



The Emerging Field of Renewable Natural Gas

Clean Air Council & Clean Air Partnership Meeting

October 27, 2017 in Toronto



Building the Biogas Sector With You

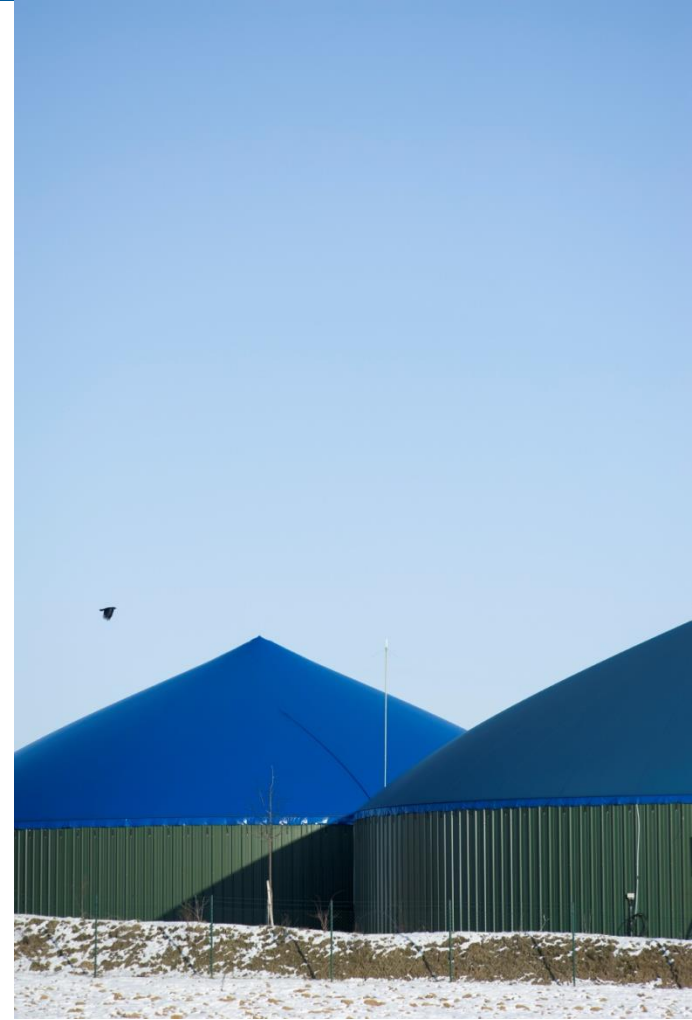
Overview

- Introductions
- Renewable Natural Gas
- Addressing Ontario Policy Goals
- Renewable Natural Gas in Ontario
- Municipal RNG Interest
- Developing RNG in Ontario
- Closing



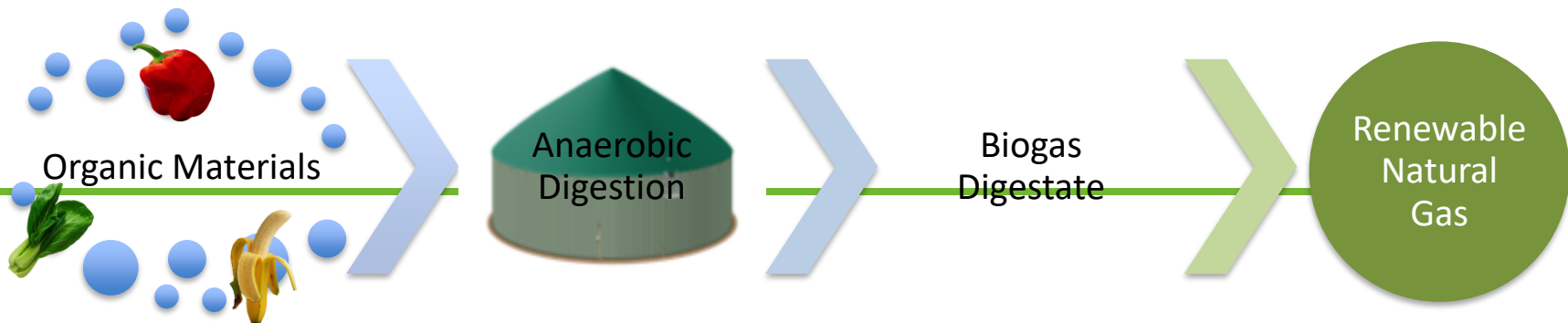
Canadian Biogas Association

- **Mandate**
 - The collective voice of the biogas industry promoting development of biogas to its fullest by capturing and processing organic materials through anaerobic digestion to maximize the utility and value inherent within that material
- **Roles**
 - Education and outreach
 - Advocacy and policy
 - Research



Renewable Natural Gas

- **Biogas** is a renewable source of methane gas
- **Anaerobic digestion** is the biological process of breaking down organic matter to create biogas
- **Renewable Natural Gas** is a low-carbon, upgraded form of biogas
- **Digestate** is a nutrient rich bi-product resulting from the anaerobic digestion process



Biogas/RNG Sources



Agriculture

- Livestock manure
- Crop residues
- Energy crops



Landfill Gas



Residential Source Separated Organics



Commercial Source Separated Organics

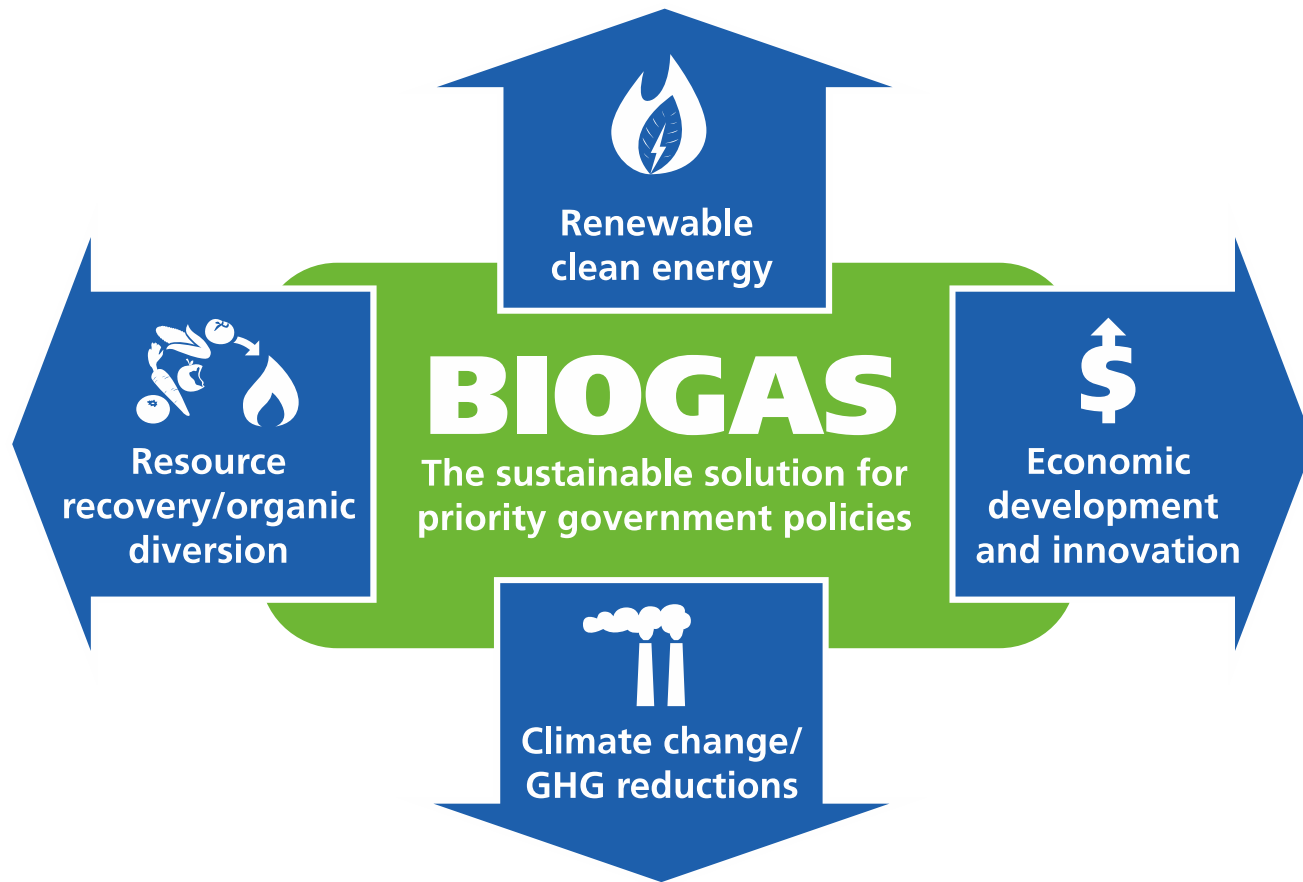


Wastewater Treatment

Ontario Policy Landscape

Policy	RNG Solution
Strategy for a Waste-Free Ontario: Building the Circular Economy <ul style="list-style-type: none">Goal of a zero-waste Ontario with zero GHG emission from the waste sector	<ul style="list-style-type: none">Divert organics from landfillsEliminates methane emissions from wasteAchieve a circular economy
Climate Change Action Plan	
<ul style="list-style-type: none">Establish low-carbon content for natural gas	<ul style="list-style-type: none">Proven technology and infrastructure ready to deliver low-carbon energy
<ul style="list-style-type: none">Renewable Fuel Standard for Gasoline	<ul style="list-style-type: none">Low-carbon intensity transportation fuel to meet GHG reduction targets
<ul style="list-style-type: none">Transportation Pilot Program for Agriculture and Agri-food	<ul style="list-style-type: none">Local, low-carbon fuel to reduce transportation GHGs and demonstrate RNG business models
<ul style="list-style-type: none">Cap and Trade, Offset Credits and Protocols	<ul style="list-style-type: none">Generate credits to meet compliance

RNG: The Sustainable Solution



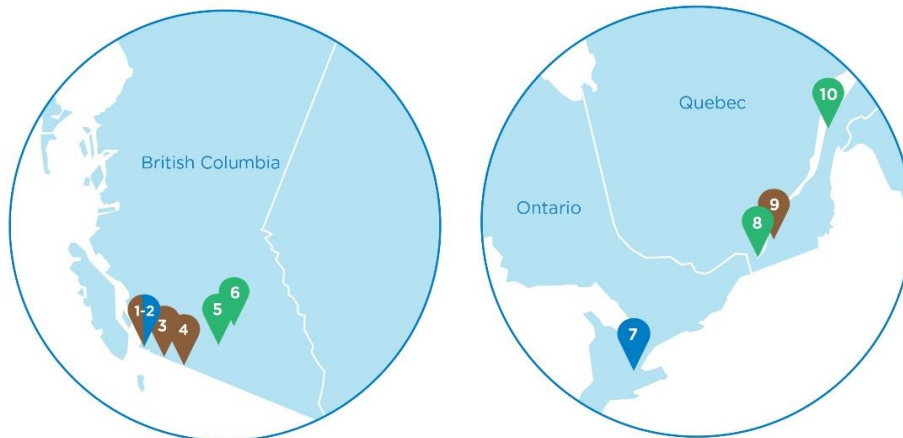
Biogas and RNG in Ontario



RNG in Canada

Canadian Renewable Natural Gas (RNG) Projects

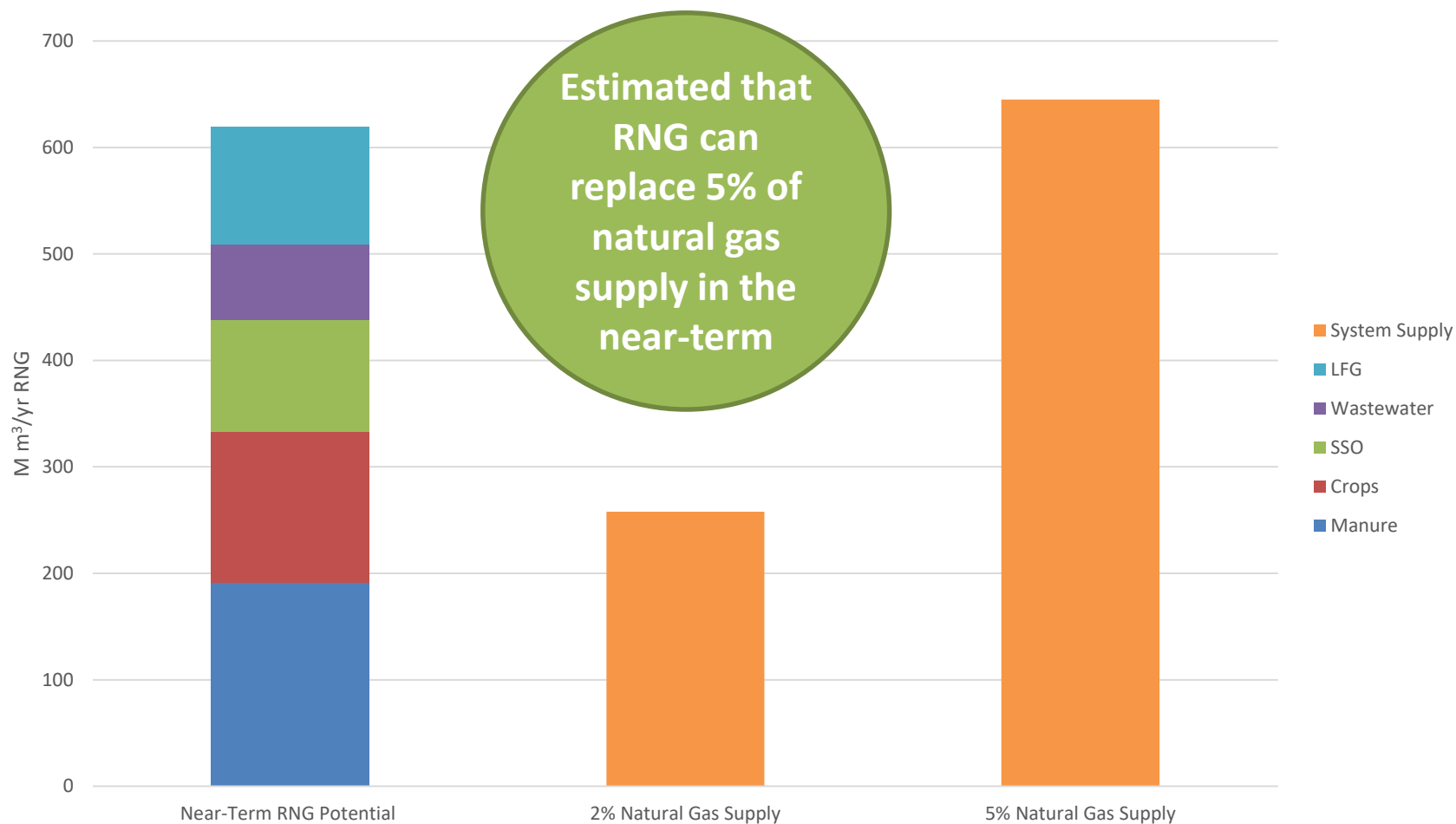
Operating & In Development as of 2017



 Digester	1 Delta, BC Start date: 2014 RNG Production: 470 homes/year Status: Operating	5 Kelowna, BC Start date: 2014 RNG Production: 530 homes/year Status: Operating	9 St. Hyacinthe, QC Start date: 2017 RNG Production: 5,054 homes/year Status: In development
 Landfill	2 Richmond, BC Start date: 2016 RNG Production: 440 homes/year Status: In development	6 Salmon Arm, BC Start date: 2013 RNG Production: 170 homes/year Status: Operating	10 Rivière du loup, QC Start date: 2016 RNG Production: 1,350 homes/year Status: In development
 Wastewater treatment gas	3 Surrey, BC Start date: 2017 RNG Production: 1,330 homes/year Status: In development	7 Hamilton, ON Start date: 2011 RNG Production: 2,695 homes/year Status: Operating	
	4 Abbotsford, BC Start date: 2010 RNG Production: 1,000 homes/year Status: Operating	8 Terrebonne, QC Start date: 2014 RNG Production: 28,000 homes/year Status: Operating	

Courtesy of Canadian Gas Association

RNG Potential in Ontario



RNG Applications

RNG is a renewable, low-carbon alternative to natural gas that can be utilized to/for:

Inject directly into the grid

Produce transportation fuel

Offset on-site energy needs

Homes
Municipalities
Businesses
Institutions
Industries

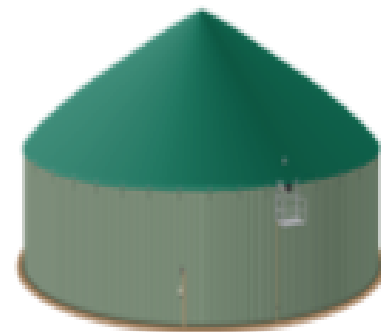
Growing Interest in RNG

- Municipalities are actively planning to build
- Several currently pursuing the concept— study or active procurement
 - Peel, Durham, York, Simcoe, London, Hamilton, Brantford, Ottawa
 - Toronto already building second AD plant



Anaerobic Digestion

- Many see the advantages to this technology, including:
 - Odour control
 - Small footprint
 - Treats organic waste and diverts organic material from landfill
 - Can deal with higher levels of contaminants like plastic and glass—allows consideration of high-density residential
 - Energy generation = a new source of revenue
 - Responds to GHG agenda



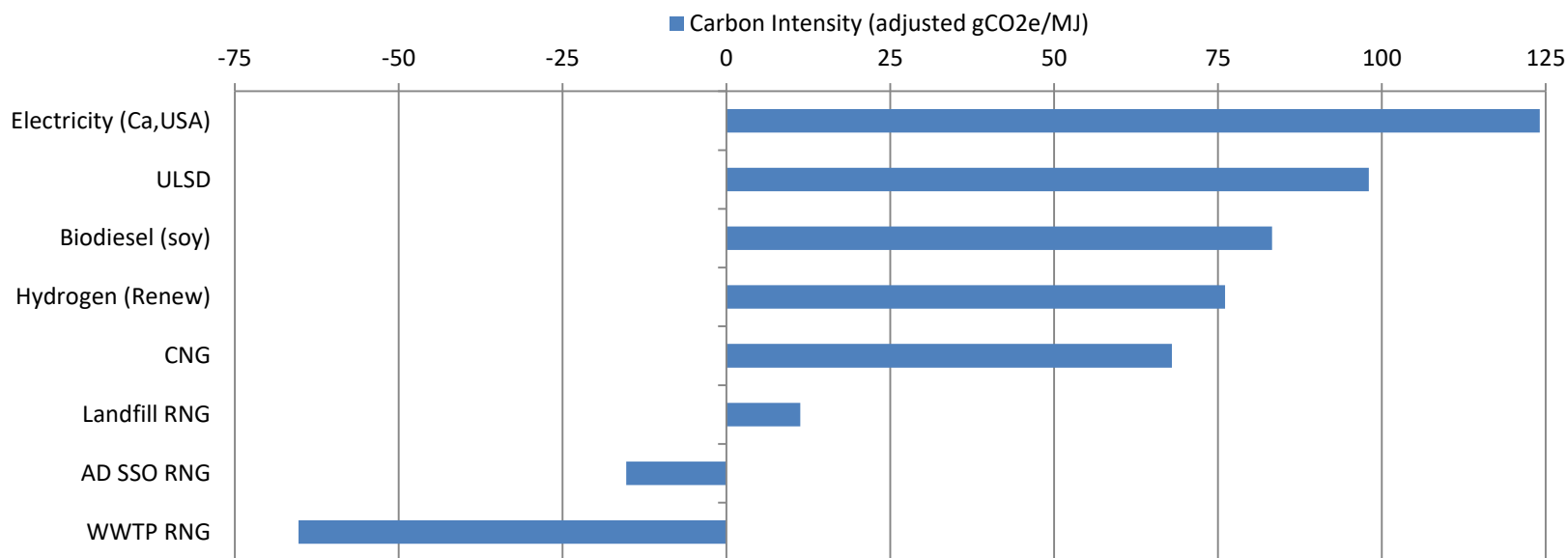
Environmental Benefits

- Only renewable fuel that directly displaces methane emissions
- Biogas projects a very effective strategy for meeting GHG-reduction targets
- Displacing natural gas with near-term RNG will reduce GHG emissions equivalent to taking nearly 200,000 cars off the road each year.*

* Source: ICF, *Marginal Abatement Cost Curve for Assessment of Natural Gas Utilities' Cap and Trade Activities*, July 2017

GHG Benefits in Transportation

Carbon Intensity of Alternative Fuels in California Heavy-Duty Vehicles



(Data Source: Carbon Intensity Lookup Table for Diesel and Fuels that Substitute for Diesel, California Air Resources Board)

Fuel Your Fleet with RNG



Roughly for every 10,000 people in a municipality, a biogas plant could produce enough RNG to fuel one collection truck for a year

Source: CBA Industry Expertise

Economic Advantage

- Produces value-added end-products
- Preserves landfill capacity
- Stimulates economic development in communities
- Creates new clean-tech jobs
- Leverages extensive pipeline infrastructure

RNG Challenges

- Challenges limiting future development
 - Approvals & Connection
 - Siting, pipeline access, public consultation, studies, NIMBY
 - Market competition
 - Provincial and state incentives upwards of \$30/GJ
 - Limits on feedstock
 - Cheaper disposal options
 - Cost
 - Low commodity pricing of natural gas and high capital investments in technology

RNG in Other Jurisdictions

- British Columbia and Quebec are leading the way with RNG programs.

Province	Date of RNG Program	Cost per GJ	Number of Projects
British Columbia	2007	Up to \$30	5 (2 more approved)
Quebec	2017	\$7-22	4 (others expected soon)

- Ontario needs to move forward with their planned RNG programs to spur RNG development and benefit from this multi-faceted solution that directly reduces methane emissions.

Unlocking the Value of RNG

- RNG is a sustainable, low-carbon waste management and energy solution



- What is needed:
 - A renewable content requirement
 - Sustainable, long-term revenues in order of \$21/GJ, average
 - Support innovation and opportunities to maximize benefits of the proven, low-risk RNG solution

RNG: A Winning Solution

- RNG supports a low carbon economy in Ontario with proven, cost-effective technology
- RNG offers Ontario a multi-faceted solution to:
 - Mitigating methane emissions
 - Effectively utilizing carbon sources and recycling nutrients
 - Generating renewable energy
 - Protecting our air, water and soil resources
 - Creating new and expanded economic opportunities

VALUE OF BIOGAS 2018:

OPPORTUNITIES FOR...

**VALUE OF
BIOGAS
WEST**

January 2018, Abbotsford BC

**VALUE OF
BIOGAS
EAST**

March 2018, Ottawa/Gatineau



**Canadian
Biogas
Association**

CELEBRATING 10 YEARS



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