

NAWTEC16-1903

A Case Study of the Selective Catalytic Reduction (SCR) System at the Algonquin Power Energy-From-Waste Facility

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Abstract

The Algonquin Power Energy-From-Waste (APEFW) facility is located in the suburban Toronto, Ontario city of Brampton. It receives approximately 140,000 metric tonnes (154,000 tons) of MSW per year from the Region of Peel (Region) and approximately 10,000 metric tonnes (11,000 tons) per year of international airport waste from the area's two international airports. The APEFW facility commenced initial operations in 1992 and included four, 91 tonne (100 ton) per day Consumat two stage incinerators with heat recovery boilers and a dual-train air pollution control (APC) system consisting of evaporative cooling towers, venturi reactors and fabric filter baghouses.

The APEFW facility expanded its capacity in 2001 with the addition of a fifth 91 tonne (100 ton) per day modular incinerator and heat recovery boiler. One of the stipulations in the permitting process was that the entire expanded facility meet more stringent emission standards that included a significantly lower nitrogen oxides (NOx) emission rate. After a review of several available NOx control technologies, the APEFW facility chose to install a Selective Catalytic Reduction (SCR) system. While SCR systems are fairly common on EFW facilities in Europe, the APEFW facility is the only EFW facility in North America that currently operates with an SCR system and as such has gained valuable insight into the application and performance of this technology that is very relevant to the North American EFW industry.

This paper discusses the operation and maintenance of the SCR system, compares pre- and post- SCR NOx emissions and presents capital and operating costs for the SCR including the cost per tonne of waste processed and the cost per tonne of NOx removed.

Introduction

With the planned closure of the Region's Britannia Road landfill in 2002, the Region was interested in having more of its waste processed within its borders rather than shipping waste outside the region. This led to a decision to add a fifth modular combustion unit and waste heat boiler to the APEFW facility, which was placed into operation in 2001. The Ministry of the Environment allowed the expansion under the condition that the entire facility meet tighter emission limits.

Prior to 2001, the average NOx emission at the APEFW facility was 233 ppm_{dv} at 11% O₂ (326 ppm_{dv} at 7% O₂) using typical combustion control technologies. The new NOx emission limit that the expanded APEFW facility was expected to meet was 110 ppm_{dv} at 11% O₂ (154 ppm_{dv} at 7% O₂). Prior to expansion, there was no stack emission limit. It was determined that the APEFW facility could not achieve the required, lower emission rate using only combustion control technology and that an add on control system would be required. Two