The Sustainable Landfill

from

SALT Inc.

(Sustainable Aerobic Landfill Technologies)

Traditional landfills are anaerobic sealed tombs, deigned to deprive the site of moisture and oxygen, as well as to prevent “leachate” from percolating through and compromising the groundwater. The downside is that groundwater contamination often does occur, organics can take up to 100 years to decompose, foul odours are emitted and approximately 1.7 tons of greenhouse gases (mostly methane) are generated for every ton of waste in placement.

SALT employs three technologies to remediate a landfill

1) Aerobic Bioreactor

The aerobic bioreactor emulates nature. A series of vertical wells are drilled into a landfill and leachate is collected and re-circulated back into the waste. Low-pressure compressed air is then blown into the waste mass. Anaerobic bacteria quickly perish and are replaced by aerobic bacteria that almost immediately eliminate methane and curb odours. Leachate quality is vastly improved and organics are composted in 2 to 3 years. Airspace gain of up to 25% is also realized as a result of material compaction.

2) Mining & Classification

Once the landfill has been stabilized, it can be mined. On average, a landfill consists of 50% to 55% organics and 5% to 7% metals. Classification separates the “compost” and the metal components of the landfill. This relieves the landfill of about 60% of the total volume.

3) Product Manufacturing

The remaining components consist of a variety of inert elements (co-mingled plastics, rubber, carpet, building materials). With the assistance of the National Research Council of Canada, SALT has developed a process to cost-effectively transform these inert elements into value-added products (utility poles, railway ties, marine docks, landscaping blocks). These products are impervious to weather, uniform in consistency and exhibit good flexural and tensile characteristics. What was once considered waste is now a potential profit center.

Summary

At the end of the process, about 85% to 90% of a site can be cost-effectively recycled. A landfill can be reconditioned and reused many times as a recycling center thereby avoiding major public relations issues and the lengthy and costly process of new site approvals along with the related infrastructure costs. Many capital-intensive operations associated with waste collection and disposal (municipal waste, municipal sludge, blue box program, green box program) can be combined into one low-cost solution for the greater good.

Impact of the Aerobic Bioreactor on Greenhouse Gases

In Canada, the fourth largest source of greenhouse gas emissions is landfills, ranking only behind energy, industry and agriculture. Landfills account for 29 million tons of carbon dioxide equivalent annually.

Deploying an aerobic bioreactor on a landfill would have immediate positive effects. The production of methane (CH4), which 21 times more harmful than carbon dioxide (CO2), ceases almost immediately. If deployed on all of Canada's landfills, over 310 million tonnes of CO2 equivalent could be eliminated in 3 years – **FOREVER!** No other existing technology can realize these kinds of reductions in the short term!

Carbon Credits

With the advent of global warming and climate change, conventional wisdom advocates penalties for excessive production of methane, the most common and harmful of the greenhouse gases. The majority of carbon offset programs worldwide are "cap & trade" systems whereby polluters such as coal-fired electrical generators are given annual emission thresholds they must strive to meet. If annual methane emissions fall under the threshold then credits are issued. If thresholds are exceeded, then penalties are imposed. Polluters must pay the penalties or purchase credits from firms or projects (such as aerobic landfill projects) that have credits available. Penalties will typically increase year over year. Carbon exchanges have evolved for the trading of credits. Penalty price points as well as supply and demand of available credits will dictate credit market prices.

Typically, every tonne of landfill waste generates about 1.4 tonnes of methane. The aerobic bioreactor technology reduces that output by approximately 85%. Therefore one ton of landfill waste is roughly equal to one carbon offset credit. Other methods (gas capture & flaring and LFG energy generation) fall well short of the aerobic process in terms of greenhouse gas mitigation and thus generate significantly less numbers of credits.

In Alberta, penalties for the first year of the provincial carbon reduction program have been set at $15 per ton of methane emitted above the allowable limit and will escalate to $65 over the next several years. The market will likely see initial carbon offsets trading in the $10 to $12 range with year over year increases keeping pace with penalty values.

SALT has struck an agreement with the largest dealer in greenhouse gases in North America to fund aerobic landfill projects. In exchange for carbon credits, funds will be advanced to implement and operate projects that meet several basic minimum requirements. SALT has access to in excess of $100M for aerobic landfill projects.

Current Status in Canada

Alberta was the first province in Canada to adopt a carbon trading mechanism. Baseline Emissions of Calgary drafted and presented the aerobic landfill protocol to Alberta Environment. Baseline is the recognized leader in Canada in the field of carbon emission systems and technologies. Baseline developed the protocol standards, co-authored the Alberta trading system legislation and wrote almost all of the 25+ accepted protocols.

In December of 2007, Baseline was retained by Environment Canada to evaluate over 350 various Carbon Protocols from trading systems worldwide. Each protocol was graded on a point total of 27. The SALT aerobic landfill process received a grade of 25.5, placing it in the top 20, and ensuring it of being a primary protocol for the Federal government.

In early February of 2008, the Province of Ontario retained Baseline to establish GHG protocols for Ontario. The deadline for completion is early April 2008. The aerobic landfill process is one of the protocols that the province will adopt. It is anticipated that Ontario will implement a carbon reduction trading system before the end of 2008.

Baseline has openly opposed the proposed Ontario mandate of gas flaring for landfills over 1.5 Million tonnes. They argue that such legislation is contrary to the public good and will inhibit the normal development of a GHG trading system. It is suspected that the proposed legislation will NOT go forward.

The aerobic bioreactor is considered to be the most effective carbon mitigation technology in Canada. It produces more carbon reductions, faster and at less cost than any other technology.

Why is this important? Because efficient carbon reduction not only mitigates more greenhouse gases, but also becomes the economic driver to offset the cost of implementing the aerobic technology.

By employing an aerobic bioreactor, the value of the generated credits would offset the cost of implementing and operating the system. In essence, the system would be **cost-free**.

SALT Advantages

- Elimination of greenhouse gases
- Landfill life greatly extended
- Landfills can be reused as recycling centers (becoming assets - not liabilities).
- Groundwater contamination is mitigated
- Existing contaminated groundwater can be remediated.
- Closed landfills can be recycled or recovered for higher value uses.
- Communities can recycle their own waste without costly transfers to other sites
- New landfill approval and related infrastructure requirements are eliminated
- Existing landfill footprints can be dramatically reduced, requiring space for only 5 to 6 years of waste
- Post-closure perpetual maintenance is eliminated
- Odours, a major “not in my back yard (NIMBY)” issue, are mitigated.
- Leachate is contained and ultimately eliminated prior to any seepage.
- Safety systems can be examined and repaired after the landfill is mined
- Valuable resources are recovered, minimizing the requirement for virgin materials.
- Air quality is vastly improved
- Compost can be used for daily cover, municipal use, personal use, agricultural use for non-food crops, construction use, and clean fill.
- Only one collection stream is required
- Costly blue box & green box programs could be eliminated

- Alternatives such as incineration require massive capital and operating costs.
- Environmental groups would embrace the concept
- Developers would embrace the process for conserving land for alternative use.
- Closed landfills, with environmental issues, could be remediated at minimal cost.
- Landfills having higher value land use can be made more productive.
- Wastewater sludge can be processed through the bioreactor, reducing the impact on already overburdened municipal wastewater treatment facilities.
- Pre-sorting of recyclables, a manually intensive, costly and extremely hazardous process for workers (chemicals, needles, broken glass, propane tanks and other hazards) could be eliminated.

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