Sustainable treatment of medical wastes using landfill gas

By Edward McBean, Edward del Rosso, Fabiano Gondim, Rock Radovan and Louis-Philippe Mousseau

A full-scale demonstration project to sterilize medical wastes using a modified autoclave and powered by landfill gas has been constructed, and is now in the final commissioning stage in the Province of Catamarca, in northern Argentina. The project is being co-sponsored by the Canadian Climate Change Development Fund (CCCDF), currently managed by the Canadian International Development Agency (CIDA), and by Conestoga-Rovers & Associates, a Canadian engineering firm, Hydroclave Inc. from Kingston, Ontario, plus assistance from a number of local Argentinean partners.

The project was designed with pertinent Canadian equipment imported to Argentina; the project team is currently transferring Canadian technology and providing institutional capacity building to the local community of San Fernando del Valle de Catamarca (Catamarca), a municipality located in northwestern Argentina.

Biogases generated from the contents of a 30 m by 30 m energy cell (Photo 1) and containing approximately 6,000 tonnes of municipal solid waste, are collected and piped to a boiler that generates low pressure steam. The steam is utilized for the indirect heating of medical wastes, which are contained in a modified autoclave system (see Photo 2). Of the 75 ft³/min of biogases, which are generated by the biocell, only 15 ft³/min are diverted to the boiler, with the excess being flared. Each batch of medical wastes (approximately 68 Kg in quantity) is sterilized medical at a pressure of 15 lb/in² and a temperature of 121°C in a 60-minute cycle. For each batch, a biological indicator is submitted to the same waste conditions, incubated and checked by colorimetry, certifying the effectiveness of the sterilization procedure.

This application of landfill gas successfully integrates the waste-to-energy project to a medical waste treatment facility. Prior to the project, the medical wastes were being disposed into the municipality's 'dump' (see Photo 3 which shows a needle lying on the landfill's surface), and hence the results include greatly reduced health exposure hazards to the members of the local population performing noncontrolled waste scavenging activities as well as to other citizens of the municipality. As well, by combustion of the biogas generated by the refuse in the energy cell, releases of methane to the atmosphere are prevented, and hence the project is contributing toward decreased global warming impacts.

The project includes specific training for the municipality's wastepickers, improving their working environment, and preventing direct contact with the medical wastes when handling wastes to separate recyclable materials. Several agencies in Argentina associated with the environmental and health sectors have demonstrated a high level of interest in the project, with the local municipality currently reviewing medical waste management practices.

Canada is also benefiting by the project since Canadian expertise is being transferred, opening new markets as well as providing a low-cost opportunity to mitigate climate change under the Kyoto Protocol commitment, complying with the objectives of the CCCDF. Definitely the undertaking is creating a 'win-win' situation for the participants involved.

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