

**B5 K H97 % !' ) ) ,**

## **SUSTAINABILITY IN ENERGY FROM BROWARD COUNTY'S WASTE TO ENERGY PLANTS**

**Dr. Ram Tewari, P.E.**  
**Waste and Recycling Services**  
**1 North University Drive**  
**Plantation, FL 33324**  
**Telephone: (954) 577-2394**  
**E-Mail: [rtewari@broward.org](mailto:rtewari@broward.org)**

**Jairaj Gosine**  
**Wheelabrator South Broward, Inc.**  
**4400 S State Rd. 7**  
**Ft. Lauderdale, Florida 33314**  
**USA**  
**Telephone: (954) 581-6606**  
**E-Mail: [jgosine@wm.com](mailto:jgosine@wm.com)**

**Scott McIlvaine**  
**Wheelabrator North Broward, Inc.**  
**2600 Wiles Road**  
**Pompano Beach, Florida 33073**  
**USA**  
**Telephone: (954) 971-8701**  
**E-Mail: [smcilvai@wm.com](mailto:smcilvai@wm.com)**

### **ABSTRACT**

Sustainability and Going Green have been the recent buzz words in the solid waste management field. These two words have an ongoing impact on planning (for either a new project or for refurbishment), performance, people, planet Earth and our quality of life. So the challenge for solid waste professionals is to optimize a balance among environment, natural resources and solid waste management technologies. This paper describes such a sustainability and greening effort through a public -

private partnership initiative for an integrated solid waste management for our two Broward County, Florida facilities. Water conservation and use of wastewater, experimental use of waste (sludge) from water treatment plants, continuous quality improvement by monitoring, process optimization and design approaches are some of the on-going areas where efficiencies are being realized.

## INTRODUCTION

This paper describes the existing facilities that are undergoing sustainability initiatives in Broward County. Water conservation and use of wastewater, minimize waste and maximize recycling, improve air quality, support energy conservation, conserve wildlife and habitat, promote sustainability through our supply chain, continuous quality improvement by monitoring, process optimization and design approaches are some of the on-going areas where efficiencies are being realized. These initiatives are directly related to Waste Management Inc.'s (WMI) environmental plan that will serve as a platform for sustainable growth between now and 2020.

The two Waste to Energy (WTE) facilities in Broward County that are undergoing sustainable growth are our North and South Broward facilities. Broward County and WMI are also heavily involved with both plants in moving this initiative forward on a sustainable growth platform.

## AREAS OF FOCUS FOR SUSTAINABLE GROWTH

The areas of focus are as follows:

- Waste and Recycling
- Water Conservation and Recycling
- Energy
- Air Quality
- Conservation of Natural Resources
- Wildlife and Habitat Conservation
- Supply Chain

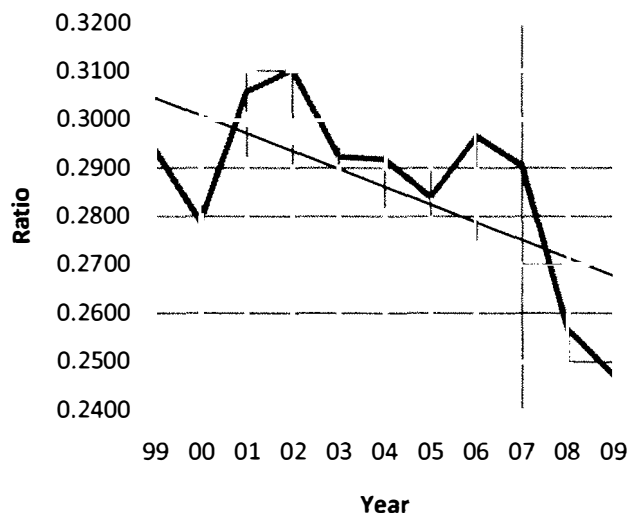
These areas of focus are being worked on a very integrated level with the involvement of the Wheelabrator, WMI, the county, and our major suppliers.

## WASTE AND RECYCLING

Wheelabrator South Broward (WSB) has initiated a single stream recycling initiative in conjunction with Waste Management Recycle America (WMRA).

This has reduced our internally generated waste by approximately 0.5 tons per week due to recycling and demand reduction. The major issue encountered here is the people's adaptation to this new sustainable cultural shift but as we progress through this initiative, the employees' awareness is improving.

Metal recovery is a very big part of our sustainable growth as these systems provide increased revenues to the facility, increased facility recycling rates, and a decrease in the quantity of ash disposed of at a sanitary landfill. Each facility has invested or is investing capital in the range of five to six million dollars on these post combustion systems which will increase the WSB's ash monofill life by approximately three (3) years while increasing air space utilization. The decrease in ash production is illustrated in Figure 1.



**Figure 1: Tons of Ash to Monofill to Tons of Trash Processed**

It should be noted that there has been a significant decline since the metal recovery system came full on line in 2008.

WSB has also invested in a compact front end loader that is utilized on our tipping floor to remove bulk pre-combustion metal before the fuel is fed to our

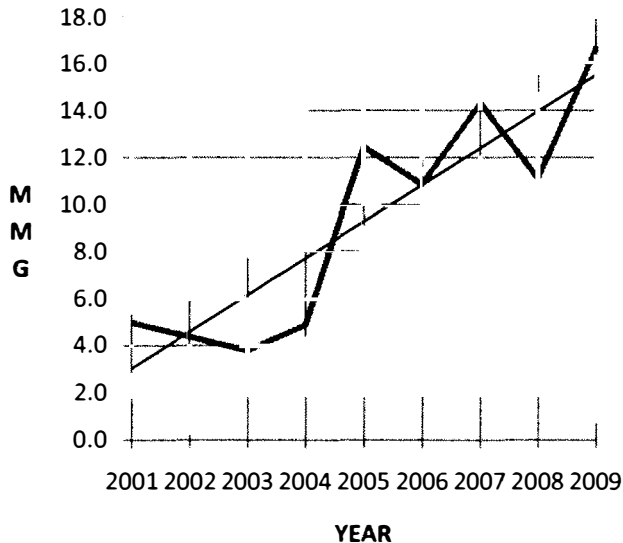
boilers. This recycling activity has increased in consecutive years as shown in Table 1.

Year	Pre-Combustion Recovery (Tons)
2007	229
2008	318
2009	359

**Table 1: Pre-combustion Recovery**

**WATER CONSERVATION AND RECYCLING**

These facilities were built for zero wastewater discharge so that all rain water collected are re-used in the ash quenching and spray drying processes. At WSB, the major water used for these processes though, comes from our leachate collection system. This prevents the use of city water, saves on discharges to the county’s wastewater treatment plants and is a tremendous fiscal savings to the county and the company. Figure 2 reflects the usage of leachate in millions of gallons (MMG) at the facility for the last ten years.



**Figure 2: Leachate to Plant**

Figure 2 clearly indicates a significant increase in the usage of leachate for the last ten years.

Both facilities are also sustainable in their major cooling processes. At WSB, the facility utilizes an Air Cooled Condenser to cool the exhaust from the turbine for reuse in the system while at our North facility, they have a 1.55 million gallons per day cooling tower that utilizes tertiary water. The reuse of this tertiary water has a positive impact on the Florida Biscayne Aquifer.

**ENERGY**

WSB embarked on an energy conservation initiative by utilizing the Kaizen process. A Kaizen Blitz (or Kaizen Event) is a focused, short-term project to improve a process. The idea was to reduce costs, drive reductions in Greenhouse Gas Emissions (GHGs) and improve overall operations at WSB. WSB partnered with WM Green Squad and General Electric (GE) in moving forward with this project. The Kaizen teams focused on lighting and electrical, overhead cranes, motors and drives, compressed air and HVAC systems.

The process identified forty seven (47) opportunities that turned into short term and long term projects. The results from this process showed that we could produce 25,000 fewer metric tons of CO<sub>2</sub> and save approximately \$862,000 if all projects were implemented. The “just do it” projects are completed such as compressed air audits, some lighting and photo switches replacement, operational adjustments and motor replacement.

A proposed Metal Recovery System at WNB will incorporate building designs that use natural lighting, energy efficient light systems and motors.

Planning is underway for some of the more technical projects while some are being re-evaluated by our engineering group. Overall, this process gave us some good cost saving energy and operational ideas and an increased team awareness and enthusiasm for energy reduction. The overall potential impact for this project is equivalent to eliminating 4,806 cars or planting 6,819 acres of trees. (WM Green Squad, 2008).

## AIR QUALITY

Our plan also focused on the reduction of acid gases by process optimization. The first phase was to reduce the sulfur oxide emissions. The sulfur oxide emissions are removed from our flue in the spray drying process by its reaction with an atomized calcium hydroxide slurry. To reduce the emissions, we would have had to use more calcium oxide in our slaking process to form the slurry which in turn would have driven up the CO<sub>2</sub> emissions in the manufacture of the calcium oxide.

Both facilities decided to supplement its use of the calcium hydroxide slurry with a waste carbonate/bicarbonate slurry product from water treatment plants. This product would have otherwise been land-filled. This has helped us reduce emissions as shown in Figure 3. There has also been a fairly good saving of approximately \$250,000 per year in material costs.

	2007	2008	2009
SO <sub>2</sub> lbs/ton MSW processed	.35	.33	.27

**Table 2: SO<sub>2</sub> Lbs per Ton MSW Processed**

The facilities are also working with the corporate group to fully realize the company goal of GHGs reduction by completing the energy saving projects and participating in the WMI's GHG Inventory Program.

## CONSERVATION OF NATURAL RESOURCES

Wheelabrator North Broward (WNB) currently uses reclaimed water for cooling water purposes throughout the plant at the rate of 1.55 million gallons per day. To enhance our Sustainability Programs, WNB is installing a 200 GPM reverse osmosis system to treat Broward County reclaimed (tertiary) water, so reclaimed water can be used as process water throughout the facility. Our current demineralizer system will remain as a polisher for boiler water. This system will treat tertiary water removing chlorine, minerals, and other impurities, so

it can be used in the boiler system. It is estimated that this project will save an additional 50 million gallons of water per year that is currently pulled from the Florida Biscayne Aquifer.

The project takes advantage of the environmental benefits of using reclaimed water for process water purposes as well. The use of excess reclaimed water that would otherwise be injected into the local waterways reduces the nutrient loads in the bays and rivers. Areas of the plant that currently use city water that can be substituted with RO treated reclaimed water are: boilers, slakers, ash conditioning, SNCR system, and general plant wash down water. This project will save an estimated \$250,000 per year in electrical and chemical costs.

WSB will also install an RO system utilizing city water with the savings in chemical costs. Also, the replacement of the calcium oxide with the waste carbonate/bicarbonate product will provide the supplier the opportunity to reduce mining of the naturally occurring calcium carbonate.

## WILDLIFE AND HABITAT CONSERVATION

Today, Waste Management facilities across North America provide more than 24,000 acres of protected land for wetlands and wildlife habitat. A total of 73 Waste Management locations have received Wildlife Habitat Council's (WHC's) Wildlife at Work certification; 14 of these have also received Corporate Lands for Learning certification. In addition, the company was recognized in 2006 as the first organizational recipient of the Wildlife Habitat Council's President's Award, and in 2008 became the first recipient of WHC's William W. Howard C.E.O. Award, recognizing the company's efforts in conservation, education and outreach.

Together with Broward County and WMI, Wheelabrator is committed to preserving approximately eighty (80) acres in and around our facilities to support the wildlife that use the ponds and grounds as a natural resting place in their annual migration cycle.

## **SUPPLY CHAIN**

Both facilities are interested in partnering with suppliers who share our concern for the environment and are committed to reducing the impact of their operations on the environment as well. We share with each supplier our base information about the impact of operations on the environment, and the steps and/or goals that can be taken to reduce these impacts. The purchasing group is constantly working to find sustainable suppliers and then sign long term contracts with them. Some examples are illustrated in the following paragraphs.

In WMI procurement process, we ask the supplier base about their sustainability strategy. Through this process, we uncover some interesting approaches to sustainability. For example, WMI's uniform service provider is focused on the reduction of energy and water consumption. They have been able to reduce electricity, natural gas and water usage by 5% each of the last five years by installing mechanical upgrades and implementing process improvements recommended by a group of engineers who work on their energy conservation projects.

Another supplier of mechanical services, who owns and operates several warehouses throughout the

country, has built a new materials warehouse facility in Newburyport, MA with skylights throughout reducing the amount of time that lights need to be in use, and installed a rain water collection system to be used in the irrigation of the facility. The contractor has also installed motion sensors that control lighting in all work areas of its facilities nationwide and established a car pool program for its employees.

For maintenance and repair products, WMI aligns with suppliers who share our concern for the environment. We expect our preferred suppliers to evaluate the products we use and make recommendations for improvement. As a result of this approach, we have replaced absorbents, lubricants, degreasers, and cleaners used in our plants with products that are environmentally friendly and sustainable.

## **SUMMARY**

Sustainability in the Waste to Energy market is key to the future growth of this industry. Broward County, WMI and Wheelabrator are working together, and are committed to recycling, conserving our natural resources such as water, improving air quality, conserving energy, minimizing our carbon footprint and sharing the land we use with nature.