



SCIENTIFIC & RESEARCH PROJECTS

Project No.: 04 **Year: 2016**

Project Field: Combined Heat & Power / Co - Generation

Publisher: Applied Thermal Engineering, Vol. 107, pp. 1324-1333, 2016

Project Title:

Energy Conservation in Methanol Plant Using CHP System

Abstract:

Today, the efficient use of energy is a significant critical issue in various industries such as petrochemical industries. Hence, it seems essential to apply proper strategies to reduce energy consumption in such processes. A methanol production plant at a live Petrochemical Complex was selected as the case study in this research. The plant was first evaluated with combined pinch and exergy analysis from exergetic dissipation point of view. Owing to high temperature and pressure of reactor outlet stream, methanol synthesis reactor products contain considerable content of exergy. For the purpose of the present survey, the available content of exergy was used for power production by integrating a turbine expander with methanol reactor product. Utilization of reactor product's high pressure in turbine reduces the temperature of turbine outlet stream to levels lower than those required for heating demands of existing streams in methanol synthesis cycle. Therefore, to keep the stream thermally balanced, the required hot utility of the process is increased and to compensate this increase, the heat exchanger network of the process was retrofitted based on pinch analysis concepts. The results showed that in gas turbine integrated scheme, approximately a net power of 7.5 MW is produced. Also, the total investment of turbine, compressor and heat exchangers area equals to 18.2×10^6 US\$, and the annual saving value is about 6.1×10^6 US\$/y. Based on economic data, payback period is estimated to be 3 years.