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From Design to Operation of a 2 Mgal/y (20 m³/d) Membrane-based Ethanol Dewatering System

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Energy is the largest cost component in the production of fuel ethanol which is completely under the control of the plant designer / operator. The SiftekTM membrane technology can reduce the energy required for ethanol distillation/dehydration by up to 50%, because dewatering is done in the vapor phase, without phase change, and in a continuous process.

SiftekTM is a novel polymeric hollow fibre membrane made of a proprietary polyimide blend that offers high water/ethanol selectivity and water permeance. The water/ethanol vapor mixture is fed to the membranes at a total feed pressure of 120 to 140 kPa (3 to 6 psig) and temperature of 105 to 115 C°. Water is removed under a gradient established by applying a vacuum on the permeate side. The water permeate stream is condensed and the steam latent heat is recovered.

The SiftekTM technology has been piloted since August 2006 in a Greenfield Ethanol plant in Tiverton, Ontario, Canada and early results were presented by Côté *et al* (2006). The Tiverton unit has a capacity of 1 m³/d (0.1 Mgal/y) and has been producing fuel ethanol from a feed containing between 80-90wt% ethanol in a single stage system.

Based on the successful operation of the pilot, it was decided to scale-up the technology. A two-stage membrane system with a capacity of 20 m³/d (2.0 Mgal/y) was built for the Greenfield Ethanol plant in Chatham, Ontario, Canada. The unit is equipped with full-scale commercial membrane modules and capable of treating a beer-column feed containing 50-60 wt% ethanol to produce >99wt% fuel-grade ethanol. Installation and commissioning are planned during winter 2008.

This presentation will include a review of the lessons learned from the Tiverton pilot, the design and integration of the demonstration unit into the Chatham plant, and early operating results.

Côté, P.L., Roy, C., Bernier, N., Schwartz, M., Kazmir, M. and Shamash, R., "Field Demonstration of the SiftekTM Membrane for Ethanol Production", 2007 Fuel Ethanol Workshop, St-Louis, June 26-29, 2007

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