



Industries of the Future-West Virginia

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PPG Industries

Project Partners:
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U.S. DOE Industrial Technologies Program— Technology Delivery Plant-wide Assessment at PPG Industries, Natrium, WV

Project Summary:

The PPG Natrium, WV Plant is a major producer of chlorine, caustic soda, and a variety of derivatives of these basic chlor-alkali chemicals. Chlorine and caustic soda are produced by electrolysis of sodium chloride brine in electrolytic cells. This highly energy-intensive process requires large amounts of electric power for electrolysis and large quantities of steam to concentrate the dilute caustic soda. The PPG Natrium Plant is one of the Top 5000 industrial energy consuming facilities in the U.S. according to the Department of Energy. These chemicals are very important economically, with chlorine and caustic soda representing the 8th and 9th largest-volume chemicals produced in the U.S. This project represents the first DOE-supported plant wide energy assessment of a chlor-alkali plant.

This project builds on the results of a preliminary energy assessment conducted by PPG staff and the West Virginia University (WVU) Industrial Assessment Center during the first half of 2004. Two process units whose combined annual energy consumption represents less than 5% of total plant energy consumption were selected for this preliminary assessment because their relatively compact size enabled a thorough study in the limited time available for this study, and because the types of unit operations and equipment used in these processes are representative of the overall plant. This study resulted in nine assessment recommendations with estimated energy savings totaling over 74 billion Btu/yr valued at over \$250,000 annually, and having simple payback periods from 6 to 37 months. Similar opportunities are expected to be found across the plant during the plant wide assessment.

The project team will examine the entire Natrium Plant for energy efficiency opportunities, including both process and utility areas. The plant generates all of its steam requirements and most of its electricity needs on-site. The plant also purchases significant amounts of electricity and natural gas. The plant energy system is complex, and is highly integrated with production operations. The project team will review not only the individual utility systems but also the overall plant energy system and operating strategy.

The team will utilize a “Systems Approach to Plant-Wide Assessment” methodology that was developed by WVU team members during an earlier plant wide assessment. The Natrium Plant assessment will provide the first opportunity to validate and refine this Systems Approach. Best-Practices tools and software developed by DOE’s Industrial Technology Program will also be used where appropriate. WVU team members have extensive experience in applying these tools in numerous Industrial Assessment Center projects. The team will also use “Pinch” techniques to determine the minimum practical energy requirement of various process units, and to evaluate opportunities for optimization of heat exchange networks and process integration.

PPG will replicate successful projects in their Lake Charles, LA plant, which produces over 2.5 times the chlorine and sodium hydroxide produced at Natrium. PPG is the third largest chlor-alkali producer in the U.S., with Natrium and Lake Charles represent 12.6% of total U.S. industry capacity. Thus, the potential for savings across the industry through replication of the findings from this assessment is significant.