PINELLAS COUNTY RESOURCE RECOVERY FACILITY
CAPITAL REPLACEMENT PROJECT
“SECURING A RETROFIT INVESTMENT- A CAPITAL REPLACEMENT INITIATIVE”

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ABSTRACT
The Clean Air Act Amendments (CAAAs) promulgated by the U.S. Environmental Protection Agency (EPA) in 1990 set new emission standards for Waste-To-Energy (WTE) plants throughout the United States. Pinellas County, Florida, has achieved compliance with the new emission guidelines by completing an Air Pollution Control Retrofit to their Resource Recovery Facility (PCRRF) in 2000. Pinellas County, the owner of the PCRRF, now faces the challenge of preserving this investment for the years to come. This paper describes the additional investments being made by Pinellas County as part of the Capital Replacement Project (CRP) to extend the operating life of PCRRF.

INTRODUCTION
The PCRRF is located on the 750-acre Bridgeway Acres Class I/III landfill site in mid-County, and is currently under an operating contract (Consolidated Management Agreement or CMA) with Wheelabrator Pinellas Incorporated (WPI). The PCRRF consists of three (3) combustion units (boilers), each having a rated capacity to mass-burn 1,050 tons per day of municipal solid waste (MSW), with a heating value (HHV) between 3,800 and 5,000 BTU/lb. The steam supply from the boilers is directed to two (2) turbine-generators (T/G); T/G No. 1 and No. 2, nominally rated to generate 50 megawatts and 25 megawatts, respectively. The net electrical generation, after satisfying plant auxiliary load demands, is sold to Florida Power Corporation (FPC) under energy and capacity provisions of a Power Purchase Agreement. Boilers No. 1 and 2, T/G No. 1 and all supporting auxiliary systems were placed into operation in 1983. Boiler No. 3, T/G No. 2 and the required additional supporting auxiliary systems became operational in 1986. This is the largest WTE facility in the United States.

In June 2000, a four-year Air Pollution Control (APC) Retrofit Project was completed, which replaced the original electrostatic precipitator on each unit with an emissions control system consisting of Spray Dry Absorbers (SDA), Fabric Filters (FF), a common Selective Non-Catalytic Reduction (SNCR) system and a common Powered Activated Carbon Injection System (PACIS) (Figure 1). This project, which has successfully complied with all new emission guidelines of the CAAA, involved an investment by Pinellas County of over $90 million.

Each PCRRF boiler is rated to produce 261,400 pounds per hour of 615 psig, 750°F steam. Make-up to the boiler feedwater systems is supplied from an onsite two-train demineralizer system. The circulating water system for condenser cooling utilizes a five-cell mechanically induced draft, wood frame cooling tower with constant speed fans. Treated water from the landfill site and treated wastewater from local municipal supplies are the primary and secondary sources for cooling water make-up at the cooling tower basin.

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PROJECT INITIATION
In May 2003, the facility will have been in operation for 20 years and the CMA will expire. Within the next year, Pinellas County anticipated that it would prepare a new CMA and solicit interest in the operation of the facility for another 20 years. Pinellas County also recognized that it should invest additional capital to extend the life of the aging facility.

Pinellas County had recently completed a highly successful APC Retrofit Project with a project team that remained largely intact. There was an issue between Pinellas County and the Operator (WPI) regarding interpretation of the Power Purchase Agreement and the CMA. A negotiation was
completed with the signing of a Settlement Agreement, which satisfied both party's interests and resulted in the CRP.

As part of the Settlement Agreement, Pinellas County made a commitment to secure its investment in the RRF, after having completed the $91 million APC Retrofit Project. Evaluation of the condition of several key balance-of-plant (BOP) operating systems in the RRF indicated that significant capital improvements would be necessary. Such improvements would extend the useful life of the facility, and would also regain performance that was gradually being lost due to an aging facility. WPI and Pinellas County would both benefit with improved facility availability to increase waste disposal rates through improved combustion, while increasing electrical revenues. This would also serve to reduce maintenance and result in a facility that would require no significant capital investment when the amended CMA term expires in 2007.

To implement the CRP, WPI and Pinellas County entered into a new Construction Agreement that defined the project scope, schedule, and costs. The current Consolidated Management Agreement, between WPI and Pinellas County for operation of the facility, was also amended to capture new performance guarantees.

**PROJECT SCOPE**

Throughout its operating life, Pinellas County, WPI and HDR Engineering (HDR) have monitored and evaluated the operations, maintenance and performance of the facility. Pinellas County has retained HDR to conduct a complete facility inspection on an annual basis; and report on the condition of the facility to satisfy Trust Indenture requirements. Based on operating history, and by projecting future operational and maintenance trends, Pinellas County and Wheelabrator mutually developed the following scope of contracted services.

**Boiler and Feedwater Systems**

The boiler modifications consist of demolition and replacement of all components from the furnace gas exit to economizer gas exit for boiler unit trains 1, 2 and 3. Existing equipment and systems will be removed, replaced and/or relocated, as required, to accommodate the modifications. To meet the performance criteria specified in the amended CMA, the following major components will be provided:

- Boiler membrane wall tube panels
- Superheater section
- Economizer
- Evaporator platens
- Supplemental structural support steel
- Boiler trim and piping
- Safety valves
- Soot blowing system
- Ductwork and ash dropout hoppers
- Insulation and lagging

**Boiler Feedwater Pumps**

Of the four existing pumps, two electric motor driven pumps will be replaced with new similar pumps. The remaining two pumps will be inspected and repaired. The overhauled pumps will replace the two turbine driven pumps.

**Crane Rebuild**

The three existing Refuse Handling Cranes will be rebuilt, including installation of new trolleys, festoons, vacuum contactors and rails. The rated lifting capacity of each crane will be upgraded from 11-ton to 15-ton. Upgrades will include replacement of the bridge and runway festoon conductor systems, miscellaneous control components and new operator armchair control consoles.

**Cooling Tower Refurbishment**

In order to maintain the existing performance and prolong the structural integrity, the existing cooling tower will be cleaned, inspected and refurbished; including installation of new fill, distribution system, replacement of mechanical equipment, fan deck and structural framing. In addition, the fans on two of the five-cell tower, which currently have constant speed fan motors, will be replaced with Variable Frequency Drives (VFD).

**Water Treatment System**

The current boiler water make-up system is served by a dual bed (anion/cation) demineralizer system. This existing system will be replaced with a new dual bed demineralizer system; consisting of two 100% trains, each rated at 100 gpm. The local demineralizer programmable logic control (PLC) system will interface with the plant distributed control system (DCS) for process monitoring.

As a separate O&M project, the influent to the new demineralizer system will utilize treated wastewater as the primary source of make-up. [1]

**Martin Instrumentation & Controls Upgrade**

Due to age and difficulty in maintaining spare parts, the instrumentation and control system for the existing Martin grate system will be upgraded to current technology. The scope of this activity will primarily include installation of new proportioning valves for the hydraulic control pumping system. A new PLC control system will be provided to optimize firing rates, and will interface with the balance of plant DCS for system monitoring. New field instruments will be installed to replace those removed when the boiler sections are replaced. A new feature to enhance boiler combustion control will be the installation of six infrared pyrometers for measuring flue gas temperature in the second pass of each boiler.

Refer to Figure 2 for the scope of the new boiler replacements.
BOP Instrumentation

The existing control system for the RRF is pneumatically based, as originally installed. With the APC retrofit of the RRF, a new state-of-the-art DCS was installed specifically for the control of the APC equipment and systems. By utilizing the APC DCS system configuration as a starting point, the expansion of this system to replace the balance of plant pneumatic system with DCS was the next logical progression. The only exception was that the existing General Electric turbine control system was not included in the controls upgrade.

Tipping Floor Modifications

The current tipping floor operation involves a one-way traffic flow pattern; in the south end of the Tipping Building and out the north end. Between these entrance and exit points, hauling vehicles must be directed and staged for three-point turns and backup maneuvers to reach a position for unloading at the front wall of the refuse pit. High traffic volumes, combined with long transport trailers, cause slowdowns in the throughput of vehicles.

The tipping floor modification will consist of entrance and exit ramp modifications, installation of concrete push walls within the existing building, and modification to the outside wall of the Tipping Building for installation of rollup doors. Combined with a 120 foot extension of the approach to the building, these modifications will provide a more spacious exterior area for vehicle maneuvering and also offer more covered space for refuse storage in the existing Tipping Building. (Refer to Figure 3)

PROJECT COST

The current estimated cost for the CRP, including engineering, procurement and construction/testing, is approximately $51 million. The largest portion of this cost is for the refurbishment of the three boiler units, which comprises approximately $20 million for engineering and procurement, and $10 million for demolition/construction. With the extended term of the project over several years, the project will be financed by reserve funds and no projected increase in tipping fees.

In accordance with Pinellas County requirements, all procurements for material, equipment and construction related services are to be made on a competitive bid basis; unless single source procurement can be justified. As the scope of the project involves refurbishment of portions of several existing systems, single source procurements will be made to the original manufacturer (such as DB Riley for boiler replacement design and materials). Generally, all demolition and construction services will be competitively bid.

PROJECT SCHEDULE

A key component of the Settlement Agreement was to negotiate a curtailment period with FPC for each of the boiler outages. Penalty payments to FPC would be severe if Pinellas County failed to meet its capacity commitments. A curtailment offered Pinellas County an economic incentive in the negotiation process with WPI.

The critical path activity of the project schedule is the replacement of major sections of the boiler on each unit. The maximum contracted time for demolition, construction and acceptance testing of each boiler replacement activity is 12 calendar weeks. As a result of negotiations with the FPC for curtailment periods during the calendar year, the schedule for boiler replacements will occur from October 1st to December 24th in the years 2001, 2002 and 2003. Based on a constructability review, the order of replacements will be Unit No.2, Unit No. 3 and finally Unit No.1.

The schedules for the balance of CRP activities have been addressed by two categories; those requiring unit outages to implement, and those that can be implemented independent of unit operational status. The majority of CRP activities will be completed by the end of 2001.

ACCEPTANCE TESTING

The main focus of acceptance testing for the CRP is the performance of the refurbished boiler combustion trains. The general acceptance criteria is that each boiler combustion train will perform as well, or better than, the unit performance prior to the CRP; while maintaining compliance with environmental regulatory requirements. Wheelabrator will perform a continuous 7-day operational test on each unit, as witnessed by a representative of Pinellas County. Unit operational acceptance is a contractual requirement for Wheelabrator to commence demolition of next scheduled boiler unit.

Performance Criteria

The modified boilers will be designed for continuous operation at MCR of 244,000 lbs/hr of superheated steam at 615 psia, 750F at the superheater outlet, based upon municipal solid waste fuel with a higher heating value of 4800 BTU/lb.

REGULATORY COMPLIANCE

At the time the CRP contract agreements and conceptual design scopes were being developed, the impacts of any environmental regulatory requirements were reviewed. This project raised many complex and interrelated environmental issues under Florida and federal law. Faced with a number of different regulatory options, Pinellas County decided to request a modification to the construction permit that previously had been issued for the PCRRF under the Florida Department of Environmental Protection (FDEP) and U.S. Environmental Protection Agency (EPA) programs for the prevention of significant deterioration (PSD) air quality. The FDEP conferred with the EPA about the relevant PSD issues and then approved the request by Pinellas County. A PSD permit modification for the CRP was issued by the FDEP in December 2000.

The PSD permit modification is an important project milestone activity, as it authorizes Pinellas County to construct the various described capital improvements that will extend the
useful life of the PCRRF. The PSD permit modification also enables Pinellas County to currently avoid a time-consuming and potentially expensive regulatory review process. The ability of Pinellas County to avoid the PSD review process in the future will depend upon several factors, including compliance with the FDEP new permit conditions and the success of Pinellas County in operating the PCRRF in a manner that is consistent with the current projections about the PCRRF future operations.

**SUMMARY**

The Capital Replacement Project demonstrates a successful endeavor, offering mutual benefits, through the cooperative efforts of an Owner and Operator of a Waste-To-Energy facility. The primary beneficiaries of this project will be the residents of Pinellas County, Florida, by optimization and extension the solid waste disposal plan further into the future.

**ACKNOWLEDGEMENTS**

D.B. Riley, Inc. – Worcester, MA
David Dee, Esq. – Lander & Parsons
Don Elias – RTP Environmental Associates, Inc

**REFERENCES**

Figure 2 – Boiler Replacement Scope