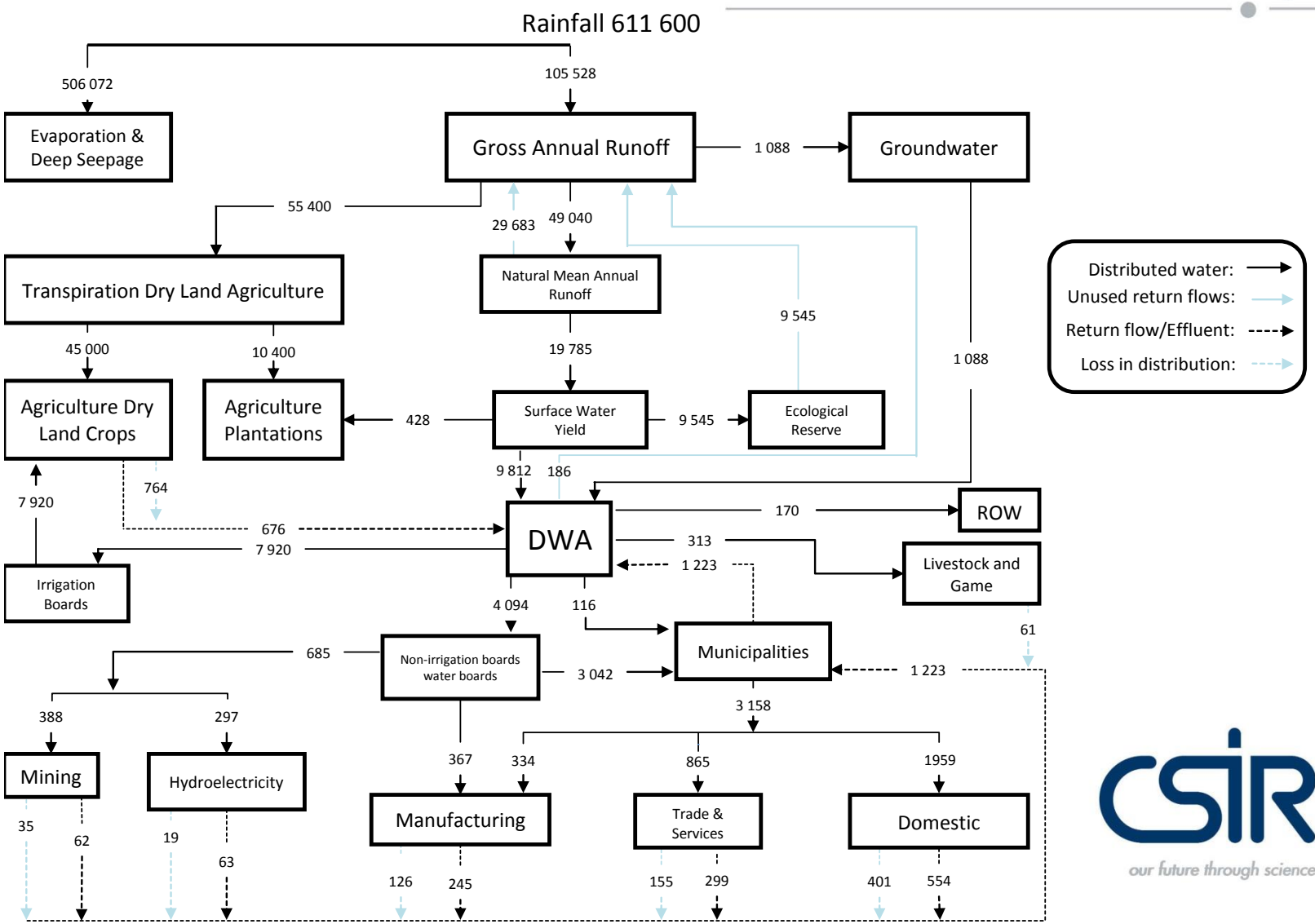
Water balance in SA (million m3/yr)



Water management regimes

- Allocation management
  - Demand side management approaches
  - Supply-side management approaches
- Quality management

Demand-side management

- Demand-side management focuses on improving the coordination of water resource management, enhancing the flexibility of dam and reservoir operations, distribution and management systems and the adoption of new analytical tools and methods. The aim is to promote the efficient use of water and to realise water savings in order to postpone the need for capital-intensive supply augmentation (especially when funds are limited).
  Examples:
  - strategic tariff structures
  - improved maintenance of infrastructure (leakage detection)
  - installation of water-efficient fittings
  - pressure regulation
  - user education
  - more efficient metering
  - water markets
- These options typically have shorter payback periods than supply augmentation options, adding to the attractiveness of these options.

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Supply-side management

- However, the extent to which demand-side management approaches can accommodate the growing demand for water is limited if the demand continues to grow. The most common option in South Africa has been the construction of new, bulk storage dams, but given that suitable sites for large storage dams has become few and far between, other supply-side management will need to be pursued including:
  - Revitalising current storage capacity — cleaning dams was considered to be an expensive option but this is becoming more viable.
  - Recycling water to a potable standard.
  - Desalination of seawater or brackish water; this will, however, remain an energy-hungry ‘stop-gap’ option for isolated areas because of the high, direct maintenance cost and the associated negative impacts of pollution due to brine disposal and the utilisation of fossil fuel to drive the technology.
  - Alien vegetation control: a significant volume of water is used by alien vegetation and control measures aimed at reclaiming the water is an option.
  - Inter-basin and trans-country transfers: The importation of water from central Africa remains an option.
  - Virtual water to realise water savings.

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Water quality management

- Water pollution directly affects the ‘fitness of use’ of water by decreasing its opportunity cost (polluted water has fewer uses compared to clean water).
- Deteriorating water quality is the biggest threat to water supply in South Africa as there is a direct relationship between quality and supply (i.e. supplying polluted water is counter productive).
- Pollution prevention proved to be more cost effective than pollution treatment.
- Water pollution permits could play a significant role in preventing pollution.

Economic instruments

- Several economic instruments could be applied to allocation and quality management
- Economic instruments subdivided in:
  - Market driven instruments (prices and permits)
  - Non-market instruments (conditional taxes and levies)
- Examples of economic instruments for water management:

	Allocation management		Quality management
Type of approach	Demand-side	Supply-side	
Market approach	Tradable use rights	Inclusive and strategic pricing	Pollution permits
Non-market approach	Rebates for water efficient appliances	Use-base taxes and levies	Pollution taxes

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Markets for water use rights

- After the separation of water and land use rights in 1998, it became possible to trade water-use rights without selling the associated land linked to the water resources.
- This has created space for the development of a market for water use rights. Users with a lower use-value for water could sell their water-use rights, while those with higher use-values.
- However, the institutional structures governing the market were slow to accommodate the process.
- Still, a water market could enable transparent and fair reallocations between users.

Implications for the NDP 2030 vision

Few uses of water has substitutes (same goes for energy), which implies that the resource should be managed on scarcity principles and a balancing act between effectiveness vs efficiency vs equity vs. sustainability (resilience):

1. First consider substitution to improve effectiveness (e.g. substitute some cooling / cleaning / sanitation uses with innovative substitutes)
2. Then optimise for efficiency for remaining water uses.
   - However, beware of a Jevon's Paradox – a continued drive towards efficiency could unintentionally, increase the overall demand for water. This is because, while efficiency gains either reduce the amount of water used per unit output or increase the output per unit of water, the relative cost of water is lowered, which could increase the overall demand, i.e. expansion of hectares under irrigation.
   - A continued drive towards efficiency can decrease the resilience of systems, i.e. highly efficient systems are often less resilient against external shocks such as droughts.

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Implications for the NDP 2030 vision

3. Consider virtual water as supply augmentation strategy by importing water hungry produce.
   - Find innovative ways to significantly increase the virtual water component of our water use profile. South Africa's drive towards economic growth would be **'green'** in terms of water resource utilisation if a significant effort is made to **decouple water utilisation from economic growth** (i.e., decrease the water use per unit economic output of the economy). The current figure is approx. US$ 27 / m^3. This figure needs to improve in real terms (i.e. not due to depreciation in exchange rate), e.g. Botswana lies at US$ 87 / m^3. This improvement will facilitate an increase in virtual water trade.
   - However, the carbon and energy footprint of a drive towards increasing virtual water will need to be accounted for.
4. Pollution prevention proved cheaper than pollution treatment. A focused effort is needed on implementing water pollution prevention measures in South Africa. E.g. implement water pollution permit systems in selected catchments.
5. Account for equity related inequalities. The drive towards a greener economy has to account for legacies of the past. Although, backlogs in basic water and sanitation service provision have a draining effect on the momentum of the transition process it will be of no use if some sectors of the economy adopt green economy principles while other components are left behind. Cross subsidisation will be inevitable.

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Remaining challenges

- Huge research need in terms of implementing different economic incentives for saving water (water use markets, pollution permits etc.). Very little has been done in South Africa in this regard.
- The question of how to change water utilisation behaviour so that it will be supportive of the transition towards a green economy also represents a major knowledge gap.
- Water valuation and foot printing is required for several value chains.
- Minimise leakages. Leakages is not only wasted water, it is foregone income as well.

Discussion

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