

WATER SUSTAINABILITY BEST PRACTISE

SAPIA MEETING

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Background – How It All Started

Engen Refinery used just **over 2 million** kL of fresh water per year, enough to sustain **4700** average South African households. Water is utilised mainly for the following :

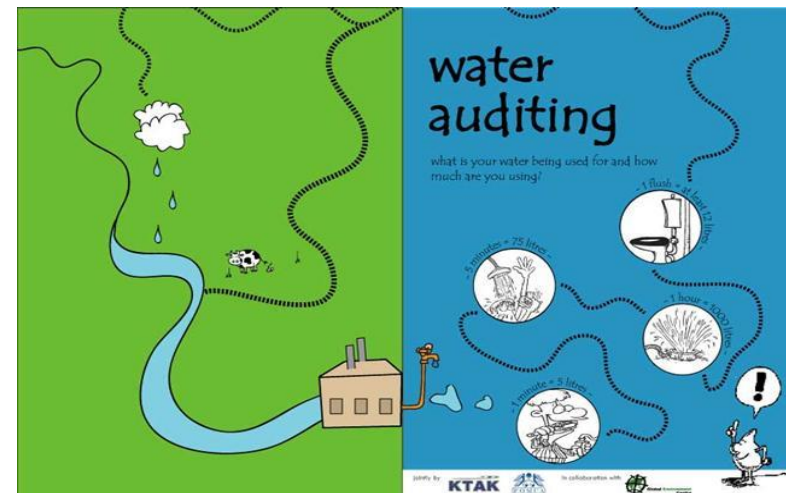
- ✓ Steam Generation
- ✓ Cooling Water in Heat Exchangers
- ✓ Process Water
- ✓ Washing of Equipment
- ✓ Hydrotesting of Equipment
- ✓ Firewater systems
- ✓ Domestic Use



IMPROVEMENT STRATEGY

HISTORY

- ✓ In **2011** an audit of Engen Water Systems highlighted **deficiencies** – decision made to implement recommendations to **optimise** refinery operation.
- ✓ Further to this a **Water Availability Risk Assessment** for Engen Operations in the Umgeni/Mooi River Catchment Area showed annual Corporation water consumption was required to be reduced to less than **2,000,000kL** to move the Refinery from the **High Risk** to **Medium Risk** zone.
- ✓ Improved Refinery sustainability has an impact on the wider community, particularly in terms of **fresh water availability**.



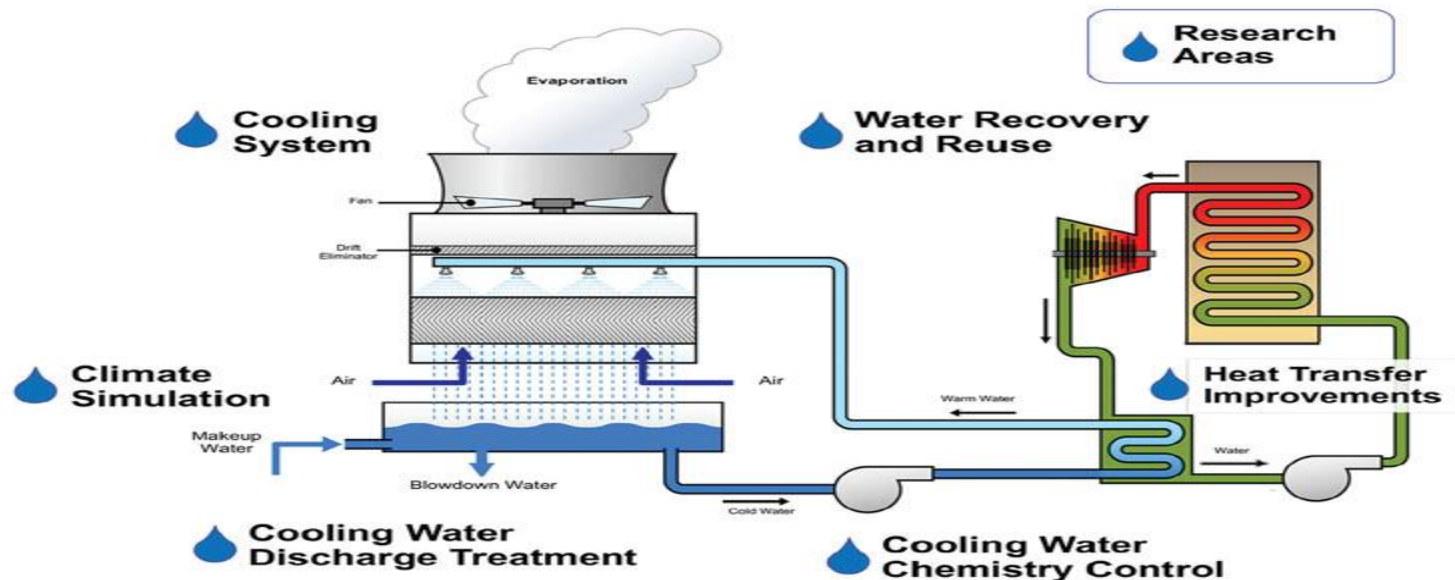
FIRST INITIATIVE

Cooling Water System Improvement

- ✓ Cleaning of cooling water piping – **Never** done at Refinery before
- ✓ Reduce corrosion in cooling water heat exchangers – changes to the chemical treatment program

Result:

- ✓ More **reliable** operation of Refinery
- ✓ Reduction in cooling **water leaks**
- ✓ Water cost savings of over **R2,000,000** per annum



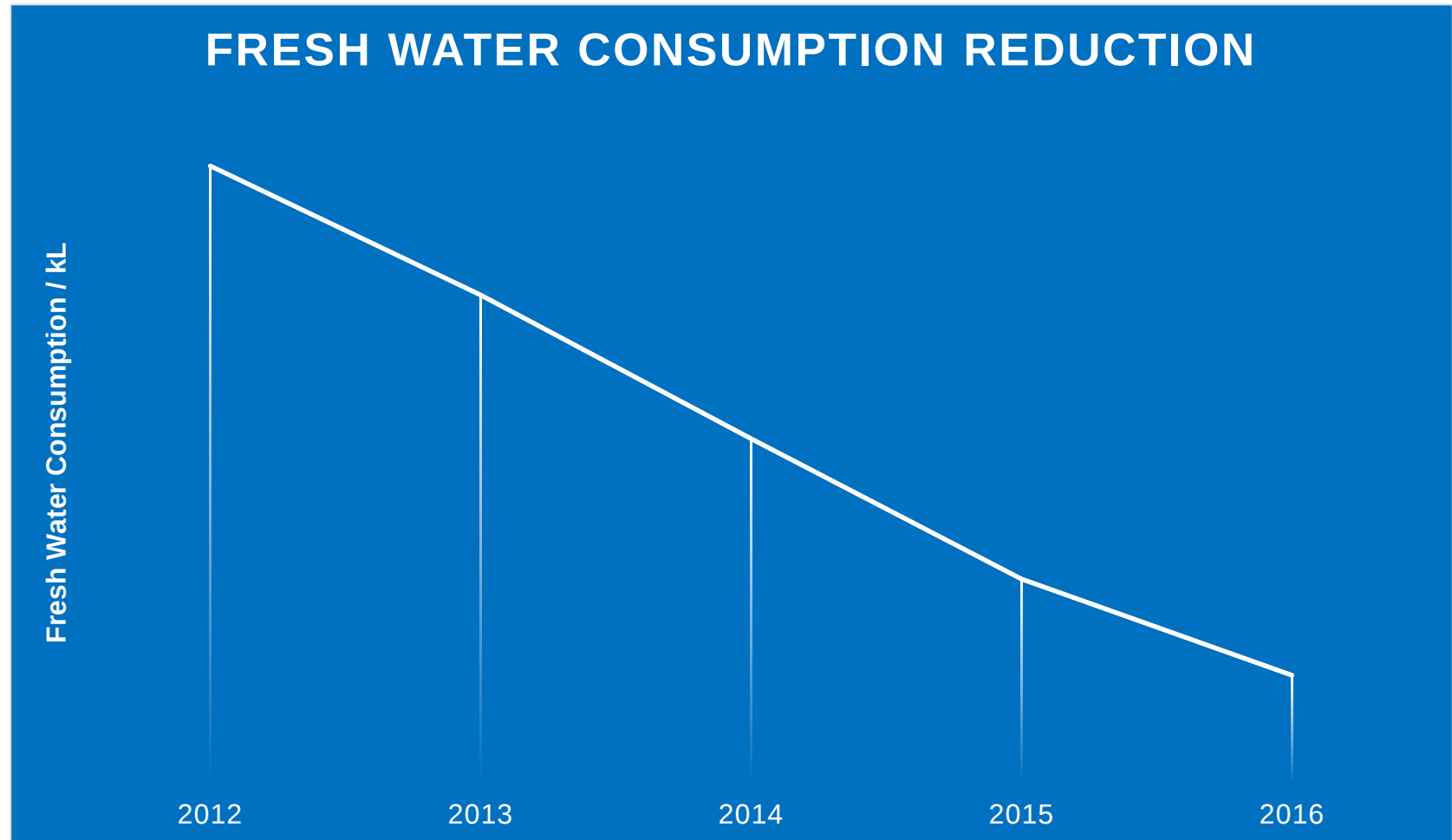
FURTHER INITIATIVES



Encouraged by success and savings achieved, **more initiatives** were implemented:

- ✓ Increased use of borehole water as a replacement for **Corporation water** – managed to double previously assumed maximum.
- ✓ **Re-use of water** – stripped sour water and hydraulic test water usually routed to Effluent Treatment.
- ✓ **Optimisation** of boiler water specifications to reduce unnecessary losses.
- ✓ Installation of a **new steam letdown** valve to allow shutdown of a section of the plant and reduce steam losses through improved distribution.
- ✓ **Online monitoring** of microbiological growth in Cooling Water System
- ✓ Installation of **online pH** analyser for automatic acid dosing in cooling water system
- ✓ Installation of **dissolved oxygen analyser** after boiler feed water deaerator – resulted in change to injection point of oxygen scavenger

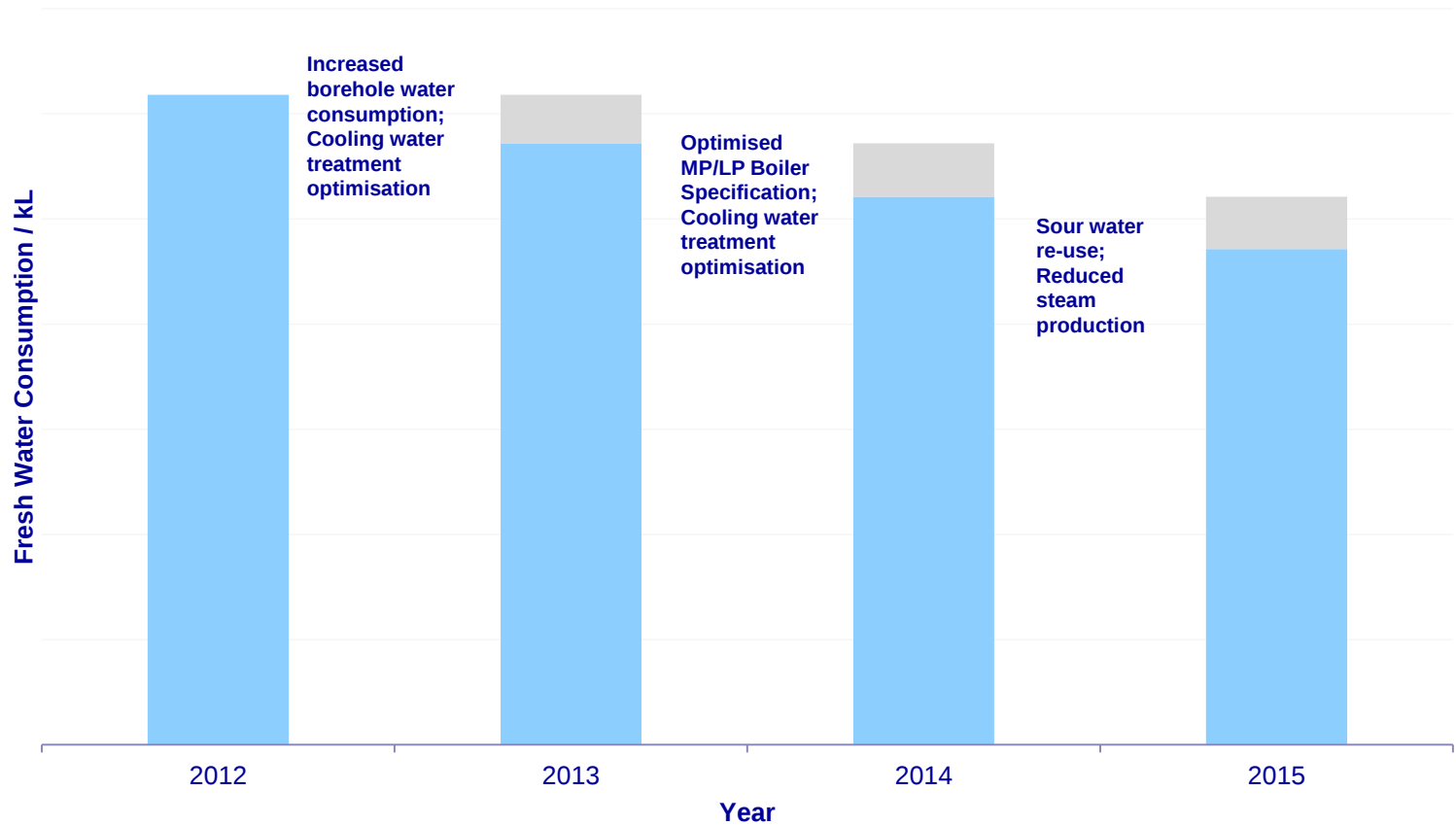
RESULTS: Municipal Water Consumption Reduction



RESULTS: Fresh Water Reduction from 2012 = 730,000 KI



Chart 1: Annual Fresh Water Consumption

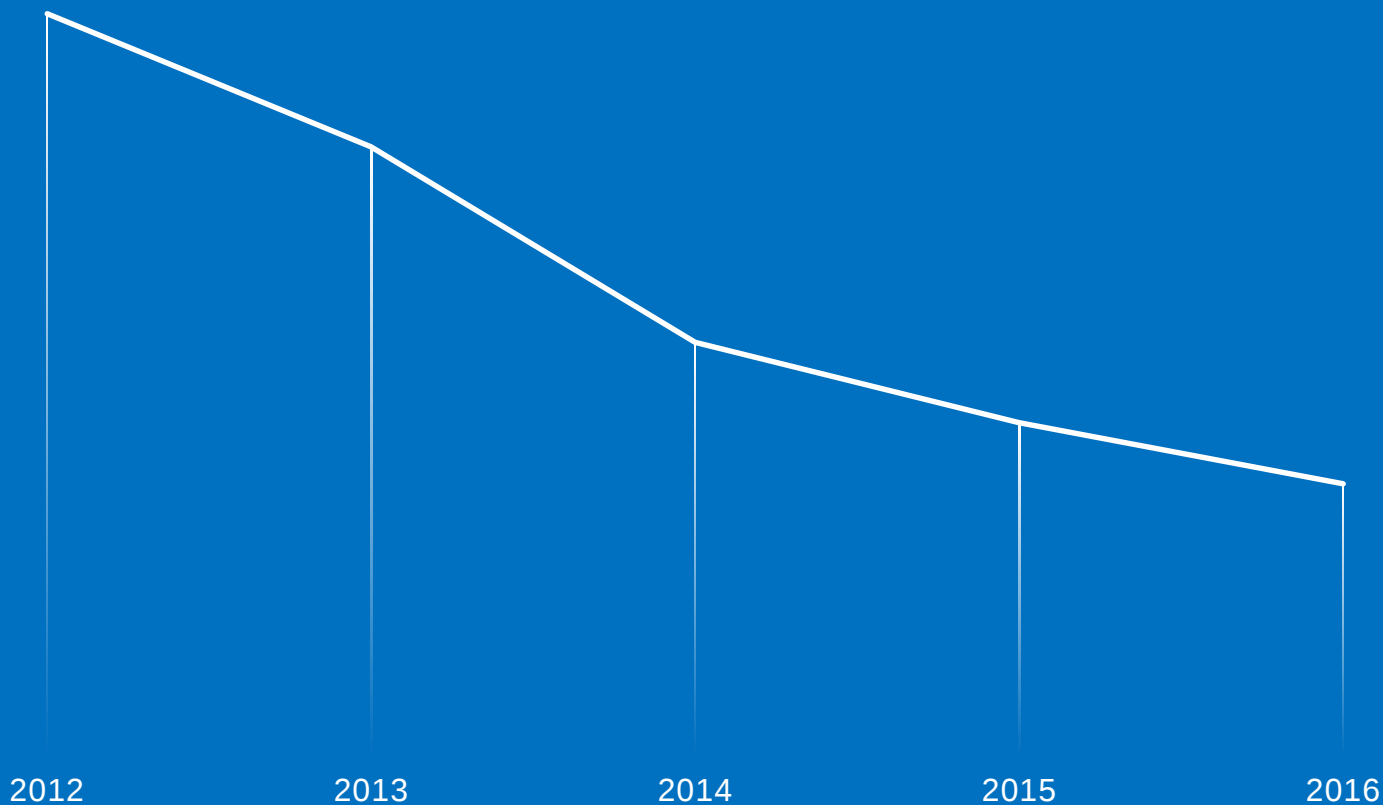


RESULTS: Effluent Reduction



EFFLUENT REDUCTION

REFINERY EFFLUENT / KL



RESULTS



Refinery Operations and Maintenance departments increased focus on water savings:

- ✓ Increased focus on maintenance of **water lines**
- ✓ Increased focus on maintenance of **steam lines and steam traps**
- ✓ Reduced consumption of water for **washing down units**
- ✓ Harvest of rain water captured in ponds

Result:

- ✓ Water saving of >650,000 kL/annum.
- ✓ Water cost savings of **R14,000,000** per annum.
- ✓ Effluent cost savings of **R5,400,000** per annum.

Thank you

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