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ALBERTA INNOVATES

CLEAN RESOURCES

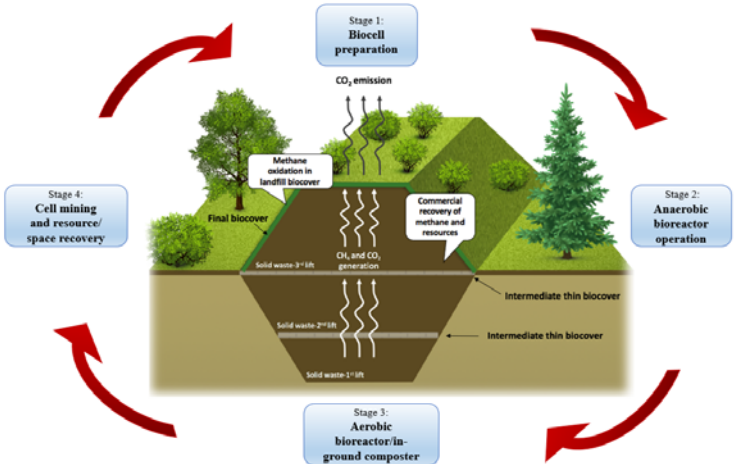
CLEAN TECHNOLOGY

BIOENERGY – WASTE CONVERSION

FUNDING DETAILS

Landfill BioCell Technology for Biomass Waste to Energy and Waste Processing

Landfill gas is high in methane content which contributes to greenhouse gas (GHG) emissions. This project, led by Dr. Patrick Hettiaratchi, demonstrates the application of a three-stage, Landfill Biocell (LBC) technology to eliminate all methane emissions associated with biomass (organic) waste. In the first stage, the LBC is operated as an anaerobic bioreactor to maximize energy (methane) recovery from biomass waste. In the second stage, the waste is allowed to stabilize, operating either in aerobic mode or continuing in anaerobic mode. In the third stage, the LBC is mined to recover bio-stabilized organics and combustibles for conversion to refuse-derived fuel. Mining of the LBC frees up valuable landfill cell space while maintaining cell infrastructure. for reuse.



RECIPIENT:
University of Calgary

PARTNERS:
City of Calgary; Government of Canada (NSERC)

TOTAL BUDGET:
$1,328,000

AI FUNDING:
$428,000

PROJECT DATES:
MAR 2020 - DEC 2022

PROJECT TRL:
Start: 4
End: 7

APPLICATION

Considering there are no silver-bullet solutions to solid waste management problems, municipal and industrial waste managers are always on the lookout for new cost-effective technologies. The Canadian waste management industry could consider the LBC technology as an alternative to conventional technologies, such as in-vessel anaerobic digestion, to recover energy from both municipal solid waste and other residual biomass arising from agriculture, food, and forestry industrial sectors.

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PROJECT GOALS

The overall goal of this project is to demonstrate the applicability of the LBC technology as a viable alternative to conventional methods of energy recovery and methane emission mitigation. Individual project objectives are to:

- Conduct cell mining and resource/space recovery, and demonstrate successful completion of the final cell stage of the LBC operation at a biocell located at the City of Calgary's Shepard Waste Management Facility;
- Assess the feasibility of using the recovered bio-stabilized organic material (BSOM) as landfill biocover material to minimize methane emissions from landfills in future;
- Assess the waste-to-energy potential of recovered high energy components as refuse-derived fuel (RDF);
- Evaluate the efficiency of greenhouse gas (GHG) mitigation and the economic feasibility of LBC operations in Alberta landfills.

BENEFITS TO ALBERTA

The successful completion of the Calgary Biocell Project and eventual adoption of the LBC technology in Alberta and other jurisdictions as a viable waste management technique could result in:

- A significant reduction of fugitive methane emissions associated with municipal and industrial waste in Alberta;
- A cost-effective method to generate energy from biomass waste produced by municipalities, the wood products industry, and agricultural operations throughout Alberta;
- The availability of a home-grown technology that can be exported to other jurisdictions, providing Albertans with new opportunities for employment, research, and development;
- The tangible support of the Government of Alberta in meeting greenhouse gas mitigation targets in a cost-effective manner; and
- The creation of partnerships between industrial and municipal sectors.

8 Publications

4 HQPs Trained

7 Project Jobs

18 Future Jobs

1 New Product/Service

25 kt/yr Project GHGs Reduced

180 kt/yr Future GHGs Reduced

CURRENT STATUS

APR 2021 – IN PROGRESS

In order to assess degradation and bio-stabilization of organic waste, three boreholes were made and 18 material samples were collected at various depths from City of Calgary biocells. Preliminary waste characterization of borehole samples is complete, and laboratory analysis is in progress. Laboratory experimental set-ups are being prepared for waste-to-energy (gasification) experiments and biological characterization, including methane production. Planning and design of biocell mining activity has started.