

Procter and Gamble

COMPANY BACKGROUND



Founded in 1837, Procter and Gamble is now one of the world's largest companies. Procter and Gamble makes many well known household and personal products, and employs over 138,000 people worldwide. The Iowa City site has traditionally been responsible for making shampoos and conditioners, as well as Scope® mouthwash. Shampoo and conditioner brands produced at Iowa City include Head and Shoulders® and Clairol Herbal Essence®. Recently the plant has expanded to include Crest Pro Health® mouthwash as well as Gillette® and Oil of Olay® body washes.

ALEX POSS

CHEMICAL ENGINEERING, UNIVERSITY OF IOWA



PROJECT BACKGROUND

The main goal of the pollution prevention internship was to investigate water reduction and reuse possibilities. Other projects identified included investigating the potential to use renewable energy onsite.

INCENTIVES TO CHANGE

In 2007, Procter and Gamble launched a global initiative to reduce carbon dioxide emissions by 10%. Procter and Gamble also committed to 10% reductions in water, energy, and solid waste. Goals have been set for each Procter and Gamble plant

to achieve this reduction by fiscal year 2011-2012. For the Iowa City site, water has been identified as one of the key areas for improvement.

RESULTS

Wastewater Reuse: A recently constructed onsite wastewater treatment plant uses city water at several different places in order to blend with chemicals being added to the system. Rather than use city water, it is possible to reuse water that has already been through the treatment process. Using the effluent from the wastewater plant rather than city water will provide large water savings.

RO Optimization: The three reverse osmosis units used at the plant are currently being increased from 75 percent recovery to 80 percent recovery. A study was undertaken to determine if an 85 percent recovery was possible. Based on Reverse Osmosis System Analysis (ROSA) software results, 85 percent recovery has been shown to be obtainable. This will greatly reduce the amount of water used in the RO systems.

Also noticed in the process of optimizing the RO system is that the current antiscalant provider for the company is using a large amount of chemicals to control scaling. A quote from another antiscalant provider showed the potential to drastically reduce the amount of chemicals necessary to control scaling. A large saving in chemical usage can be seen by switching antiscalant providers.

Another savings potential for the RO system is to use a variable frequency drive on each of the three RO feed pumps. These 75 hp pumps are currently boosting the pressure much higher than necessary. The pressure is then throttled down to achieve the necessary osmotic



pressure for separation. Using a variable frequency drive on each pump can reduce the electrical consumption by 50 percent.

Reject RO Reuse: The next step in optimizing the performance of an RO system is to reuse the reject water being produced. The plant factory feed system was identified as the best area for reuse of this water. Before the water can be reused here, it must first be treated to prevent scaling in equipment throughout the plant. Several treatment methods were investigated. Lime softening or a magnetic treatment system would potentially be able to eliminate scaling. More research needs to be done to determine the best possible option.

Tank Farm Washout Reduction: Cleaning occurs on a regular basis throughout the plant's tank farm. Currently, hot reverse osmosis water is used to clean at four different washout stations. Each station has a hose that uses large amounts of water. It was identified that by using nozzles, a 75 percent reduction in water use could be seen.

AIR POLLUTANTS DIVERTED IN TONS

Total for all sectors	
SO ₂	1.53
CO	0.90
NO _x	0.88
VOC	1.40
PM	0.074

GREEN HOUSE GASES DIVERTED IN TONS

(CO₂ Equivalent)

Total for all sectors	
CO ₂	451.13
CH ₄	1705.88
N ₂ O	892.42
CFC	4.88

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
WASTEWATER REUSE	\$44,000	4,000,000 GALLONS	IMPLEMENTING
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SWITCH ANTISCALANT PROVIDERS	\$54,537	4,170 KG OF CHEMICAL	RECOMMENDED
RO PUMP REPLACEMENT	\$17,500	350,000 KWH	RECOMMENDED
RO REJECT REUSE	\$201,300	18,300,000 GALLONS	RESEARCHING
TANK FARM WASHOUT REDUCTION	\$10,125	337,500 GALLONS	IMPLEMENTING