Tapping the Potential of Landfill Gas

THE NATIONAL GAS COMPANY OF TRINIDAD AND TOBAGO LIMITED
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In service of global climate action imperatives and national emissions reduction targets, The National Gas Company of Trinidad and Tobago Limited (NGC) and its subsidiary companies are making pioneering advances into the green energy space. Among the latest projects being explored by The Group is the conversion of landfill gas into a commercially viable energy source.

On September 13th, 2021, a Memorandum of Understanding (MOU) was signed among NGC, NGC CNG Company of Trinidad and Tobago Limited (NGC CNG), National Energy Corporation of Trinidad and Tobago Limited (National Energy), and the Trinidad and Tobago Solid Waste Management Company Limited (SWMCOL), to explore opportunities to capture and commercialise landfill gas for uses such as the provision of carbon-negative, renewable compressed natural gas.

What is Landfill Gas?

Landfill gas (LFG) is a natural byproduct of the decomposition of organic material in landfills. LFG is composed of roughly 50% methane (the primary component of natural gas), 50% carbon dioxide (CO_2), and a small amount of non-methane organic compounds. Methane is a potent greenhouse gas 28 to 36 times more effective than CO_2 at trapping heat in the atmosphere over a 100-year period, according to the latest Intergovernmental Panel on Climate Change (IPCC) assessment report (AR5). By reducing methane emissions, we can quickly reduce the atmospheric warming effect, and according to Jeff Chanton, Climate Scientist at Florida State University, targeting landfills is a great place to start.

Landfills help keep our communities clean, but they also pose serious threats to the health of our environment. The most pressing environmental concern regarding landfills is their release of methane.[1] At the same time, methane emissions from municipal solid waste (MSW) landfills represent a lost opportunity to capture and use a significant energy resource.

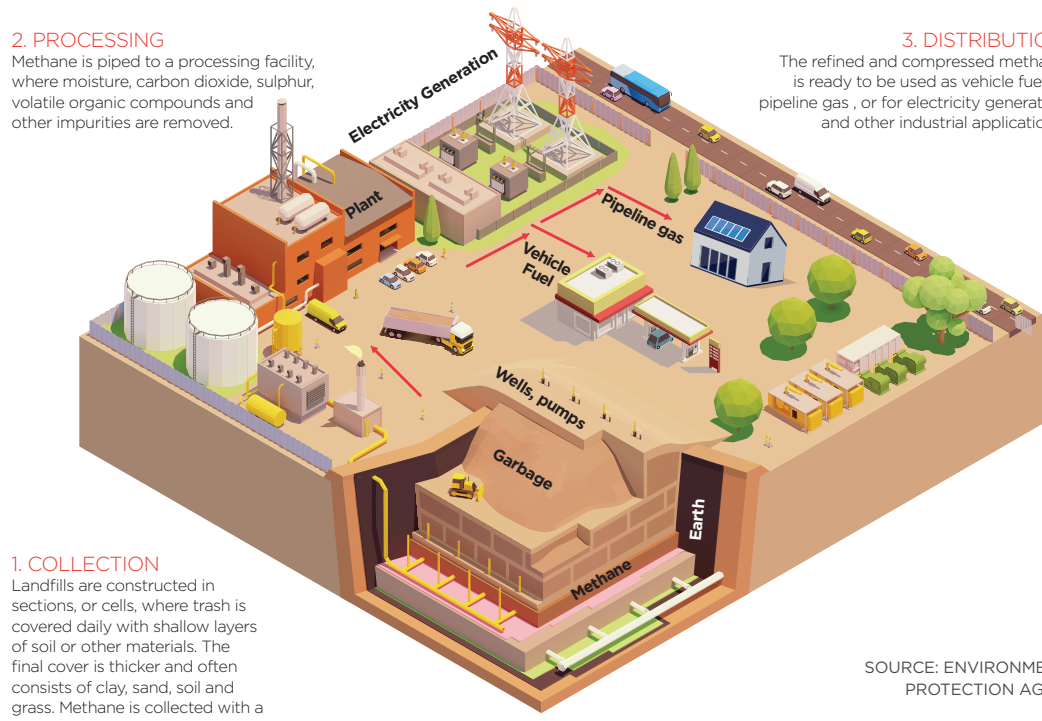
Utilising landfill gas as a renewable energy source helps to meet energy needs, addresses environmental and health concerns, and provides economic benefits such as revenue generation, job creation, and market development. By capturing methane from landfills, various forms of energy can be produced, such as electricity, boiler fuel, steam, alternative vehicle fuel, and pipeline gas.[2] Current industries using LFG globally include auto manufacturing, chemical production, food and beverage processing, pharmaceuticals, cement and brick manufacturing, wastewater treatment, consumer electronics and products, paper and steel production, and prisons and hospitals.

LFG can also be upgraded to renewable natural gas (RNG), a high-BTU gas, through treatment processes by increasing its methane content and, conversely, reducing its CO_2, nitrogen, and oxygen contents. RNG can be used in place of fossil natural gas, as pipeline-quality gas, compressed natural gas (CNG), or liquefied natural gas (LNG). Options for the use of RNG include thermal applications to generate electricity or as fuel for vehicles. The RNG can be used locally at the site where the gas is produced or can be injected into the natural gas transmission or distribution pipelines for delivery to another location.[3]

[1] https://www.colorado.edu/ecenter/2021/04/15/hidden-damage-landfills

[2] http://large.stanford.edu/courses/2014/ph240/thorne2/

Landfill Methane Capture and Use



SOURCE: ENVIRONMENTAL PROTECTION AGENCY

Exploration of the Use of Landfill Gas for Energy in Trinidad and Tobago

In Trinidad and Tobago, most municipal solid waste is disposed of in four main landfills - the Beetham Landfill, Forres Park Landfill, Guanapo Landfill and Studley Park Landfill - which are either close to capacity or are at capacity and still collecting waste. Fifty-five percent of Trinidad's MSW goes to Beetham, 16% to Guanapo, and 29% to Forres Park. All of Tobago's waste goes to Studley Park.

According to the Waste Management Report presented before the Joint Select Committee of the Parliament in 2019, the average person in Trinidad and Tobago generates approximately 1.5 kilograms of waste per day, which amounts to approximately 2,000 tonnes of waste that reaches the landfill sites per day. This figure does not include the large quantities of waste that are improperly disposed of, polluting our streets, drains, rivers, beaches, and other environs.[4] In 2020, Trinidad and Tobago had a forecast estimate of 1.56 million tonnes of solid waste generated per annum.

When we consider that decomposition of this waste generates a potential energy source, it makes commercial and environmental sense to explore options for mobilising and utilising this resource. From another perspective, since all our landfills generate significant quantities of Green House Gas (GHG) emissions, putting LFG to productive use can also help reduce our country's growing carbon footprint.

[3] https://www.epa.gov/lmop/basic-information-about-landfill-gas

[4] https://www.swmcol.co.tt/index.php/education/7-waste-management-topics

In this context, the NGC Group's MOU with SWMCOL is a valuable one. Through this MOU, the parties will identify and quantify landfill gas emissions for existing landfills, explore existing and new infrastructure requirements to facilitate transportation and commercialisation of extracted landfill gas volumes, and explore opportunities for utilisation of the derived renewable compressed natural gas as an alternative transportation fuel for vehicles. Specifically, the captured methane emissions can potentially be used to fuel SWMCOL's fleet of vehicles and other official government fleets.

It is expected that this initiative will contribute to Trinidad and Tobago's energy transition journey and create new revenue streams for the country.

Advancing the Green Agenda

Through its Green Agenda projects and partnerships, The NGC Group continues to explore several opportunities to reduce Trinidad and Tobago's reliance on fossil fuels and transition the country into a decarbonised, safer, and healthier environment. With its focus on reducing its corporate carbon footprint while simultaneously supporting Trinidad and Tobago in meeting its emissions reduction targets, The NGC Group is committed to driving the local energy transformation to a zero-carbon energy future. This collaboration with SWMCOL is just one of several partnerships that The Group is embracing to address the rapidly changing energy and economic landscape and mitigate the threat of climate change.

Now more than ever, renewable energy and energy efficiency initiatives are needed if we are to create a circular economy and achieve a sustainable energy future. Harnessing the power of landfill gas is a step in the right direction.