13th North American Waste to Energy Conference
May 23-25, 2005, Orlando, Florida USA

NAWTEC13-3164

Optimizing Steam Turbine Generator Output: Identifying Opportunities

Dominic Marra, PE
Montenay-Onyx Power Corp.
6990 NW 97th Avenue
Miami, Florida 33178, U.S.A
Tel: 305-593-7226, Fax: 305-593-7220
Dmarra@montenay-onyx.com

Abstract
In an effort to maximize steam turbine generator output, Montenay Power Corp. (MPC), operator of the Miami Dade County Resources Recovery Facility (DCRRF) undertook a systematic approach to analyze various turbine and steam cycle issues affecting performance. Several low cost methods were used to identify opportunities for increased megawatt generation.

Shortfalls within the actual steam path through the turbine blading and internals were quantified with a steam path audit and computerized modeling of the blade path. This audit identified a shortfall of 2.5 megawatts (MW) from the original design and almost a full 1 MW gain through work done during the regular maintenance overhaul. The audit proved to be a valuable tool for making good economic decisions on what seal packing to replace/repair during the TG overhaul.

The plant had previously explored re-blading options with the Original Equipment Manufacturer (OEM). This brief study showed turbine internal changes would be capital intensive and carry megawatt improvement claims that were questionable due to various steam cycle issues.

Four major operational parameters that affect turbine performance were examined and quantified. Deviations from design steam flow, throttle temperature, back pressure, and throttle pressure accounted for a loss of 24 megawatts (MW) in generation.

The three low cost methods used to quantify these losses/opportunities were: 1) Acoustic valve leak detection surveys which identified not only low cost MW gain improvement opportunities but also safety and reliability issues; 2) Helium tracer gas leak detection, used to identify vacuum leaks and confirm the leaks were sealed properly; and 3) A complimentary steam trap survey, which also helped identify lost steam and potential risk to equipment.

Preliminary measures were taken to improve steam throttle flow, throttle temperature, back pressure and throttle pressure with a net gain of 7 MW so far. This paper details the methods used and results of the optimization program thus far.

Background

The Miami-Dade County Resources Recovery Facility (DCRRF) is a 4,200 ton (3,810 tonne) per day combined waste to energy and waste processing plant. The plant services the greater Miami – Dade County Florida area by processing approximately one third of the 3.5 million tons (3.2 million tonnes) of waste generated.

The 40-acre (16.2 hectares) site began operations in 1979 and has been retrofitted three times. The first retrofit completed in 1989, involved changing the waste processing system to a dry process and a rebuild of all 4 boilers. [1] See Fig. 1 for a site plan.

The second retrofit completed in 1997 involved upgrading the trash processing system, boosting the facility processing capabilities to over 1.2 million tons (1.1 million tonnes) per year, making it the largest in the world. [2]

The third retrofit completed in 2000 involved complying with the Clean Air Act Amendments (CAAA) of 1990