RENEWABLE NATURAL GAS BACKGROUNDER
February 2019

Technical Feasibility

By cleaning biogas of impurities, it is possible to upgrade landfill gas into pipeline quality renewable natural gas (RNG). The core processes in upgrading biogas include CO_2 and N_2 removal, which brings the CH_4 percentage up to an acceptable level for injection into the FortisBC distribution system. Ancillary processes include removal of moisture, H_2S and/or O_2, and waste gas destruction.

The Capital Regional District (CRD) retained SCS Energy to undertake a *Renewable Natural Gas Technical Feasibility Design Report* that examines the technical feasibility of upgrading landfill gas to RNG at the Hartland site. This report evaluated 12 upgrade process chains through multiple criteria, including the lenses of cost, efficiency, technical feasibility, site constraints at Hartland Landfill, safety, reliability, potential for expansion and opportunities for residuals utilization. A technical risk assessment, analysis of biogas availability and evaluation of FortisBC biogas requirements were also conducted and concluded that CRD's landfill gas can be upgraded to meet the FortisBC specifications.

The CRD additionally has worked with FortisBC to assess project feasibility and confirm that FortisBC is able to accept RNG produced at the CRD site. To inject RNG into the FortisBC distribution network, a pipeline extension will be needed to connect the FortisBC grid to Hartland Landfill. FortisBC presented two options for interconnection to its natural gas distribution network:

1. West Saanich Road and Old West Saanich Road; or
2. Sparton Road at Old West Saanich Road.

Market Viability

Clean BC, the climate change strategy released by the Province of BC in 2018, identifies a clean natural gas grid as a central component of the provincial strategy to reduce greenhouse gas (GHG) emissions. The strategy sets a target for 15% of residential and industrial natural gas consumption to be renewable by 2030. The strategy also aims to increase the supply of cleaner fuels by ramping up new production in BC of 650 million litres of renewable gasoline and diesel by 2030.

In support of the required market transition, the Province has amended the Greenhouse Gas Reduction Regulation to authorize the public utility (FortisBC) to pay up to $30 per GJ to acquire RNG. The actual price CRD receives for gas would be determined through negotiations with FortisBC. It would depend in part on the cost of production, and requires approval of the BC Utilities Commission. In this negotiation, it would benefit the CRD to seek to maximize project returns and obtain an equivalent or greater return on production of RNG, as is currently received for selling electricity. The sale price of RNG would be negotiated after conducting a procurement process for the capital equipment, thereby shielding the organization from price escalation risk.

Opportunities for Synergies

Project interdependencies to date: Landfill gas utilization and organics processing have, in many ways, been viewed as discretely separate projects. They share interdependencies that could inform the technology options available and have implications in terms of capital costs and borrowing. The process technology that is used to upgrade landfill gas into RNG can also be used to upgrade other sources of biogas, including the biogas generated through anaerobic digestion when processing organics diverted from the landfill.

Solid Waste Management Plan (SWMP): Confirming an approach and preferred technology for utilizing landfill gas and organics processing will help inform public engagement on the SWMP in late summer 2019, and will inform the sizing and technical requirements of landfill gas utilization infrastructure.

Opportunities for Innovation and Research

Clean BC, the Province's recently released climate change strategy sets a pathway towards decarbonization of BC's fuel supply. The strategy targets 15% of all residential and commercial natural gas supply to be renewable by 2030 and additionally aims to increase the supply of cleaner fuels by ramping up new production in BC of 650 million litres of renewable gasoline and diesel by 2030. Market transformation will need to occur to respond to this challenge.

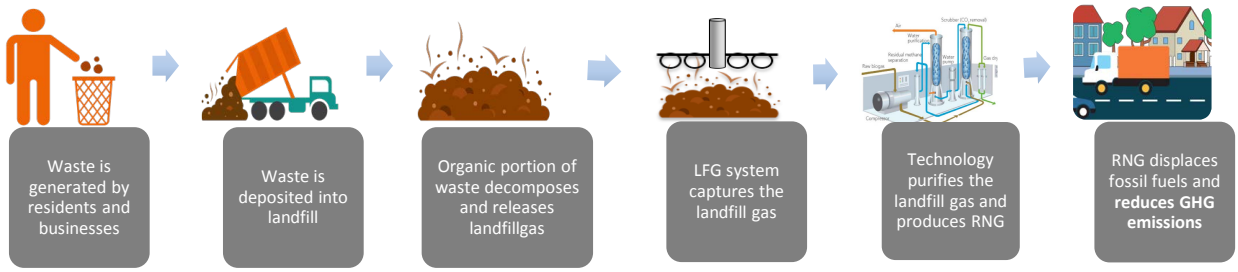
Development of an RNG initiative at Hartland provides an opportunity for the CRD to address the climate change emergency that has been identified and declared, and participate in BC's transition to decarbonize the fuel supply. Through employing proven RNG upgrade technologies in new system pathways, the CRD can mitigate project risk of RNG upgrade, while still making best use of RNG, and associated waste streams.

Researchers at the University of Victoria's Institute for Integrated Energy Systems have developed a proposal for a Renewable Fuels Research Center, hosted at Hartland Landfill, that would respond to the need for advanced renewable fuel supply in BC, and globally. Early conversations between UVic, ForitsBC and the BC Ministry of Energy, Mines and Petroleum Resources have identified early support for the initiative. If the CRD Board endorses RNG as the preferred approach to landfill gas utilization, staff will return to the Board for direction on pursuing feasibility exploration on the Renewable Fuels Research Center, including direction on entering into an Memorandum of Understanding with UVic to further investigate project feasibility, including financing strategy and availability of grant and/or partner funding.

Climate Change Lens

The landfill gas utilization project addresses that landfill gas collected through the landfill gas collection system (currently 69%), avoids the release of this gas into the atmosphere contributing to greenhouse gas emissions. Purifying the landfill gas into RNG and using the RNG in place of fossil fuels adds additional climate change mitigation benefits, by displacing combustion of conventional natural gas (and associated emissions) with a clean emissions source. Upgrading landfill gas to electricity will avoid the release of landfill gas into the atmosphere. While the BC Hydro grid is relatively clean (currently 93% renewable, with a provincial target of 100% renewable by 2025), there are not the same GHG emissions benefits when displacing grid electricity as conventional natural gas.

Overview of one source of RNG: from waste to landfill to RNG *Source: Hartland RNG Project Climate Lens, Pinna Sustainability Inc.*



Summary of Findings

Upgrading landfill gas into RNG opens the possibility of using the same technology to upgrade other sources of biogas, such as organics processing or wastewater treatment. Displacing conventional natural gas with biogas or RNG, a low emissions source of energy, creates GHG emissions reductions. This low emissions energy source can then be used in CRD or municipal operations to help achieve GHG reduction targets, or can be sold to generate a financial return. This return can be reinvested into the management of the landfill, into synergistic projects, such as organics processing, or a portion could be directed toward regionally significant climate change mitigation or adaptation activities. A stream of RNG and residual by-products, such as carbon dioxide could also be directed towards research around renewable fuels, in partnership, with the University of Victoria.

Developing a project to upgrade landfill gas into RNG at the Hartland Landfill is the recommended approach based on the financial, environmental and technical feasibility analysis that has been conducted.