Verso Paper Corp.

Final Scientific/Technical Report
June 2012

Award Number: DE-EE0002727
Project Title: IMMEDIATE DEPLOYMENT OF WASTE ENERGY RECOVERY TECHNOLOGIES AT MULTI SITES
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Executive Summary:

Verso Paper Corp. implemented a portfolio of 13 commercially available proven industrial technologies each exceeding 30% minimum threshold efficiency and at least 25% efficiency increase. These sub-projects are a direct result of a grant received from the Department of Energy (DOE) through its FOA 0000044 (Deployment of Combined Heat and Power (CHP) Systems, District Energy Systems, Waste Energy Recovery Systems, and Efficient Industrial Equipment), which was funded by the American Recovery Act. These were installed at 3 sites in 2 states and are helping to reduce Verso costs, making the facilities more competitive. This created approximately 100 construction jobs (FTE's) and reduced impacted Verso facilities' expense budgets. These sub-projects were deployed at Verso paper mills located in Jay, Maine, Bucksport, Maine, and Sartell, Minnesota. The paper mills are the economic engines of the rural communities in which these mills are located. Reinvestment in waste energy recovery capital improvements is providing a stimulus to help maintain domestic jobs and to competitively position the US pulp and paper industry with rising energy costs. Energy efficiency improvements are also providing a positive environmental impact by reducing greenhouse gas emissions, the quantity of wastewater treated and discharged, and fossil fuel demand.

As a result of these projects, when fully operating, Verso realized a total of approximately 1.5 TBtu/Year reduction in overall energy consumption, which is 119% of the project objectives. Note that three paper machines have since been permanently curtailed. However even with these shutdowns, the company still met its energy objectives. Note also that the Sartell mill's paper machine is down due to a recent fire which damaged the mill's electrical infrastructure (the company has not decided on the mill's future).

Summary of Accomplishments:

This project resulted in a reduction of approximately 1.5 TBtu/Year in overall energy consumption, which exceeded project objectives by 19%. Below is a breakdown of technologies utilized and estimated savings for each of the three facilities involved.

- Jay, Maine:
  - This facility achieved approximately 0.6TBtu/year in annual energy savings.
  - These are the result of 4 sub-projects which were implemented at the facility.
  - Brief description of the sub-projects
    - A combination of pumps, screens, filters and associated piping and controls were installed on 3 paper machines in effort to displace cold river water (which requires steam to heat) with warm paper machine white-water for use on paper machine showers. This eliminated the sewering of this warm white water.

        - A new flash tank and associated pumps, piping, and controls were installed for one of the Kraft pulping processes. This allowed for a higher amount of heat to be reclaimed into the cooking process thus reducing the amount of steam required.
        - Two sub-projects involved the replacement of antiquated paper machine paper dryer drainage systems. The new systems are much more efficient, thus reducing the amount of fresh steam required to dry the paper. These were installed on two separate machines.
- Bucksport, Maine:
    - This facility achieved approximately 0.6 TBtu/year in annual energy savings.
    - These are the result of 3 sub-projects which were implemented at the facility.
    - Brief description of the sub-projects
        - A combination of pumps, screens, filters and associated piping and controls were installed for 4 paper machines in effort to displace cold river water (which requires steam to heat) with warm paper machine white-water for use on paper machine showers. This eliminates the sewering of this white water.
        - A non-functioning Thermo Mechanical Pulp heat recovery system was replaced with a new heat recovery system comprised of a heat exchanger, pumps, tanks, piping and controls. The heat recovered is utilized to preheat the demineralized water and condensate flowing to the power plant, thus reducing the amount of steam required to heat this water.
        - Air to liquid heat exchangers and associated pumps, tanks, piping and controls were installed to recover the heat from the exhaust of 3 paper machines. The heat recovered from these heat exchangers is utilized to heat the warm water to the paper mill thus reducing the amount of steam required to heat this water.
- Sartell, Minnesota:
    - This facility achieved approximately 0.3 TBtu/year in annual energy savings.
    - These are the result of 6 sub-projects which were implemented at the facility.
    - Brief description of the sub-projects
        - A poorly functioning Thermo Mechanical Pulp heat recovery system was replaced with a new heat recovery system comprised of a heat exchanger, piping and controls. The heat recovered is utilized to heat some of the process air to the paper machine and used to supply building heat in the winter months.
        - A heat exchanger and associated piping and controls were installed to capture the heat from the exhaust water from several water ring vacuum pumps. The heat will be recovered and used to preheat the water to the paper machine, thus reducing the amount of steam normally used to accomplish this. (note that these were damaged in the recent fire).
        - Ductwork and controls were installed in two of the paper machine exhaust stacks and used to preheat the air supply to the paper machine. This reduced the amount of steam used to heat this air.
        - Heat exchangers and associated controls were installed to capture the heat that is exhausted from the 5 mill air compressors. This heat is used to preheat some of the water to the paper machine, thus further reducing paper machine steam demand. In addition, an air compressor supervisory management system was installed to manage overall compressor use, thus reducing electricity consumption.

- The cooling water from a non-contact vacuum condenser is now collected using a tank, pump and associated piping and controls. This warm water is now used to heat the river water to the power plant, thus reducing steam use to heat same.
- In order to capture paper machine steam condensate that was currently lost to the sewer, a line was installed to collect same and route it to a condensate collection tank, thus improving the percentage of condensate that is captured in the mill. This resulted in the reduction of steam to heat the boiler feedwater.

Summary of Project Activities:

The project activities consisted of the following:

- Process engineers worked with operations personnel to complete the design of process flows and system design.
- Environmental engineers reviewed all the projects and submitted permit applications as required.
- Project engineers designed/specified equipment to achieve the objectives stated by the process engineers. These included pumps, tanks, heat exchangers, screens, filters, and controls and associated piping/ducting and wiring.
- Purchasing agents procured the necessary equipment and contracted with the construction companies necessary to complete the projects.
- Construction supervisors worked with the project engineers and contractors to complete the equipment installation
- Operations personnel started and commissioned the equipment
- Process engineers validated system performance.

Problems were encountered with vendor supplied equipment which impacted the performance of 2 sub-projects. Three alternative sub-projects were substituted.

Products Developed:

This project was focused on modifying the mill processes to create energy efficiency improvements. There were no products developed by this project. There were also no publications, Web sites, patents or inventions created by these projects.

Computer Modeling:

This project did not involve computer modeling.