



REPUBLIC OF SOUTH AFRICA

1.1.1 Remix: Demonstration Plant for Energy Efficient Desalination

1.1.1.1 Introduction & Background

A study was conducted to review the water demand in the eThekweni region and was found that the water demand will exceed the water supply in 2018. The situation is worsened by the current drought that is being experienced countrywide which is producing lower dam yields and thus putting pressure on the water supply system. The growing demand of water supply and the drought situation would require a sustainable solution to address the water supply issues. In response to this, EWS is investigating technologies available to implement in the city, one of them being the Remix Water System, an energy-saving and environmentally friendly desalination technology.

A remix water system consists of a combination of seawater and treated effluent from a wastewater treatment that is treated through the use of membrane bioreactor technology. The Central Wastewater Treatment Works has been identified as the ideal location of the remix treatment plant because of its close proximity to the sea. A demonstration treatment plant with the capacity of 6.25 ML/day has been planned to be constructed at the site to test the technology. When the demonstration plant has been successfully implemented, the remix treatment plant will be upgraded to a capacity of 100ML/d to provide 50ML/d to the inner city and 50 ML/d to the South of Durban.

Hitachi currently has one operational Remix plant in Kitakyushu City, Japan. EThekweni Municipality representatives visited the plant and following on from further discussions, a pre-feasibility and feasibility studies have been conducted for a demonstration plant to be implemented in the City of Durban. The purpose of the small scale demonstration plant is to demonstrate the new Remix technology and highlight the practical advantages of the system. Hitachi has received funding from NEDO to conduct these studies. The project will see a demonstration plant using energy saving environmentally friendly desalination technology, referred to as the Remix Water system, funded by NEDO.

1.1.1.2 Project Area

The demonstration plant will be located at the Central Wastewater Treatment Works to take advantage of the close proximity to the sea and also to use the existing infrastructure (Figure 6.8).

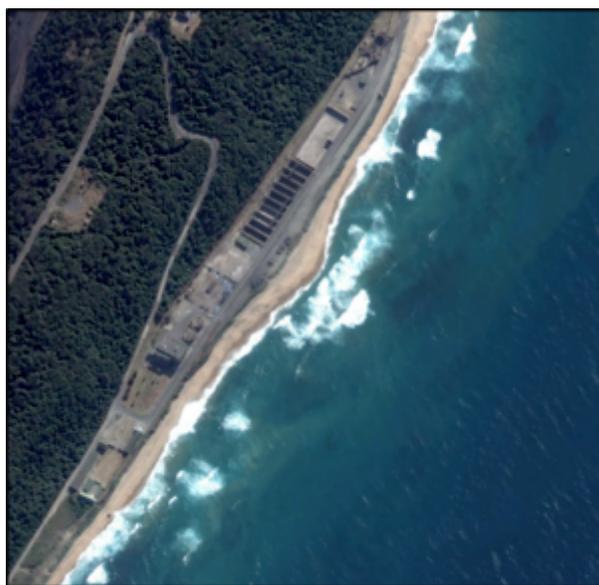


Figure 1: Location of the proposed Remix plant (Central wastewater treatment works)



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1.1.1.3 Technology

The Remix desalination technology is the combination of water reuse process and the reverse osmosis desalination process as indicated in the figure. The remix plant relies on membrane technology for ultrafiltration (UF) and reverse osmosis (RO) treatment units. The first remix desalination plant commenced operations in December 2010 at Kitakyushu, Japan. The current plant capacity is about 1.4 MLD and currently supplies process water to Kyushu Electric Power Company in Japan.

Using a membrane process allows for a continuous supply of stable water quality. Although this process has been developed fairly recently, the ability to continuously operate this system for over 2 years has been verified at the Kitakyushu remix plant. Utilising this system allows pump power energy efficiency to be maximised by reducing the amount of sewage treatment water and salt concentration in the SWRO raw water (Figure 6.9).

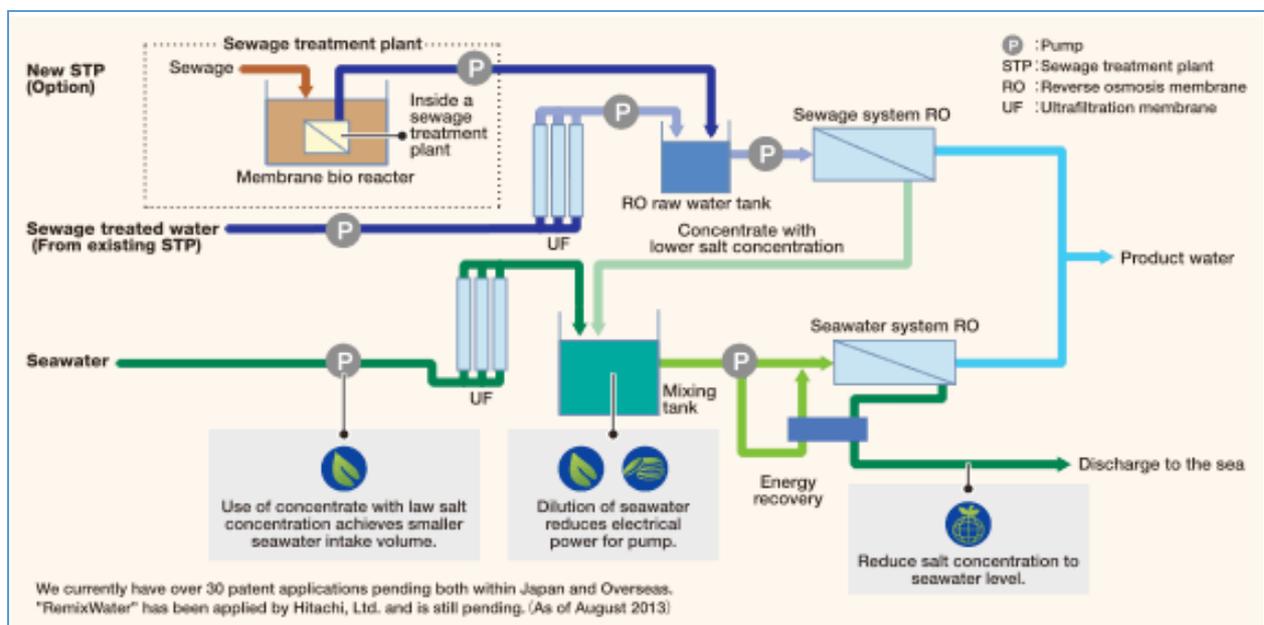


Figure 2: Schematic of a Remix system:

1.1.1.4 Implementation Plan

The project has Design, Build, Operation and Maintenance components with training and troubleshooting workshops for all internal parties with a vested interest in the demonstration plant.

1.1.1.5 Budget

The demonstration plant will be funded by NEDO with Hitachi, as the implementing agent, bearing the costs of operating and maintaining the demonstration plant.

1.1.1.6 Challenges

- The duration of the EIA process can be affected by public participation and objections which will affect the project timeline.
- Environmental sensitivity of the surrounding area.
- SA water quality guidelines/standards do not adequately cover biological active compounds that need to be removed or monitored for water reuse.
- New legislation around requirements for a Coastal Water Discharge Permit.
- No condition assessment of the existing outfall.