Water reuse and recycle practices at Eskom Power Plants

Factsheet

1. Introduction

Eskom is a large consumer of fresh water in South Africa, accounting for approximately 1,5% of the country's total water consumption annually. Raw water is mainly used for cooling, as boiler feed-water and for production of potable water. As a strategic water user, Eskom has a responsibility to use water in an effective and sustainable manner.

Eskom's Safety, Health, Environment and Quality (SHEQ) Policy (32-727) has a stated objective to: "Reducing fresh water usage and eliminating liquid effluent discharge to avoid impacting water resources through effective water management processes and the use of mine water" is one of Eskom's environmental management strategic objectives. Recycling and reusing of wastewater is vitally important to achieve objective.

2. What is Water Recycle and Reuse?

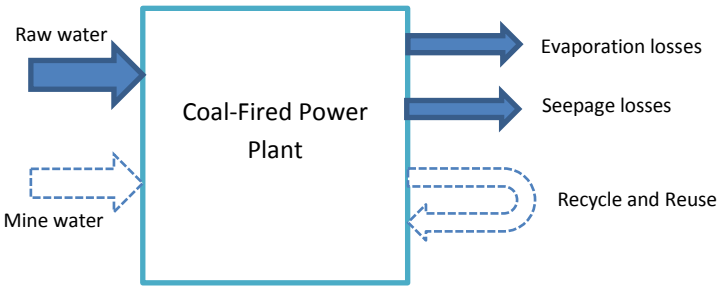
Wastewater recycling is a process of converting wastewater into water that can be reused for other purposes. The term water recycling is generally used synonymously with water reclamation and water reuse.

3. What are the benefits of Water Recycle and Reuse?

Reuse of wastewater has both financial and ecological benefits. Reuse of water as part of sustainable water management allows wastewater to be used as an alternative water source, thus offsetting the cost associated with the use of raw water. The reduced demand for freshwater also help alleviates ecological pressure on already stressed catchments. Reuse of wastewater.

3. Wastewater recycling and reuse practices at Eskom Power Plants

In power generation, water does not get embedded into the product (i.e. electricity). Water consumption or losses are mainly due to evaporation (including drift and windage losses) and seepage.



Water recycling and reuse form an integral part of all Eskom power plants' design and operations. These include the following recycle and reuse practices:

- Zero Effluent Discharge (ZLED)
- Recycling cooling water (CW)
- Recovery and reuse ash water
- Recovery and reuse station drains
- Recovery of treated mine water
- Recovery of treated sewage reuse

4. Zero Liquid Effluent Discharge (ZLED)

All Eskom power plants are designed as Zero Effluent Discharge (ZLED) facilities. This means that all reasonable measures are taken to prevent pollution of water resources by the establishment of a hierarchy of water uses based on quality. The cascading wastewater from higher quality to lower quality users/uses enables high rates of re-use. Water is lost mainly by evaporation, whilst the accompanying dissolved and suspended solids are retained. The net result is that no deliberate discharge of pollutants to a water

resource under normal operating conditions and average climatic conditions takes place.

5. Recycling of cooling water

Cooling water circuits may be open (once-through cooling), or closed, as is the case at all of Eskom's wet-cooled power stations. In closed cooling water circuits, the warm cooling water is recycled through cooling tower to reduce its temperature back to a level which would allow it to be reused for cooling purposes. The closed circuit design is much more water efficient because the water is used a number of times before it is blown down (higher recycle rates). The recycle rate in the CW system is managed by optimising Cycles of Concentration (CoC).

Blowdown from the CW system is not lost from the overall system, but it is cascaded to the ash water system where it is used for ash conveyance or dust suppression.

6. Recovery and reuse of ash water

At Eskom power plants, ash disposal to the ash disposal facilities is achieved via wet ashing handling systems (conveyance of ash slurry to the ash dam is via slurry pipes) or via dry ashing handling systems (conveyance of ash to the ash dump is via a conveyer belt).

Wet ash handling systems are closed circuits where water is recovered from the ash dam via penstocks and reused to convey ash from the plant to the ash dam. This system allow for the ash water to be recycled and thus contribute to conserving water. The recirculating ash water is lost through evaporation, seepage and absorption on the ash. Make-up to the system is via CW blowdowns, water treatment of effluent, storm-water runoff and make-up from station drains.

At some stations (e.g. Duvha), ash water could be recovered through a clarifier (provided the quality permits) and reused as makeup to the cooling system.

7. Recovery and reuse of station drains

Water losses from the water systems on the power block result mainly from overflows, drainages, leaks, flushing and cleaning of systems. This water is collected in a network of drains and channelled to the station drains dams. If the water quality permits, the water is recovered to the CW system. Otherwise the water is used as make-up to the ashing system (wet ashing system) or for dust suppression (dry ashing system).

8. Recovery of treated mine water

To reduce the intake of fresh water at Tutuka and Lethabo Power Station, polluted water is being sourced from nearby tied mined, desalinated together with the station and used to augment the fresh water supply. Total amount of mine water recovered to Tutuka and Lethabo is approximately 8 Mm^3/a. Water recovered from the mine help offset raw water use.

9. Recovery of treated sewage water

Most of Eskom coal fired power stations (10 of the 13 station) treat and recover sewage water for reuse in their operations. Total amount of sewage water reuse is approximately 5 Mm^3/a.