



CampusEnergy2019

February 26 - March 1, 2019 | New Orleans, LA | Hilton New Orleans Riverside

Transforming GHG Emissions into Marketable Products

ONE YEAR LATER: *UPDATING OUR JOURNEY WITH POND TECHNOLOGIES*

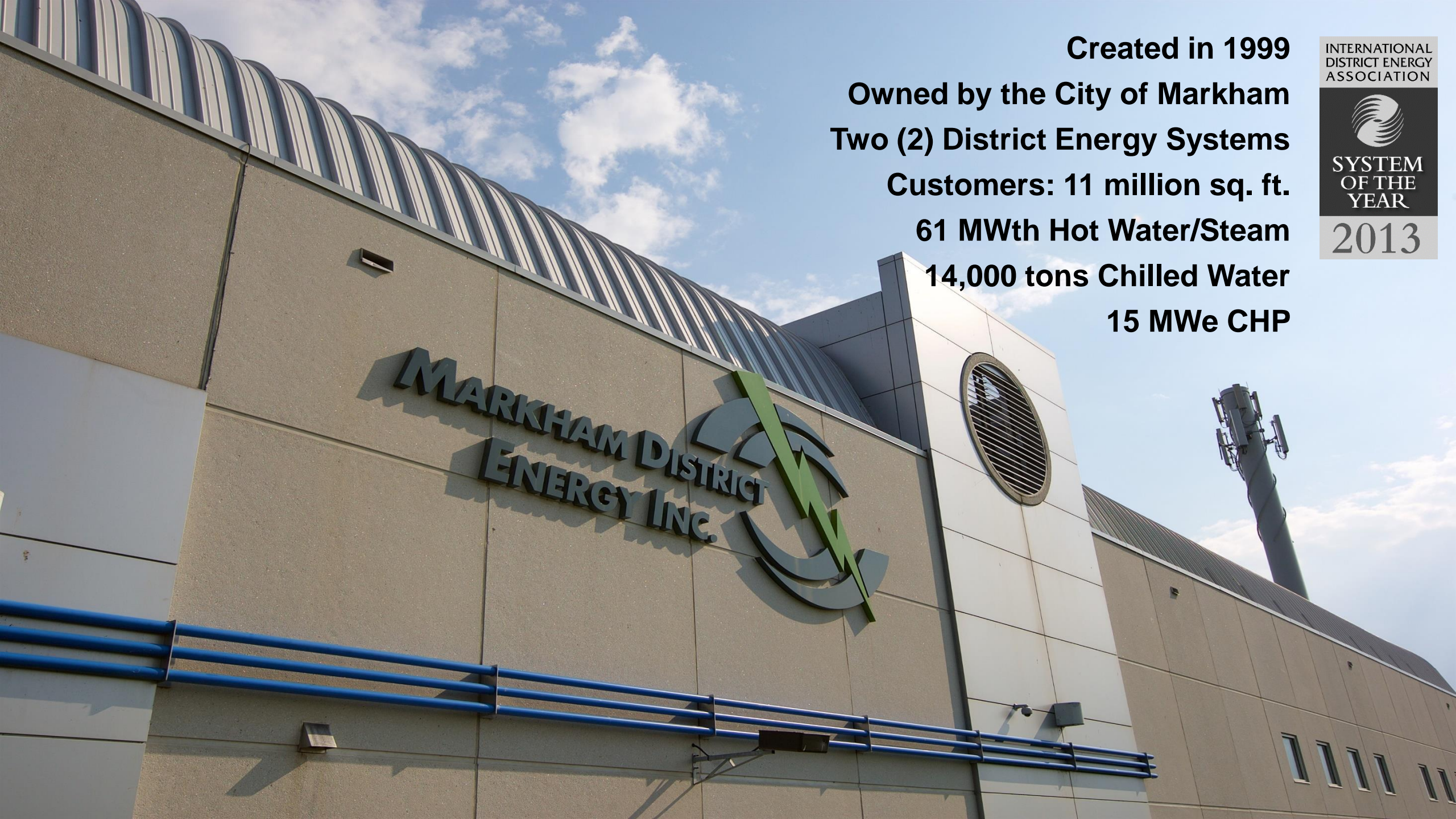
BRUCE ANDER
PRESIDENT & CEO
MARKHAM DISTRICT ENERGY INC.



February 28, 2019



**Markham District Energy
City of Markham
Net Zero
Pond Technology
Project Status**



Created in 1999

Owned by the City of Markham

Two (2) District Energy Systems

Customers: 11 million sq. ft.

61 MWth Hot Water/Steam

14,000 tons Chilled Water

15 MWe CHP

INTERNATIONAL
DISTRICT ENERGY
ASSOCIATION



SYSTEM
OF THE
YEAR

2013

CITY OF MARKHAM

350,000 Residents

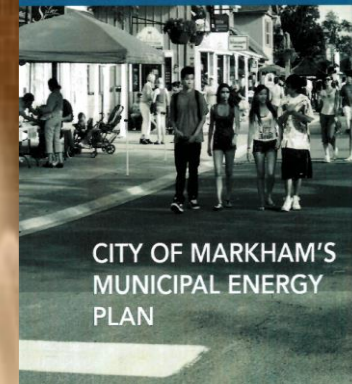
Canada's Fastest Growing City

Canada's Most Diverse City

Canada's High Tech Capital

**Award Winning Development Strategies &
Sustainability Planning**

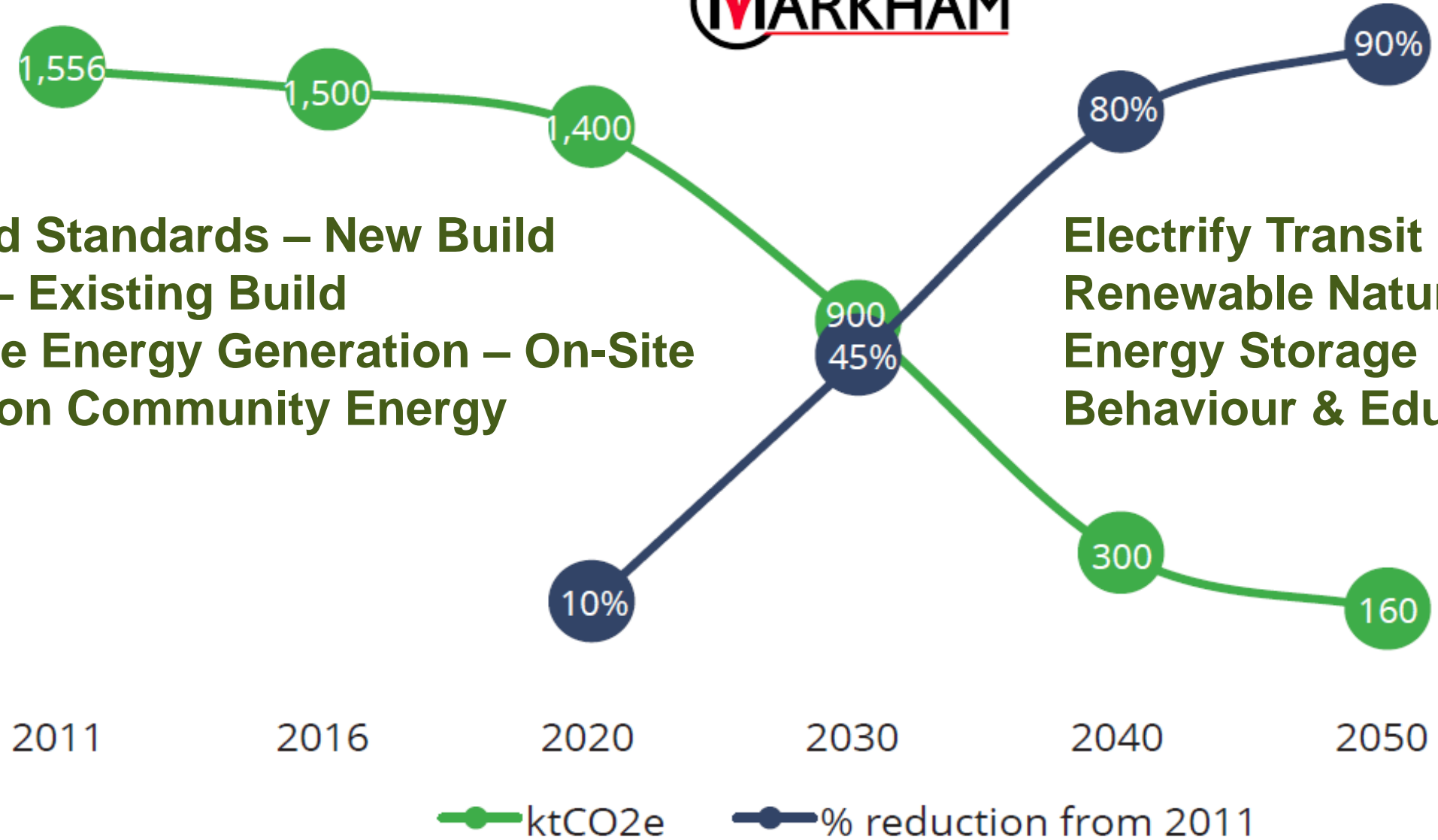
**Getting
to zero**





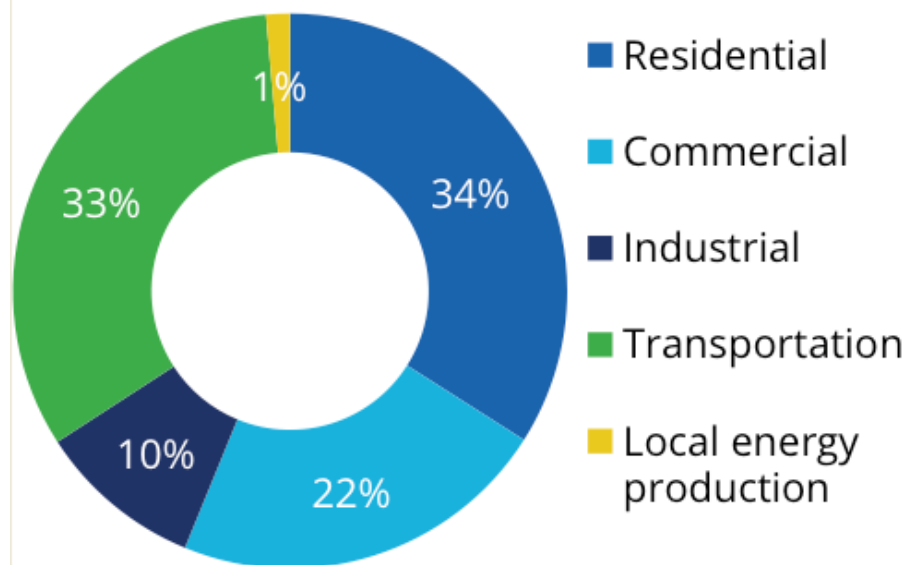
Codes and Standards – New Build
Retrofits – Existing Build
Renewable Energy Generation – On-Site
Low Carbon Community Energy

Electrify Transit
Renewable Natural Gas
Energy Storage
Behaviour & Education

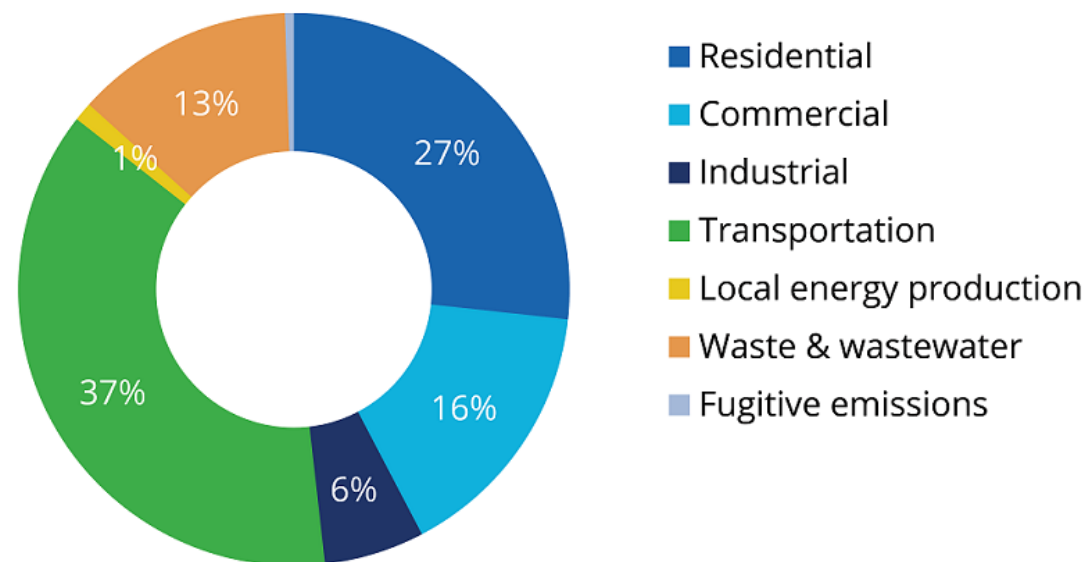




ENERGY USE BY SECTOR

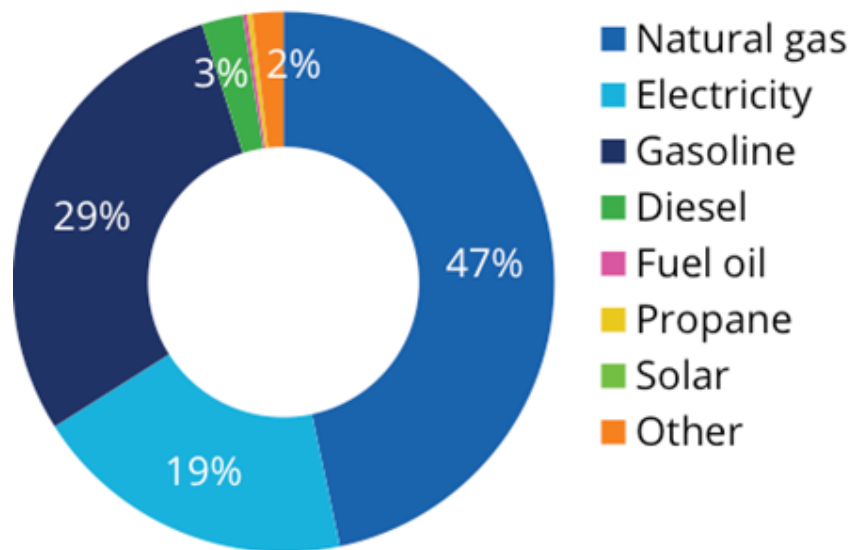


EMISSIONS BY SECTOR

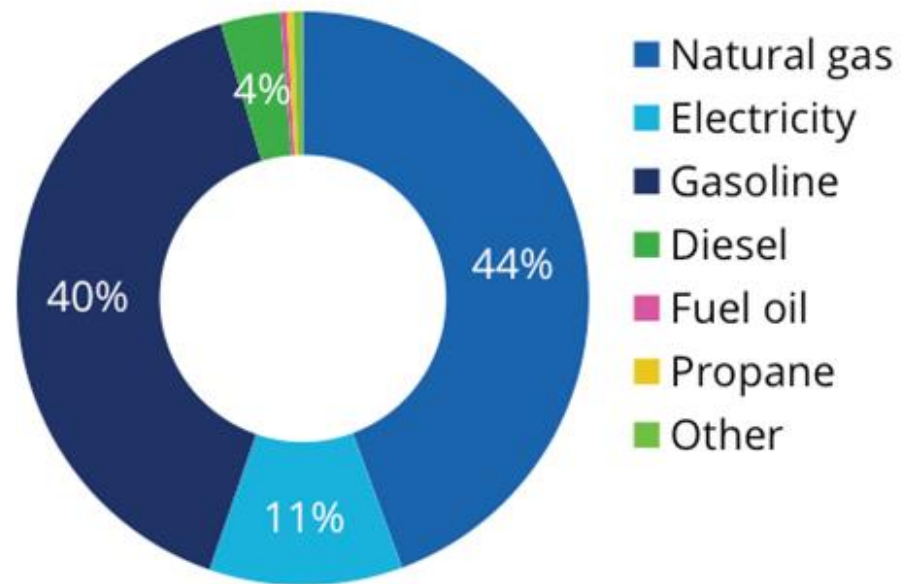




ENERGY USE BY FUEL



EMISSIONS BY FUEL





~50,000 tonnes CO₂ in 2018

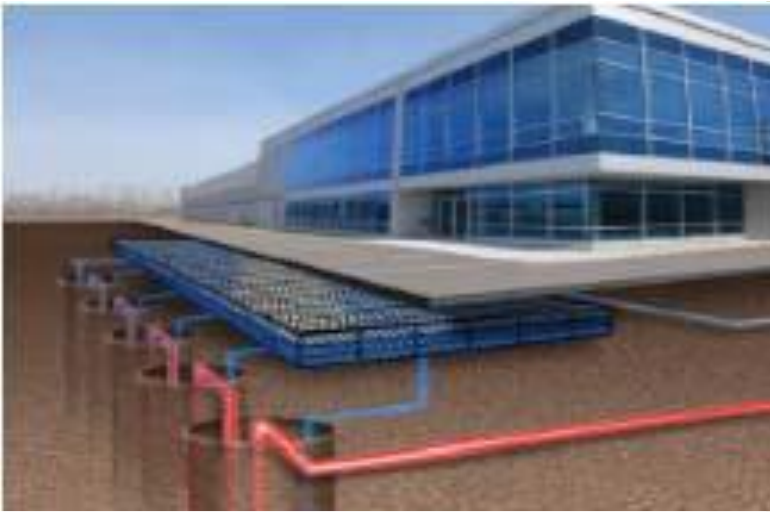
(customer base = 11 million square feet)

BAU ~100,000 tonnes CO₂ in 2030

(projected customer base = 20 million square feet)



Ground Source



Biomass



Solar





CARBON CAPTURE & UTILIZATION STRATEGY

pondtech

CO₂ **THE OVERLOOKED RESOURCE**

CO₂ is the most abundant, yet underutilized resource in our economy



INDUSTRIALIZATION

GHGs are rising steadily as developing countries industrialize their economies.



POPULATION GROWTH

Globally, a growing middle-class places a higher demand on a more nutritious and protein-rich diet while arable land is lost to degradation and urbanization.



PROGRESS DRIVES HIGHER GHG LEVELS

Industrialization and population growth combine to boost emissions of CO₂, NO_x, SO_x & VOCs, all of which contribute to climate change and the related severity of weather patterns.





Capture Emissions

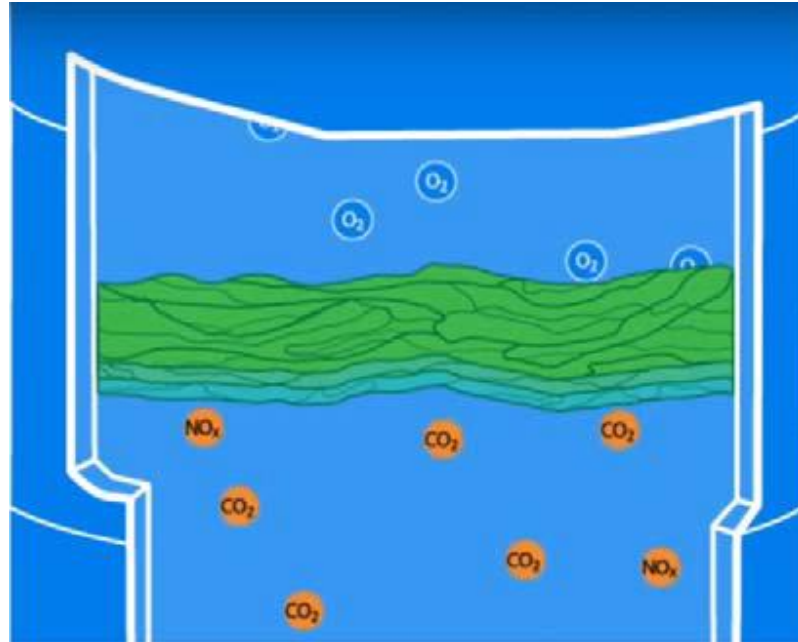


Photo-Bioreactor



Algae



Illumination System: Core Feature of the Technology

- Algae growth is generally light limited.
- Photosynthesis is most efficient when utilizing red light in the 680 – 700 nanometer wavelength range.
- Pond has spent over a decade developing and refining the illumination system to optimize algae growth.



Markets for Algae

Nutraceuticals

Chlorella powder, spirulina powder, astaxanthin, omega-3.

Animal Feed

Aquaculture feed, animal feeds.

Biofuel

Biodiesel, biomass pellets.

pondtech





pondtech



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Project Overview

First Phase

Biologically remove up to 2000 tonnes of CO₂ emissions from the combustion of natural gas (hot water boiler & CHP operations). The facility will manufacture, dry and ship algae.

Start Construction: Q2 2019

Operational: Q1 2020



Energy Services Lease Agreement

MDE will finance the process building - Pond is the tenant

MDE will sell electricity and chilled water to Pond

DE will provide 24/7 operational support

Value of emissions abatement will be shared

Pond is responsible for algae off-take agreements

Revenue sharing agreement





Future Phases

Expand carbon capture and utilization
Target 50% (10,000 CO₂ tonnes annually)

Longer Term

Apply the Pond technology at similar DE installations in Canada, the US and around the world.



Why is this technology important?

Algae grown from natural gas combustion emissions can be sold into higher value nutraceutical and animal feed markets

Carbon emitter continues to operate with natural gas as its primary fuel while reducing its carbon footprint.

Broad market application for any natural gas consumer.

Natural gas can be “transformed” to a zero-carbon fuel with this technology



Why is this important to the District Energy Sector?

Our sector is being driven to low carbon.

Our options are limited.

This is an end-of-pipe solution.

Our primary fuel supply remains unchanged.

This technology is more than carbon abatement; it creates a revenue opportunity.

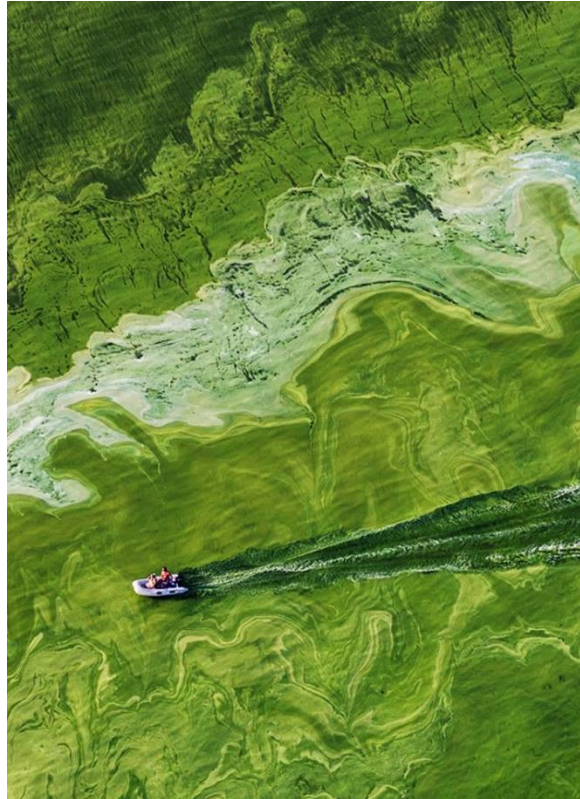
Pond's technology requires scale and continuous operation.

There is a natural synergy between Pond and our sector



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