2009 WASTE-TO-ENERGY EXCELLENCE AWARD NOMINATION

Lee County Resource Recovery Facility
Lee County Solid Waste Division, Florida
2009 WASTE-TO-ENERGY EXCELLENCE AWARD
NOMINATION FORM

Program/Facility Nominated:

Lee County Resource Recovery Facility

Contact Person Name & Title: Lindsey Sampson, P.R., Director

Address: 10500 Buckingham Road

City, State, Zip/Province, Postal Code: Fort Myers, FL 33905

Phone #: 239-533-8000 Fax #: 239-533-8025 Email: sampsolj@leegov.com

Nomination submitted by (if different than information listed above):

Name: Don Castro Phone #: 813-282-2404 Email: don.castro@hdrinc.com

If selected for an award, how would you like the name of the organization to read on the award (limit of 50 characters)?

Lee County Resource Recovery Facility

2009 Applications must be submitted to SWANA no later than Friday, April 3, 2009

*** PLEASE NOTE THAT ENTRY REQUIREMENTS HAVE RECENTLY CHANGED ***
See the attached Entry & Eligibility Requirements sheet for further information

Application Checklist (Please make sure the following items are included in your submittal packet):

- Completed nomination form with signed release statement (this page)
- 1 original hard-copy application binder
- 1 copy of your award submittal on a CD-ROM
- Executive Summary of your nomination (NO more than 200 words)
- At least 2 pictures of your operation (may be included in nomination text)
- Check (made payable to SWANA) for nomination fee (in U.S. dollars)

Please mail all application packages to:

SWANA
ATTN: Technical Programs Department
1100 Wayne Avenue, Suite 700
Silver Spring, MD 20910

Release Statement: I certify that the information provided in this application is accurate and correct to the best of my knowledge. SWANA reserves the right to publish the enclosed information. Nominations become the property of SWANA. My signature gives SWANA the right to reprint or make available for purchase any portion of this submittal.

Signature: Lindsey Sampson Date: 3/23/09
Executive Summary

“You don’t just throw it away. You try to get some value from the materials you collect.”

– Lindsey Sampson, PE
   Director, Lee County Solid Waste Division

With its state-of-the-art, recently expanded waste-to-energy plant adjacent to a material recovery facility that will convert to single-stream recycling in the near future, the Lee County, Florida, Solid Waste Division operates an advanced, integrated and environmentally responsible waste management system that coincides with the national initiative to build a future with no wasted resources.

Lee County was an early leader in the conversion of municipal solid waste into renewable energy. With a successful resource recovery facility disposing of 1,200 tons per day since 1994, population growth created a need to expand the facility. Completion of a 636 ton per day expansion in December 2007 provides Lee County with a facility that produces emissions well below Florida state limits, which are more stringent than federal Environmental Protection Agency (EPA) limits.

The significance of the Lee County expansion project as the first large new municipal waste combustion project completed in the United States in more than 10 years extends beyond Florida. It is a significant addition to an already well-designed Integrated Waste Management System.
1. Engineering Design Systems and Technologies

Communities across the United States face great challenges and great opportunities as they work to build a strong foundation for long-term economic growth and a clean energy future. A boost of interest in renewable energy is driving renewed interest in the transformation of solid waste into electricity. Combined with technological advancements that make waste-to-energy a clean and efficient way to deal with solid waste, the Lee County Resource Recovery Facility is a model for how communities can confront some of the toughest challenges facing us today. Completion of a 636 ton per day expansion project added 20 megawatts (MW) of renewable energy to the Florida grid.

System Overview

The original Lee County waste-to-energy facility includes two municipal waste combustion units with a 39 megawatt turbine generator completed in the 1990s. The expansion project added a stand alone turbine generator with 20 megawatts of capacity fueled by up to 636 tons of municipal solid waste per day. The expansion project recovers for sale approximately 600 kilowatt hours from each ton of waste that would otherwise be sent to a landfill. The facility also uses the effluent from a nearby wastewater treatment plant (reclaimed water) for all process water needs, including boiler makeup water, which saves millions of gallons of potable water every year.

The Lee County Resource Recovery Facility also captures a significant amount of ferrous and non-ferrous metals from the post-combustion process, which are sold to the metals marketplace, offsetting the need for additional mining and processing of ore and alloy metals. This is in addition to metals routinely collected and recovered from curbside collection of containers that are processed in the co-located Lee County Recovered Material Processing Facility.

Basic Design Criteria

The facility was designed to combust municipal solid waste to the permitted thermal limits of the three units based on 5000 Btu per pound reference fuel. The output electricity is sold to Seminole Electric, a Florida-based electric cooperative and moved across Florida Power & Light transmission lines. Lee County owns the high voltage interconnection equipment in the switchyard, which was expanded as part of the addition of the third combustion unit. The permitted limits are as follows:

- Units 1 and 2 are each permitted for 660 tons per day and maximum heat input of 275 MBtu per hour.
- Unit 3 (the expansion unit) is permitted for 660 tons per day and maximum heat input of 291.5 MBtu per hour.

Boiler steam conditions for all three units are 865 pounds per square inch (psia) at 830 degrees Fahrenheit superheat steam temperature. Each of the boilers are a four pass design, with evaporator, superheater and economizer sections following the furnace pass. Steam from the new boiler is conveyed to a stand-alone condensing turbine rated at 19.8 megawatts electrical (MWe) and condensed by cooling water from a cross flow cooling tower that uses reclaimed water as the makeup water source.

The third unit is interconnected electrically with the two original units at the 13.8 kV level so that any unit can support another unit for in-plant power requirements. The units are served by dual boiler feedpumps – one
electric and one turbine driven—with no mechanical interconnections (steam or water) between the original units and the expansion unit added in 2007.

**Martin and More: Technologies at Work**

The new unit’s furnace design uses Martin’s “four row stitching” concept to introduce overfire air and control carbon monoxide (CO) emissions. The furnace is four grate runs wide and 13 steps deep with residue removed through dual ram ash expellers. Overall the furnace is 32 feet wide with three levels of urea injection located on the side and front walls. The boiler includes two propane fired auxiliary burners for startup and shutdown operations. Flue gas from the boiler is treated in a conventional spray dryer absorber for acid gas removal, using slaked pebble lime as reagent. A powdered activated carbon injection system provides mercury control while a pulse jet fabric filter with ten compartments is used for particulate control.

The existing turbine building was expanded to accommodate the new turbine-generator and associated equipment for Unit 3. This included extending the crane rails on the existing turbine-generator service crane to serve the new turbine. New high and medium voltage equipment and distributed control system equipment is housed in separate areas in the turbine building with the new boiler located in a fully enclosed metal building that also houses the air pollution control equipment.

The ash load out area was expanded to accommodate increased residual volume with addition of the third unit. The main control room did not require expansion to house the controls for the additional unit and the conveyance equipment to move residue from the boiler to the ash house was also usable without modification for the system expansion.

The new unit includes a sophisticated micro filtration and reverse osmosis membrane system to treat cooling tower blowdown water. This will allow boiler makeup water to be produced from the reclaimed water used in the cooling tower, essentially eliminating any potable water usage in the process consumption. This is a significant advantage in southwest Florida, where population growth continues to challenge the capacity of potable water supplies which are typically derived from shallow wells.
2. Environmental Impacts and Regulatory Compliance

Who’s Tougher than the EPA? Florida!

The Florida Department of Environmental Protection (FDEP) developed requirements for nitrogen oxide (NOx) that are substantially more stringent than those of the federal EPA New Source Performance Standards. The permit limit of 110 parts per million (ppm) NOx (monthly rolling average) is accompanied by an ammonia slip limit of 30 ppm. Ammonia “slip” represents “un-reacted” or excess ammonia beyond that needed to control emissions and is undesirable. Lee County achieved environmental compliance using a combination of flue gas recirculation and advanced selective non-catalytic reduction (SNCR) controls, using urea as the reagent. The installed ammonia slip monitor provides real time ammonia data.

Acceptance testing was performed in September 2007. “Acceptance” includes full compliance with all environmental requirements, including the new stringent NOx and ammonia slip requirements. Compliance with other specific environmental permit requirements, including acid gas emissions (HCl and SO2), particulates, dioxins and furans, mercury, and carbon monoxide (CO) limits, were all demonstrated with considerable margin during acceptance testing.

Beyond Air Quality to Saving Water

Lee County saves up to 25 million gallons of potable water each year, as shown to the right. The expansion project and improved systems and controls have resulted in the reduction of potable water use by the facility by approximately 94 percent, with potable water now used exclusively for drinking and sanitary purposes.

Resource recovery plants use a large amount of water to cool and condense the steam used to turn the turbine-generator. At Lee County, to further reduce impacts to the environment, the plant was also designed to use tertiary water as the source of high purity boiler makeup water, eliminating the need to use significant quantities
of potable water. Tertiary water is the effluent from a nearby municipal wastewater treatment plant. The expansion project incorporated upgrades to the on-site water treatment facility including a new micro-filtration system and a reverse osmosis train to produce high purity water. The result is recycling of wastewater as another byproduct (supplementing the production of electricity and sale of recovered metals) from the waste processing operations.

**Setting the Stage as a Role Model**

After years of relative inactivity in this sector of the renewable energy marketplace, the Lee County expansion project sets the stage and provides a model for new resource recovery projects and expansions around the United States. The contribution of resource recovery to our nation’s energy security and environmental responsibility is significant, yet often overlooked. For example, carbon dioxide (CO₂) emissions are comparable to those of natural gas, the cleanest fossil fuels, and resource recovery avoids use of fossil fuels that would otherwise be used to generate an equivalent amount of electricity.

Additionally, resource recovery significantly reduces landfill volume. Generally, the volume of materials landfilled from a resource recovery facility (which is inert ash for Lee County) is only 10 percent of the volume that traditional municipal solid waste would occupy in a landfill.

Air pollution control systems incorporated into the expansion unit include a spray dryer absorber and fabric filter baghouse to control sulfur dioxides, acid gases and particulates, as well as an advanced selective non-catalytic reduction system that includes flue gas recirculation to control NOx and a dry carbon injection system to control mercury.

### Permit Conditions

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<th>Pollutant</th>
<th>Units 1 &amp; 2 Permit Limit</th>
<th>Unit 3 Permit Limit</th>
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<tr>
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* For NOx and CO, limits shown are for initial operation (first year), then subsequent lower limits in effect.
The graphs to the right show that all air emissions for Units 1 and 2, as well as Unit 3, are well below their respective permit levels. The darker blue bar represents permit levels.

Additional measures of the performance effectiveness of the new unit were demonstrated during a week long performance test period. Design and performance parameters verified during these tests included:

- Municipal solid waste throughput
- Residue quality
- Gross/net power generation capability
- Municipal solid waste higher heating value
- Boiler efficiency
- Turbine efficiency
- Offsite noise levels
- Utility consumption
- Reagent consumption
- Compliance with future NOx and ammonia slip levels below 110 ppm
3. Performance

Lee County is a veteran in the conversion of municipal solid waste into a renewable source of energy. With a successful resource recovery facility disposing of 1,200 tons per day since 1994, population growth created a need to expand the existing facility. The 636 ton per day expansion project, completed in December 2007, provides Lee County residents and visitors with a state-of-the-art facility. Air emissions are well below limits set by the Florida Department of Environmental Protection (FDEP), which are more stringent than those of the federal Environmental Protection Agency (EPA).

The addition of the third, stand-alone combustion unit expanded Lee County’s resource recovery capacity from 1,200 to 1,836 tons per day while creating clean, renewable power at the 280-acre Integrated Solid Waste Management campus in Fort Myers. The Lee County plant burns waste at 1,800 degrees Fahrenheit, generating up to 59 megawatts of electricity. About 15 percent of the electricity is used to power the facility complex while the remainder is sold to Seminole Electric Cooperative for use by Florida homes and businesses.

The significance of the Lee County expansion project extends beyond Florida. It represents the first municipal waste combustion project completed in the United States in more than 10 years and the first such project subject to the federal EPA New Source Performance Standards (NSPS) for air emissions that were enacted in the mid 1990’s. It also represents a significant addition to an already well-designed Integrated Waste Management System. This project highlights the success of the Lee County Solid Waste Division in fulfilling its mission to find “cost-effective methods of solid waste disposal that minimize impacts to our environment.”

"It is an effective, responsible way to handle all this trash," says Lindsey Sampson, PE, Director of the Lee County Solid Waste Division.

Performance of the expansion unit has been impressive to date. Shortly after acceptance testing was completed, the new unit suffered a catastrophic failure of the 600 horsepower induced draft fan motor. This was determined to be an “infant mortality” event and was covered by the original equipment manufacturer’s warranty. The new unit remained shut down for more than a month while a replacement motor was located, refurbished and installed. Excluding this event, the new unit has performed flawlessly, operating at more than 95 percent availability during its first two years of operation.

Integrated Solid Waste Management Embodies Environmental Stewardship

State-of-the-art resource recovery facilities have evolved to become not only accepted but a desired way for enlightened communities to reduce the environmental impact of solid waste while creating renewable energy. In a relatively short period of time, Lee County has become a trendsetter. Overcoming its struggle more than two decades ago to address the issue of increasing waste, while protecting one of the most environmentally desirable and beautiful areas in the United States, completion of the plant expansion project as the first permitted resource recovery facility of this century is a true environmental hallmark.

When Florida Congressman Connie Mack visited the Lee County resource recovery facility in June 2008, he called the expansion project a “step in the right direction” that uses a proven way to increase Florida’s portfolio of renewable energy. The Lee County resource recovery plant sells renewable energy credits as part of a contract with Seminole Electric Cooperative. Lee County began selling renewable credits in January 2009. For every kilowatt hour of energy sold, the County receives a renewable energy credit.
Ash Management Strategies

Lee County manages its own ash disposal facility at the Lee/Hendry Landfill owned by Lee County. The County developed ash monofills for disposal of residue from the waste-to-energy operation. In addition, the County uses ash residue as daily cover material for portions of the landfill reserved for municipal solid waste disposal, but the waste-to-energy expansion project has greatly reduced this requirement. Ash residue is used for cover in C&D disposal areas.

Prior to leaving the waste-to-energy complex, any ash remaining after the combustion process is "stabilized" with dolomite lime to buffer the residue to an ideal pH range. The dolomitic lime system was converted from a manual feed bag operation to an automatic system using pneumatic transport as part of the waste-to-energy expansion project. The combined fly ash and bottom ash is further processed for ferrous and non-ferrous recovery prior to loadout and transport to the landfill.

Non-ferrous materials separated from the residue stream are sold to the secondary metal market.
4. Program Planning

Keeping Southwestern Florida Beautiful

Lee County is located in southwestern Florida along the Gulf Coast, where many successful entrepreneurs, including Henry Ford and Thomas Edison, built winter retreats in years past. In 1890, just over 1,400 people lived in Lee County. By the turn of the 20th century, the population was more than 3,000 and 100 years later, Lee County had 335,000 residents. The 2000 census counted 440,888 residents and population estimates for 2005 bring the population to more than 537,000. And these population counts do not include the seasonal influx of “snowbirds” – part-year residents who flock to the warm, scenic beaches of Lee County. The Bureau of the Census has identified Lee County, Florida, as the third fastest growing metropolitan area in the United States. Total land area is 811 square miles.

The tremendous population growth combined with the popularity of Lee County as a place to visit creates an equally tremendous growth in waste… waste that must be removed quickly and efficiently to retain the positive reputation and aesthetics of the area. By the late 1980s, Lee County officials realized that their one remaining landfill would soon reach capacity. Recognizing the shortfalls of the system, the County decided to look into potentially more environmentally friendly waste disposal methods and develop a sustainable waste management solution.

Waste-to-Energy Comes to Lee County

The Lee County Solid Waste Division has focused on creating a long-term, sustainable plan to meet its mission, defined as finding and implementing “cost-effective methods of solid waste disposal that minimize the degradation of our environment.”

The Board of County Commissioners wanted to find an environmentally sound solution, something better than simply burying waste in a landfill. In 1989, Lee County developed a solid waste management plan for the next 40 years. The Board of County Commissioners’ proposal to build a resource recovery facility led to one of the most significant success stories, albeit not without challenge or controversy, in the United States today.

There are more than 600 waste-to-energy facilities that produce electricity and steam in operation around the world but only 89 of
them are in the United States. As one of those 89 facilities, the Lee County Resource Recovery Facility can be held up as an example of how the waste combustion technologies available today are among the cleanest and most responsible forms of waste management. The dominant waste-to-energy technology is mass burning, because of its simplicity and relatively low capital cost. Mass burning is also the system used at the Lee County waste-to-energy plant.

Since 2004, Lee County has focused on its long-term vision to increase the quantity of waste recycled as part of an integrated solid waste management system. Other solid waste management system components built on the 280-acre site on Buckingham Road include:

- A recovered materials processing facility that handles an average of 250 tons per day of materials gathered during curbside recyclables collection.
- A shredding facility devoted to office paper and confidential documents.
- A horticultural waste processing facility to mulch vegetative waste collected during weekly County-wide collections. This facility provided a huge boost in controlling landfill deposits during the difficult 2004/2005 hurricane season.
- A 1,000 ton per day transfer station facilitates transport of bypassed and non-combustible waste to the regional landfill.

The Expansion Project – Unit 3 Becomes a Reality

After navigating substantial public opposition in the early 1990s to emerge with an award-winning, if slightly scaled back waste-to-energy facility, Lee County turned its focus to making recycling (including paper, metal, glass and plastic containers and vegetative waste) convenient for all residents. Lee County also developed a state-of-the-art landfill where ash and bypassed waste from the resource recovery facility could be disposed, for both Lee County and neighboring Hendry County.

In 2004, the Lee County resource recovery facility celebrated its 10th anniversary, and none of the alleged environmental concerns had materialized. The facility, operated by Covanta Energy, has successfully processed an average of 1,000 tons of waste each day, generating more than 600 megawatt hours of electricity, sufficient to power the plant itself and sell excess electricity to Seminole Electric Cooperative to power local homes and businesses.
In response to the challenge of finding a way to dispose of more waste from more people, Lee County pulled out its original plans from the late 1980s for the resource recovery facility and decided that it was time to build the third unit. The success of the facility and its acceptance by the local community, made it possible to expand the facility to process an additional 636 tons per day of waste, while generating 20 megawatts of additional electricity.

In 2005, Lee County selected the top solid waste consulting firm in the nation, HDR Engineering, as its consulting engineer for the facility expansion. The project included adding a second turbine generator unit and expanding the electrical switchyard, turbine building, ash building and associated equipment and system controls. Fortunately, original facility designs included a tipping floor, refuse pit and a stack already sized to accommodate waste from a three-unit facility, which reduced construction complexity.

A Decade of Success Makes a Difference

The FDEP and the Power Plant Siting Act require that any project such as this include public awareness and public hearings. Therefore, a series of public hearings were held to encourage comments about the resource recovery expansion project. In contrast to the original 1980s-era project, these meetings were sparsely attended, without public opposition to this project.

The County Commissioners unanimously supported the facility expansion. Local press wrote positive editorials in 2002 and 2003.

Solid Waste Division Director Sampson recalls that few people attended and not one spoke out against the expansion at the public meetings. In fact, and in contrast to construction of units 1 and 2, there was considerable political and community support for the expansion.

The graphic to the right depicts key events in the evolution of Lee County solid waste planning into the manager of one of the nation's most technologically advanced, forward-thinking and environmentally successful waste-to-energy operations.

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Key Events in Lee County Solid Waste Program Planning

1989
Lee County adopts a Solid Waste Master Plan.

1991
Lee and Hendry Counties adopt an interlocal agreement to develop a waste-to-energy facility in Lee County and a landfill in Hendry County.

1992-1994
Construction of original 1200-TPD waste-to-energy facility.

1999
Waste-to-energy facility reported zero unexcused emissions for five straight years.

2000
Began operating the nonferrous recovery system at waste-to-energy facility, recycling an additional 750 tons per year that was previously landfilled.

2004
Began construction and engineering contract system for the waste-to-energy expansion project.

January 2006
Began construction of waste-to-energy expansion project.

August 18, 2007
First fire at the third combustion unit.

October 27, 2007
Dedication ceremony for third combustion unit, marking completion of waste-to-energy expansion project.
5. Worker Health & Safety

Safety performance throughout construction of the expansion project was outstanding. A full-time, OSHA-certified safety coordinator was on duty from project start through project completion. Every major subcontractor was required to have a full-time safety coordinator. Daily tailgate safety meetings were supplemented with weekly project-wide safety “walk-through” meetings.

The project employed more than a dozen subcontractors during construction. “At peak, there were several hundred workers at the plant, yet of the tens of thousands of manhours, the facility encountered less than 80 hours of scheduled downtime,” says Jody Howard, Regional Engineer, who served as Facility Manager during construction. There were only seven OSHA recordable incidents during the entire construction period.

The facility layout required the new boiler and air pollution control equipment to be located at one end of the site, while the turbine building was expanded at the opposite end, with the existing operating units located between. “Because activity occurred at each side, we had to span the operating plant, mechanically and electrically, to make this expansion happen,” Howard explained.

Maintaining a safe construction environment was a paramount goal and Covanta set a goal to secure OSHA Voluntary Protection Program (VPP) recognition for operating Units 1 and 2 in the midst of this major construction project. Howard explains that this elite safety program takes more than a year to meet all OSHA requirements, with an extensive on-site inspection process. In April 2007, in the middle of construction, the operating plant was honored with OSHA VPP status.

Getting a BG Degree

During construction of the waste-to-energy expansion, County staff who would be involved in operations at the expanded facility received a customized, rigorous training program designed and taught by solid waste experts from HDR Engineering, Inc., the consulting firm that designed the project for Lee County. This 13-session training covered the entire waste-to-energy process, with emphasis on key mechanical, electrical, controls and regulatory matters. Trainees “graduated” with a “Bachelor of Garbology” certificate in waste-to-energy.
6. Economics and Cost Efficiencies

Financing the Unit 3 expansion came from a combination of existing equity within Lee County financial resources and solid waste system revenue bonds issued at the start of construction, in early 2006. Overall project costs, including permitting, financing and construction amounted to approximately $194,000 per ton per day of nominal capacity. The project was completed below the budget.

The graphic below illustrates specific project costs.

<table>
<thead>
<tr>
<th>Project Costs</th>
<th>Lee County Waste-to-Energy Expansion Project</th>
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<td>Cost Component</td>
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<td>Combustion/Boiler Equipment and Erection</td>
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<td>Air Pollution Control/Chimney and Erection</td>
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<td>Turbine Generator</td>
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<td>Turbine Plant Equipment and Installation</td>
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A Project with Multiple Challenges

This project did not follow the traditional EPC (engineer, procure, construct) model used by most large publicly owned plants in recent years. Lee County decided to proceed with the resource recovery expansion after the Florida Department of Environmental Protection issued a Prevention of Significant Deterioration permit in early 2004, which locked in specific design choices. Among these was the decision to construct the new unit using Martin Stoker technology, licensed to Covanta Energy, Inc. by Martin GmbH. The decision to continue with the Martin mass burn grate system was made after investigating other modern resource recovery systems in Europe, a technology investigation prompted by uncertainties surrounding Covanta based on its filing Chapter 11 bankruptcy in 2002. With the final outcome of Covanta’s bankruptcy undetermined, Lee County was compelled to make decisions on procurement and contract strategies that differed from the typical contract procedures for such projects.

In the end, Lee County acted as developer, with Covanta providing project management oversight of the design and construction. Lee County retained responsibility for project engineering and design, procurement of plant equipment and construction coordination. Covanta served as construction project manager (Covanta ultimately emerged from bankruptcy on March 10, 2004.)
Meeting Construction Challenges Along the Way

This project was the first facility expansion project of this century in the United States and the first to be built to the more stringent EPA regulatory standards, yet was completed below the original budget and within three months of scheduled completion.

Sound and precise construction management techniques resulted in key project accomplishments. For example:

- All permit-required environmental precautions were met
- No scheduled or unscheduled inspections resulted in any violations
- All mechanical, structural and electrical inspections were smooth and uneventful
- Accurate scheduling of facility shut downs minimized impacts to ongoing solid waste operations
- No legal actions resulted from design, procurement, or construction

In 2004, Hurricane Charley destroyed roofing and lightning protection, and damaged siding on the original facility which was required to disconnect from Florida Power and Light (FPL) for an extended period of time. Damage estimates were $600,000. Just as construction of the new unit was scheduled to begin, Hurricane Wilma inflicted another round of damage in October 2005, almost as severe. The general construction contractor, Casey Industrial, Inc., mobilized in December 2005.

Construction began in December 2005. Although the construction completion deadline of April 2007 was aggressive and the impact of two major hurricanes was immense, the construction team overcame adverse conditions and the schedule slipped by only a few months with project completion celebrated with the “first fire” in July 2007.
7. Utilization of Equipment/Systems and Technologies

An International Exploration

With its location in the fast growing sun coast area of Southwest Florida, Lee County has experienced population growth in the high single digit range in recent years. Despite aggressive recycling programs, this unprecedented growth and resulting increase in waste quantities led Lee County to seek new waste disposal capacity in the early years of the new century. The heart of the existing County integrated waste recycling and disposal operations were co-located at the site of a 1,200 ton-per-day waste-to-energy facility. The site complex also includes a material recovery facility, yard waste processing facility, and a transfer station. Bypass waste quantities are disposed at the Lee/Hendry Landfill, along with residue from the existing waste-to-energy units.

A thorough due diligence investigation of available options to provide additional capacity was undertaken by Lee County. This process included an evaluation of advanced waste-to-energy technologies not yet available in the United States marketplace but in successful or experimental operation in European and Asian metropolitan areas. The result of this intense investigative process, designed to give the residents of Lee County the best available option from both economic and environmental perspectives, was a decision to expand the existing waste-to-energy facility by adding a third combustion train and a second turbine-generator. A factor in this decision was the 1990s-era construction of the original facility with future expansion capability in mind. This meant that several key elements were in place, including a concrete stack with space available for a third flue as well as the tipping floor, waste pit and crane capacity sized to support addition of a third combustion unit.

The decision to proceed with the expansion was made by the Board of County Commissioners in early 2004 after the Florida Department of Environment Protection issued the Prevention of Significant Deterioration Permit, which locked in certain design choices. Amongst these was the decision to add a third Martin Stoker, with technology licensed by Covanta Energy, Inc. from Martin GMBH of Munich, Germany. The decision to use the Martin mass burn grate system was made after the investigation of international waste-to-energy practices, with an emphasis on European experience. During this time Covanta Energy was under reorganization from Chapter 11 bankruptcy proceedings initiated in 2002. This situation led Lee County to certain decisions about the strategy for project implementation.

Permitting Requirements Form Foundation for System Selection

As the first waste-to-energy unit to be permitted under the new EPA New Source Performance Standards, the permitting process was both lengthy and complex. The NOx limits presented unique challenges, leading to hardware configurations that differ from most, if not all, waste-to-energy facilities in service in the United States. With the Florida Department of Environmental Protection imposing a 12-month rolling average annual NOx limit of 110 ppm, Lee County faced a limit considerably more restrictive than the EPA limit of 150 ppm. An ammonia slip limitation of 30 ppm was also part of the permitted conditions.
As the first waste-to-energy unit to be permitted under the new EPA New Source Performance Standards, the permitting process was both lengthy and complex. The NOx limits presented unique challenges, leading to hardware configurations that differ from most, if not all, waste-to-energy facilities in service in the United States.

Given these aggressive permit limits, Lee County decided to implement a configuration of selective non-catalytic reduction (SNCR) using urea as the reagent, coupled with flue gas recirculation. The advanced SNCR system uses three levels of urea injection in the furnace to ensure injection of reagent at the optimum temperature zones. Since the amount of reagent/water injection required to achieve these aggressive NOx limits would negatively impact waste throughput and hence steam generation, the Florida Department of Environmental Projection agreed to allow the furnace heat input limit to be increased by 6 percent, to 291.5 million Btu per hour, effectively increasing the nominal design throughput to 636 tons per day, enough to offset the negative impact associated with the elevated reagent injection rate.

The flue gas recirculation system recirculates a portion of flue gas (up to 19 percent of cleaned flue gas volume) from the induced draft fan outlet back to the furnace, via a recirculation fan. The flue gas recirculation system limits thermal conversion of nitrogen in the fuel and combustion air by limiting the oxygen content available for conversion to NOx. Boiler cleaning uses an array of retractable and rotary sootblowers in the superheater, evaporator and economizer sections.

The Continuous Emissions Monitoring System (CEMS) is furnished by Covanta, with a Fourier Transform Infrared (FTIR) monitor for on-line ammonia slip measurement. The FTIR is used as a diagnostic tool to minimize slip and visible plumes and is subject to periodic verification by wet chemistry (stack) testing.
8. Public Acceptance, Appearance and Aesthetics

Trash Plant Outlives Controversy
Ft Myers News Press, August 6, 2004

The headline says it succinctly, but the summary paragraph that follows in the article announcing the celebration of the tenth anniversary of the original—and originally controversial—waste-to-energy plant for Lee County, says even more:

Once the source of bitter debate, the Lee County incinerator in Buckingham has turned out to be a big success.

Florida Congressman Connie Mack took time to visit the Lee County waste-to-energy plant in June 2008. After viewing the facility and reviewing its stellar environmental performance, Congressman Mack called the expanded facility a step in the right direction that uses a “proven way” to increase Florida’s portfolio of renewable energy. As a strong supporter of ways to address the problems of “America’s dependence on foreign oil, coupled with an aging and environmentally unfriendly energy infrastructure [that] threatens America’s freedom, security and prosperity,” Congressman Mack has supported efforts to improve new energy technologies, including the state-of-the-art, first-in-the-nation for the new century waste-to-energy expansion facility to meet the needs of the more than half a million people who reside in Lee County, not to mention the throngs of visitors that crowd the area’s beaches and hotels each season.

Waste-to-Energy Comes to Lee County (or…The Rest of the Story)
The Lee County Board of Commissioners proposal to build a resource recovery facility in 1989 sparked a lengthy and bitter controversy that parallels the roller coaster history of this method of solid waste management in the United States. Protesters claimed that the facility would destroy the environment and degrade public health. Some parents who opposed the project even put gas masks on their children and brought them to public meetings.

Lee County responded by scaling back plans for the facility. Rather than building a resource recovery plant with three processing units, Lee County constructed a smaller, two-unit 1,200 ton per day facility. The determination and hard work of Lee County employees responsible for solid waste management led to successful permitting and construction of the initial resource recovery plant that began operations at the end of 1994. In 1995, the facility was named Project of the Year by Power Engineering magazine and Lee County was recognized as a national leader in using renewable energy.

In August 2004, the Lee County resource recovery facility celebrated its 10th anniversary. None of the alleged environmental concerns had materialized. The facility, operated by Covanta Energy, had successfully processed an average of 1,000 tons of waste each day, generating more than 600 megawatt hours of electricity, sufficient to power the plant itself while selling excess electricity to Seminole Electric Cooperative to power local homes and businesses.
Success Leads to 21st Century Expansion

In response to the challenge of a growing need to dispose of more waste from more people as the calendar turned over to a new century, Lee County pulled out its original plans from the late 1980s for the three unit resource recovery facility and decided that it was time to build that third unit. The success of the facility and its acceptance by the local community made it possible to move forward with plans to expand the facility to process an additional 636 tons per day of waste, while generating 20 megawatts of additional electricity.

The project included adding a second turbine generator unit and expanding the electrical switchyard, turbine building, ash building and associated equipment and system controls. Fortunately, original facility designs included a tipping floor, refuse pit and a stack already sized to accommodate waste from a three-unit facility, which reduced construction complexity.

The Lee County resource recovery plant expansion marked the first new resource recovery unit to be permitted in the United States in the 21st century. In recognition of this achievement, in 2008, Power Engineering again recognized Lee County with its Project of the Year award in the renewable energy category, just as it had done in 1995, with the opening of the original two waste-to-energy units.

Open for Visitors

The Lee County Solid Waste Division offers tours of its facilities to more than its congressional delegation. Since 2001, more than 16,000 visitors have toured the County’s integrated waste management system, from school children to elected officials.
9. Innovation and Creativity

The history of the integration of waste-to-energy as a key part of Lee County’s integrated solid waste management strategy is a story of innovation and creativity, but also one of dedication and commitment.

- **Innovation** in being the first in the nation to permit and build a large waste-to-energy unit under the New Source Performance Standards
- **Creativity** in exploring international advancements in technology as part of initial project evaluation
- **Dedication** to enhancing the environment for residents and visitors to Lee County with a sustainable and implemented plan for solid waste management
- **Commitment** to the triple bottom line of social, environmental and economic return on investment for the communities of Lee County

The characteristics of innovation, creativity, dedication and commitment are demonstrated throughout this project, but are most evident in three key areas:

**Environmental Controls:** The Florida Department of Environmental Protection (FDEP) developed emissions standards substantially more stringent than EPA New Source Performance Standards. Environmental compliance was achieved by Lee County with a combination of flue gas recirculation and advanced Selective Non-Catalytic Reduction (SNCR) controls.

**Construction Challenges:** The original combustion units had to remain operational during construction, but were in the center of the expansion area. Safety and logistical considerations were multiplied when it came time to interconnect the two live, high-voltage systems of 13,800 and 138,000 volts. Then came the impact and aftermath of Hurricanes Charley and Wilma with increased competition for resources, especially concrete, steel, construction machinery, and labor. Still, the project was completed within budget and near the original schedule.

**Renewable Energy, Water, Ferrous and Non-ferrous Metals:** The push is on to increase use of renewable energy in all sectors. Creating energy from waste reduces the amount of waste sent to a landfill and generates electricity that helps to pay for operating the plant and supports local homes and businesses. The Lee County expansion project recovers approximately 600 kilowatt hours of electricity from each ton of municipal waste that would otherwise be sent to a landfill. The facility uses reclaimed (tertiary) water (effluent from a nearby wastewater treatment plant) for all process water needs, including boiler makeup water, saving gallons of potable water every year. The facility captures a significant amount of ferrous and non-ferrous metals left over after all the combustible materials have been consumed.
The Lee County Community

Lee County Resource Recovery Facility
Lee County Solid Waste Division, Florida

2009 WASTE-TO-ENERGY EXCELLENCE AWARD NOMINATION
Incinerator decision good one

Government made right call, executed plan in fine fashion

It’s time to celebrate the success of Lee County’s Waste to Energy Facility, commonly known as the incinerator, on Buckingham Road.

County commissioners this week unanimously agreed to submit a permit to expand the trash-burning plant’s capacity from 1,200 tons per day to 1,800 tons per day. The plan not only gets rid of trash, but generates enough electricity to serve 30,000 homes.

The bill for the new burner will be about $80 million, but won’t result in an increase in trash fees.

The county reports that the plant has operated consistently with overall emission levels 60 percent to 80 percent below the stringent standards required by its operating permit.

The incinerator was finished in August 1994. Those who remember when the issue of what to do about increasing garbage and decreasing landfill space first hit the front burner in the late 1980s will also remember it as one of the most hotly debated topics of the decade in Lee County.

Incinerator opponents insisted the operation would destroy the environment and the health of Lee County’s citizens.

Not only did the dire pollution and health predictions fail to materialize, the plant has won numerous awards for its performance.

Collier County, still saddled with a shrinking, shrinking landfill, once considered buying capacity for its garbage in Lee County’s incinerator.

Those talks fell through.

A smart decision in the early 1990s to build a smaller plant with room for future expansion saved taxpayers a load of money.

Now it’s time to expand on a good idea, well executed.

When you look around at government and sometimes believe that nothing works the way it is supposed to, it’s comforting to see something that does.
Positive Press Coverage, August 6, 2004

Trash plant outlives controversy

Once the source of bitter debate, the Lee County incinerator in Buckingham has turned out to be a big success. Saturday, the county will celebrate with a 10th anniversary party.

The Lee County incinerator has been humming along quietly and efficiently for 10 years now, converting waste to electricity and winning a clutch of engineering and environmental awards.

But when county commissioners voted in 1994 to build the $200 million plant, it was the climax of one of the most bitter political conflicts in county history.

Protesters, convinced among other things that the incinerator would be a source of deadly air pollution, waved signs outside the courthouse and convened at heated meetings. Children in gas masks were seated prominently at one official meeting.

Well, they were wrong, and they were so wrong.

The dangers to health haven’t materialized, at least not yet. All indications are that the incinerator has been a big success, and is being operated about as well as such a facility can be.

We complain when government fails; let’s celebrate when it succeeds. That’s the point of the anniversary party Saturday at the incinerator, with free food and tours.

The plant exceeds standards and has been recognized as a solid operation, winning the Power Engineering and Power Engineering International magazines’ 1995 Project of the Year Award, the 1996 Environmental Citizen of the Year Award from the Florida Department of Environmental Protection, the 1999 Waste-to-Energy Excellence Gold Award from The Solid Waste Association of North America, and the 2001 Facility Recognition Award from The Solid Waste Processing Division of the American Society of Mechanical Engineers.

The incinerator was called the biggest public works project in county history when it was built, but now it looks like a good investment. Under way is the addition of a third burner unit which will increase the plant’s capacity by 50 percent to deal with growth.

Running is not the ideal. It’s best to reuse, recycle and compost where practical. But there will always be something left to dispose of. Better to burn it cleanly for electricity than to put it in a landfill.
EDITORIALS

Incinerator was right move for Lee

It may be hard to recall how controversial the Lee County incinerator—oops, sorry, “waste-to-energy facility”—was when it was proposed here more than 15 years ago.

The opposition was more than furious, it was a jihad.

Some people predicted that burning trash, even to generate electricity and allow the radical curtailment of landfilling, was an expensive environmental catastrophe in the making. Children in gas masks were hauled in to hearings. Pro-incinerator County Commissioner Ray Judah remembers having to rush his wife and 4-year-old son from a public forum under a barrage of threats and heckling. “It was extremely unpleasant,” Judah recalls.

Rarely in local political history have so many people been so self-righteously wrong.

Since it began operations in 1994, the high-tech incinerator, on a 140-acre site in Buckingham, east of Fort Myers, has converted more than 5 million tons into clean electricity and residual ash that takes up about 10 percent of the landfill space that would have been required by the unburned garbage. The sale of electricity and recovered metals covers about 85 percent of the operating costs. Garbage rates to pay for the rest have gone up to pay for better disposal, but they still average only about $4.30 a week per household.

Today, county officials will cut the ribbon on a third combustion unit. The only problem is that the site is now built out. Unless we find more ways to expand incinerator capacity, increase recycling, and reduce the generation of waste in the first place, waste disposal in this growing county is going to get a lot more expensive.

The incinerator has won awards, set standards and richly vindicated its backers.

The experience should also— but probably won’t— serve as a lesson for those who let environmental concern, or any political anxiety, morph into hysteria.

IF YOU GO

• What: Ribbon-cutting for the third combustion unit at the Lee County waste-to-energy facility.
• Where: 10500 Buckingham Road, east Fort Myers
• Events: Guided tours of the waste-to-energy plant and recycling facility. Bus tours offered between 10:11 a.m. and 2 p.m. Ribbon-cutting begins at 11 a.m.
• Lunch and refreshments will be served.
WTE TRAINING SERIES

THIS CERTIFIES THAT

Joe Fernandez

has successfully completed the required course of study provided by HDR Engineering, Inc. for the Pinellas County Department of Solid Waste Operations Staff and is therefore awarded this BACHELOR OF GARBOLGY

In Waste to Energy

This Diploma also confers Twenty PhD’s (Pile of Higher Ed Degree) credits upon said Garboologist, together with all of the other rights, privileges and obligations conferred here within.

Given this 27th day of October, 2008

Don Castro
HDR Engineering, Inc.
Chief Garboologist