



ALTA PROCESS SOLUTIONS

AFFILIATED TO ALTA ENERGY SOLUTIONS CORPORATION

ALTIUS CENTRE – SUITE 2500 – 500 4th AVE SW CALGARY, AB, T2P 2V6 CANADA

INFO@ALTAENERGY.CA | WWW.ALTAENERGY.CA | WWW.ALTAPROCESS.CA

SCIENTIFIC & RESEARCH PROJECTS

Project No.: 07 **Year:** 2009

Project Field: Water & Wastewater

Publisher: Research Journal of Environmental Sciences, USA, No. 3, pp. 604-618, 2009

Project Title:

Simultaneous Energy and Water Minimization – Approach for Systems with Optimum Regeneration of Wastewater

Abstract:

In this study, a new systematic design methodology has been developed for the simultaneous management of energy and water systems that also feature optimum regeneration of wastewater. In addition to allowing regeneration of wastewater, issues about heat losses inside unit operations have also been incorporated in the simultaneous management of water and energy. To implement such a design, two new design aspects are introduced. New method for non-isothermal mixing points identification and new separate system generation. The first aspect involves non-isothermal mixing, which enables direct heat recovery between water streams and therefore allows the reduction of the number of heat transfer units. An NLP model is formulated to identify feasible non-isothermal mixing points in the network regarding minimum operation cost, which satisfy minimum freshwater and utility requirements. The other aspect is the generation of separate system in heat exchanger network design. The flexibility of mixing and splitting of water streams allows separate systems to be created as a cost-efficient series of heat exchanger units between freshwater and wastewater streams. The new design aspects have been illustrated with a case study. The results demonstrated 56% of freshwater, 62% of hot utility, 100% of cold utility, 67% of number of heat transfer units and 60% of total cost saving relevant to the conventional design method.