Reverse Osmosis & Desalination

At a Glance

What is it?

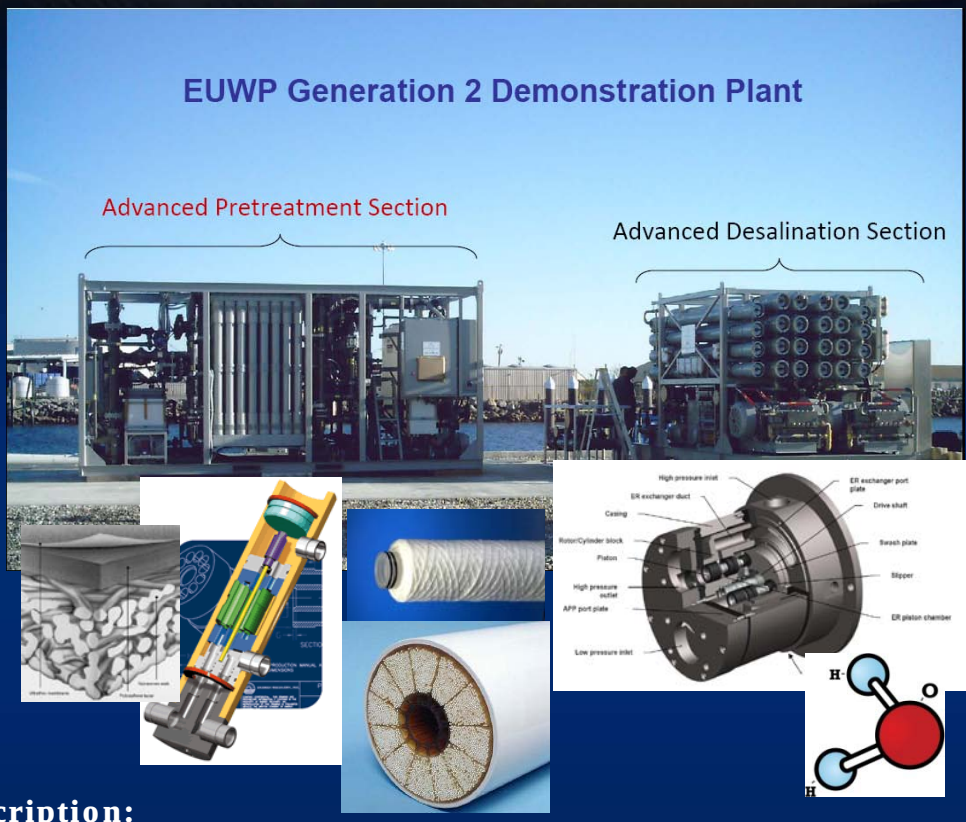
Reverse Osmosis (RO) is a low energy method to produce fresh water for sailor consumption and machinery needs. The RO system also include the removal of particulate matter from seawater as well as sanitize the water for injection into a ship board piping system.

How does it work?

Reverse Osmosis uses hydraulic pressure to force fresh water through a semi-permeable membrane, while the remaining brine is rejected overboard.

What will it accomplish?

The use of Reverse Osmosis offers the opportunity to save 65% of the energy required for desalination by distillation units, with further reduction being investigated under an ONR FNC program beginning 2010



Metrics:

- Potential fuel Savings: 550 barrels per DDG per year

Applications:

- Surface Combatants
- Submarines
- Amphibious
- Carriers
- Auxilliary

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Description:

Reverse Osmosis (RO) is a technique that uses hydraulic pressure to force fresh water through a semi-permeable membrane, leaving concentrated salt water behind. The RO system also removes particulate matter from seawater, providing fresh water in both turbid water as well as the open ocean.

Although RO is a tremendous energy savings when compared with distillation techniques, additional efforts are ongoing to improve the system through additional minimization of energy requirements and longer-lasting, higher-performance components. Several of these new efforts include energy recovery from the rejected brine stream, membrane prefiltration for enhanced operation in the littorals, and improved environmental stewardship through the reduction of replaceable parts.

Benefits:

Compared with distillation systems, Reverse Osmosis offers a 65% energy reduction, with additional reductions being investigated. Current research efforts into energy recovery, enhanced system operation, and prefiltration techniques offer the potential of additional savings, with energy requirement objectives of 10-15kWh/ 1000 gal, a savings of 98% when compared with distillation processes.