

## **Green Procedure for Energy and Emission Balancing of Alternative Scenario Improvements for Cogeneration System: A Case of Hardwood Lumber Manufacturing Process**

**Authors :** Aldona Kluczek

**Abstract :** Energy efficient process have become a pressing research field in manufacturing. The arguments for having an effective industrial energy efficiency processes are interacted with factors: economic and environmental impact, and energy security. Improvements in energy efficiency are most often achieved by implementation of more efficient technology or manufacturing process. Current processes of electricity production represents the biggest consumption of energy and the greatest amount of emissions to the environment. The goal of this study is to improve the potential energy-savings and reduce greenhouse emissions related to improvement scenarios for the treatment of hardwood lumber produced by an industrial plant operating in the U.S. through the application of green balancing procedure, in order to find the preferable efficient technology. The green procedure for energy is based on analysis of energy efficiency data. Three alternative scenarios of the cogeneration systems plant (CHP) construction are considered: generation of fresh steam, the purchase of a new boiler with the operating pressure 300 pounds per square inch gauge (PSIG), an installation of a new boiler with a 600 PSIG pressure. In this paper, the application of a bottom-down modelling for energy flow to devise a streamlined Energy and Emission Flow Analyze method for the technology of producing electricity is illustrated. It will identify efficiency or technology of a given process to be reached, through the effective use of energy, or energy management. Results have shown that the third scenario seem to be the efficient alternative scenario considered from the environmental and economic concerns for treating hardwood lumber. The energy conservation evaluation options could save an estimated 6,215.78 MMBtu/yr in each year, which represents 9.5% of the total annual energy usage. The total annual potential cost savings from all recommendations is \$143,523/yr, which represents 30.1% of the total annual energy costs. Estimation have presented that energy cost savings are possible up to 43% (US\$ 143,337.85), representing 18.6% of the total annual energy costs.

**Keywords :** alternative scenario improvements, cogeneration system, energy and emission flow analyze, energy balancing, green procedure, hardwood lumber manufacturing process

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