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Overview of the CSA/ANSI B149.6 Code

Code for Digester Gas, Landfill Gas, and Biogas Generation & Utilization







Background

Biogas is produced during the biological breakdown of organic solids. The biological process produces primarily methane from the decomposition of organic waste material, such as at a landfill site or under anaerobic conditions within a digester. The gas generated through this process is an energy source that can be captured and utilized safely. It is a highly moist mixture of gases, consisting of approximately 55 to 70 percent methane, 25 to 35 percent carbon dioxide, and trace amounts of nitrogen and hydrogen sulfide.

Systems to produce biogas are growing in demand as a basis to produce renewable natural gas (RNG) and as a key component in meeting federal and provincial mandates for reducing greenhouse gas emissions and the climate impact of carbon-based fuels.

CSA/ANSI B149.6: *Code for Digester Gas, Landfill Gas, And Biogas Generation and Utilization* applies to the safety aspects of the operation and maintenance for the production, handling, storage, and utilization of digester gas, landfill gas and biogas in wastewater treatment plants, landfill gas systems, and biogas systems whether being newly constructed or upgraded.

Once biogas has been upgraded, dried, or treated to meet the specifications of the receiving utilities it is considered “commercial grade or pipeline natural gas” which falls beyond the scope of the Code.

Evolution of CSA/ANSI B149.6 Installation Code

2011

Launched in 2011, the mandate of the Code was to develop a national standard that addresses the safety of digester and landfill gas installations in Canada.

2015

The scope was modified in 2015 version to

- Include the installations dealing with biogas produced in a location other than a municipal wastewater treatment plant; and
- Apply requirements to Canadian and U.S. installations creating a binational Code.

2020

The scope was amended in the 2020 version to clarify Code coverage and exclusions.

- Several definitions were added or modified.
- The following requirements have been removed:
  - » Compliance with the requirements of the Code for the installation at landfills upstream of the main inlet valve on the vacuum side of the blower
  - » The requirement for a lock-up positive shut-off pressure regulator upstream of an appliance valve train
  - » The requirement for a flame arrester upstream of the relief valve on a gas storage container that is designed to store gas at a pressure above 100 kPag (14.5 psig)
  - » The landfill pipe slope percentage.
- Examples for hazardous areas were expanded to include odour control, equipment, components open-type gas compressors, or blowers.
- The requirement of having an automatic safety shut-off valve certified to CSA/ANSI Z21.21:19/CSA 6.5:19, *Automatic valves for gas appliances*, and marked C/I to shut-off the landfill gas supply to a waste gas burner that is not equipped with safety shut-off valve(s) was added to the Code.
- The testing method for membrane gasholders used in biogas installation has been modified.









Where is CSA/ANSI B149.6 Referenced?

There are various authorities having jurisdictions (AHJ) in the United States and Canada that treat biogas installations differently. In Canada, the following jurisdictions have been identified that already reference different editions of the Code in their regulations and enforce its requirements:



Canadian provinces that reference different editions of the Code and enforce requirements

Province	Code
British Colombia (BC)	B149.6-15
Saskatchewan (SK)	B149.6-20
Manitoba (MB)	B149.6-20
Ontario (ON)	B149.6-20
New Brunswick (NB)	B149.6-15
Nova Scotia (NS)	B149.6-15
Prince Edward Island (PEI)	B149.6-15
Yukon (YT)	B149.6-20

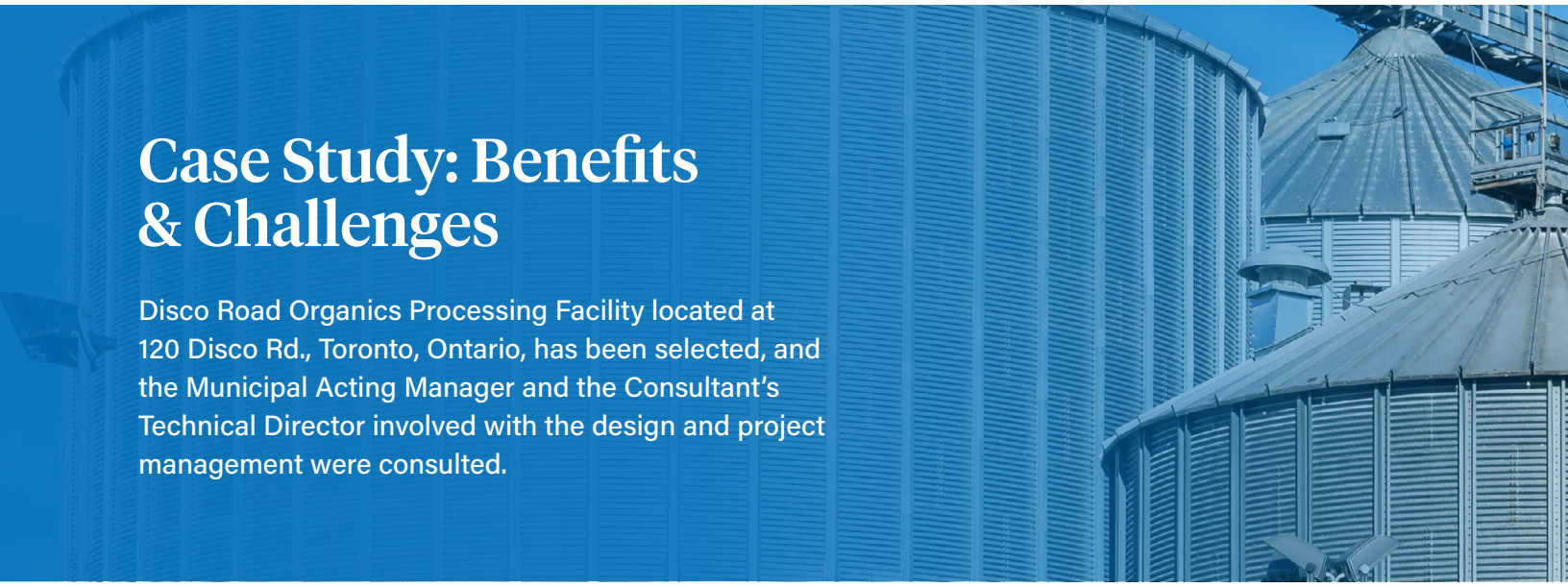


Newfoundland & Labrador, Northwest Territories, and Nunavut are among jurisdictions that have not incorporated the Code by reference yet. Meanwhile, Alberta and Québec have proposals under consideration for referencing the Code in regulations.

In the U.S., there are numerous AHJs, some only rely on the professional engineer to design the system according to “good engineering practice”; others may ask to comply with existing codes or standards.

For jurisdictions that are not referencing the Code, two primary reasons were given:

- First, the AHJ may be waiting for a higher authority to take action and change the existing regulations to reference the Code.
- Second, the AHJ does not yet see the benefit of referencing the Code, as there are too few installations of this type in their jurisdictions.



Case Study: Benefits & Challenges

Disco Road Organics Processing Facility located at 120 Disco Rd., Toronto, Ontario, has been selected, and the Municipal Acting Manager and the Consultant's Technical Director involved with the design and project management were consulted.

Facility specifications [3]:

75,000 TONNES/YEAR of source separated organics (SSO)

Approximately **110m^3** of biogas per tonne of SSO at 65% methane

Overall facility construction ended in **2013**

This facility is owned by the **City of Toronto** and operated by **Veolia Water Technologies**

The major components of this biogas facility are two digester tanks, an enclosed type of flare, and two boilers running on the biogas that is derived from the collected organic waste or natural gas

By complying with the requirements of the CSA/ANSI B149.6 Code, in addition to having personnel/public safety increased, the risk of greenhouse gas leaks (namely CH_4) to the environment and related penalties issued by the Ministry of Environment will decrease.

Some users found that the Code is not descriptive enough while some believe it is beneficial as it doesn't limit the facility designer and increase the burden of obtaining approvals from the AHJ. It is important to note that in case there is a suggestion to improve the Code, stakeholders could take advantage of the "Request for Change" (RFC) system, where stakeholders could share their proposals and help improve the Code by suggesting the required change in a specific Clause. The other option is obtaining an interpretation (Request for Interpretation or "RFI") of that clause to get clarification.



Conclusion

Converting biogas to energy currently dominates the industry's focus, making it essential to know how to manage biogas production, collection, and safe handling. Today there is an influx of plant upgrades driven by plant expansion to allow for increased capacity and loading. A clear understanding of design principles will enable facilities and engineers to excel in creating safer, more efficient designs, thereby shifting biogas from the sidelines to the forefront of technological progress. CSA/ANSI B149.6 is a critical tool in supporting safe and efficient designs, which has been increasingly referenced by regulators to support growing interest in biogas production.

With increased reference, adoption, and use of CSA/ANSI B149.6, the biogas industry can continue its safe and efficient deployment of systems to increase the use of bioenergy.

References

[1] https://www.cfta-alec.ca/wp-content/uploads/2021/08/Construction-Codes-RA-2019.pdf

[2] https://fwrj.com/techarticles/0619%20tech%201.pdf

[3] https://www.ccibioenergy.com/wp-content/uploads/2018/01/CCI-Fact-Sheet_Disco_mar-2015_email.pdf

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