



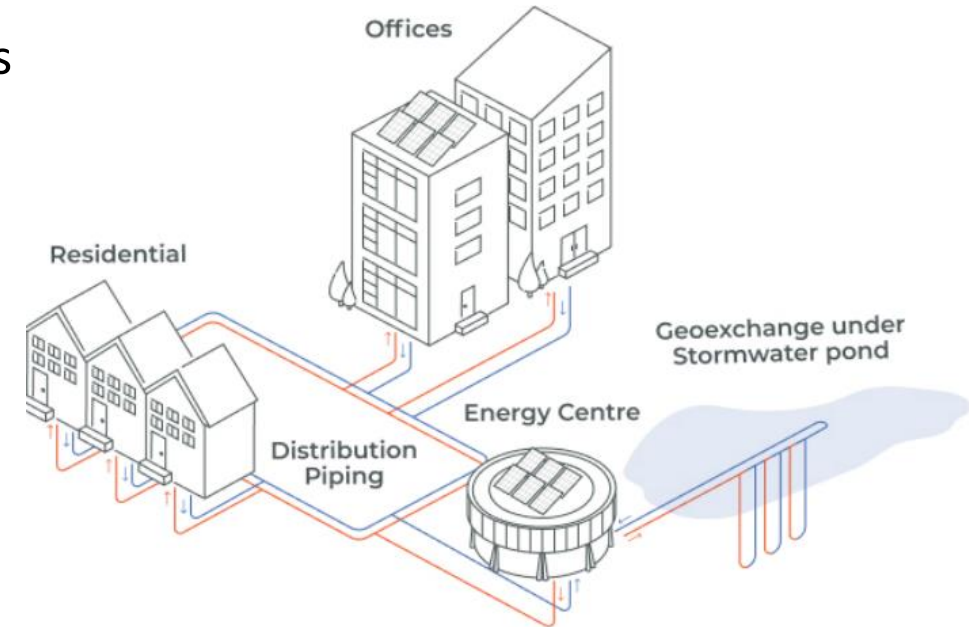
# Courtice Transit-Oriented Community District Energy System

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Municipality of Clarington General Government  
Committee – February 5<sup>th</sup>, 2024

# District Energy – An introduction

**District Energy Systems:** DE systems are centralized systems where thermal energy (i.e., heating and cooling) is distributed via underground pipes to multiple buildings in a neighbourhood, downtown district, or campus.

- The improved efficiencies and potential for low-carbon fuel sources in DE systems make them a key part of climate change and renewable energy strategies.
- DE systems are well developed in many European cities, largely as a legacy of the 1970's energy crises.
  - In Denmark, Sweden & Finland, DE accounts for 50-60 percent of the total heating market nationally.
- Interest in community-scale DE systems in North America is growing due to its benefits from an energy security and environmental sustainability perspective.



# Strategic alignment

- **Envision Durham:** highlights the importance of supporting the development of low carbon energy systems such as DE. The plan encourages the development of district energy systems to provide low carbon energy to Community Areas, with a focus on connectivity to existing or planned DE networks.
- **Durham Community Energy Plan:** sets ambitious emission reduction targets. Projected growth in population and need for new home construction creates an emerging need to develop low and zero carbon energy infrastructure.
  - DE feasibility is highly correlated with density of land use – i.e., greater density increases the business case for DE systems.
  - DE systems projected to contribute to 16% of Region’s emissions reductions (low carbon pathway).
- **Community Host Agreement** between Region & Clarington outlines commitment to promote development within Clarington Energy Business Park to utilize district heating provided by Energy-From-Waste (EfW) Facility.



# Project History & Context



RESHAPE STRATEGIES

- Prior study completed by FVB Energy in 2021/22
- Evaluated DE potential for a very large service area
- Current work is focused on the area surrounding the future Courtice GO Station (i.e. Major Transit Station Area, or “MTSA”)

Current Service Area Boundary  
for DES Business case

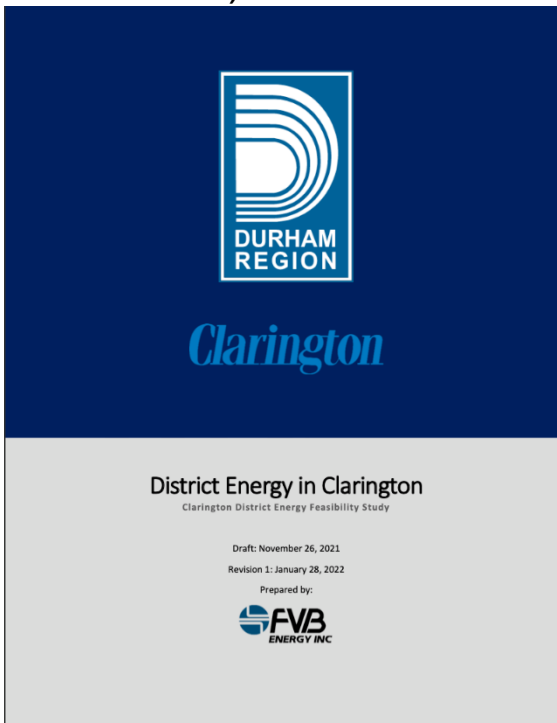
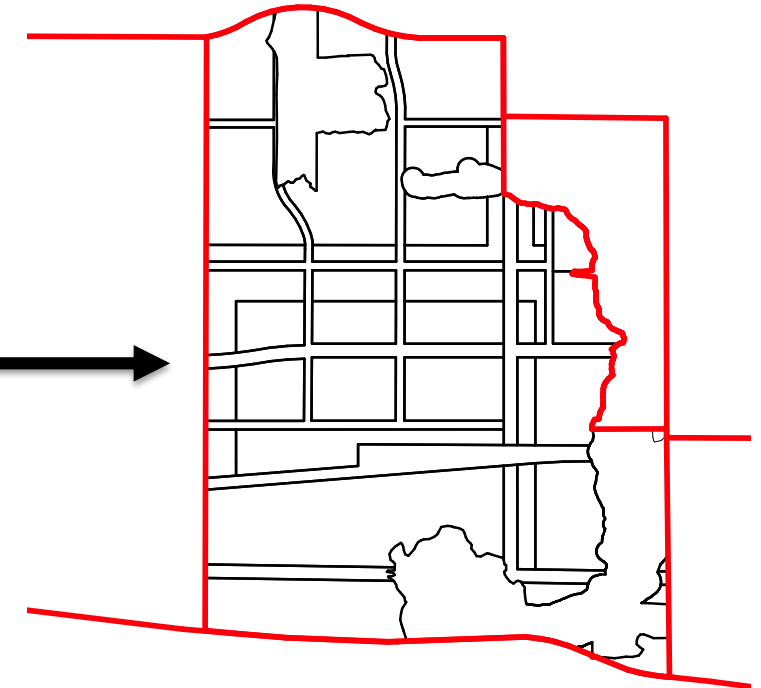
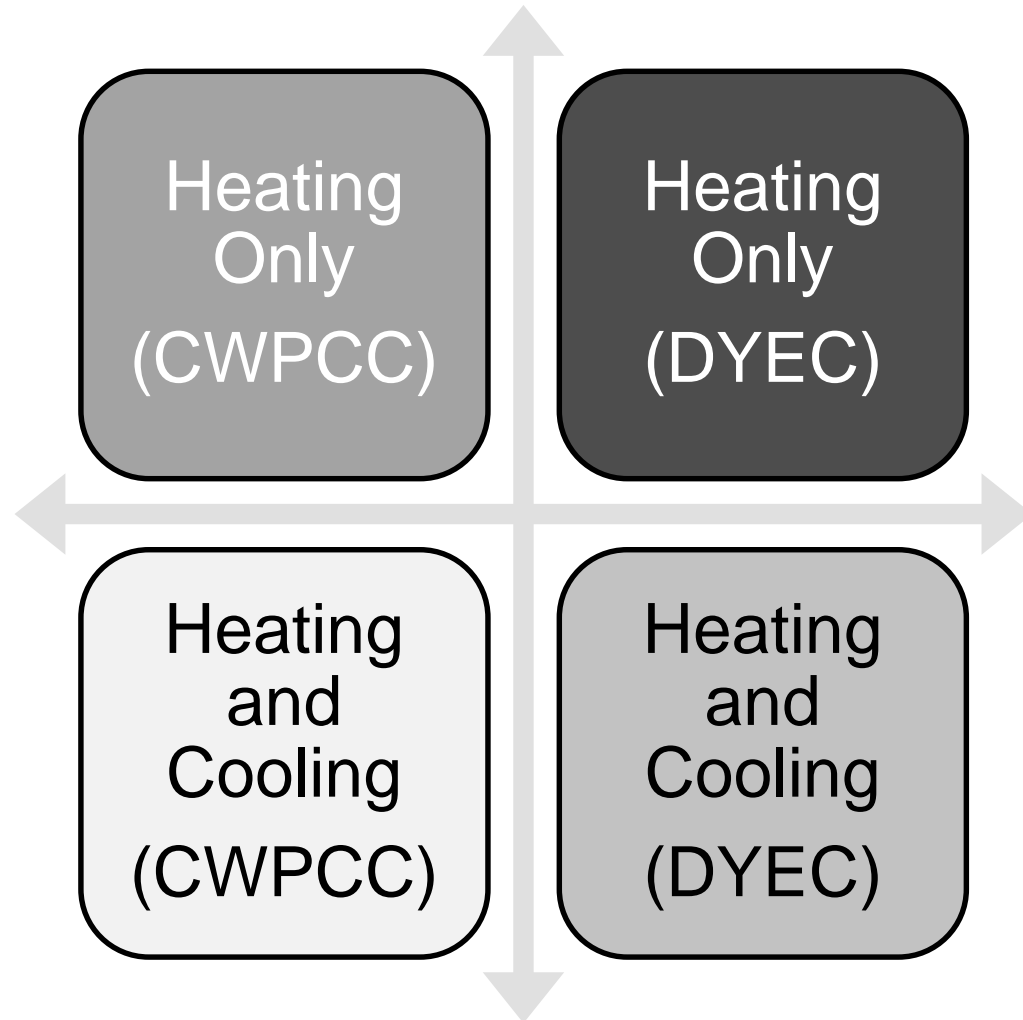


Figure 1: Clarington Secondary Plan Areas



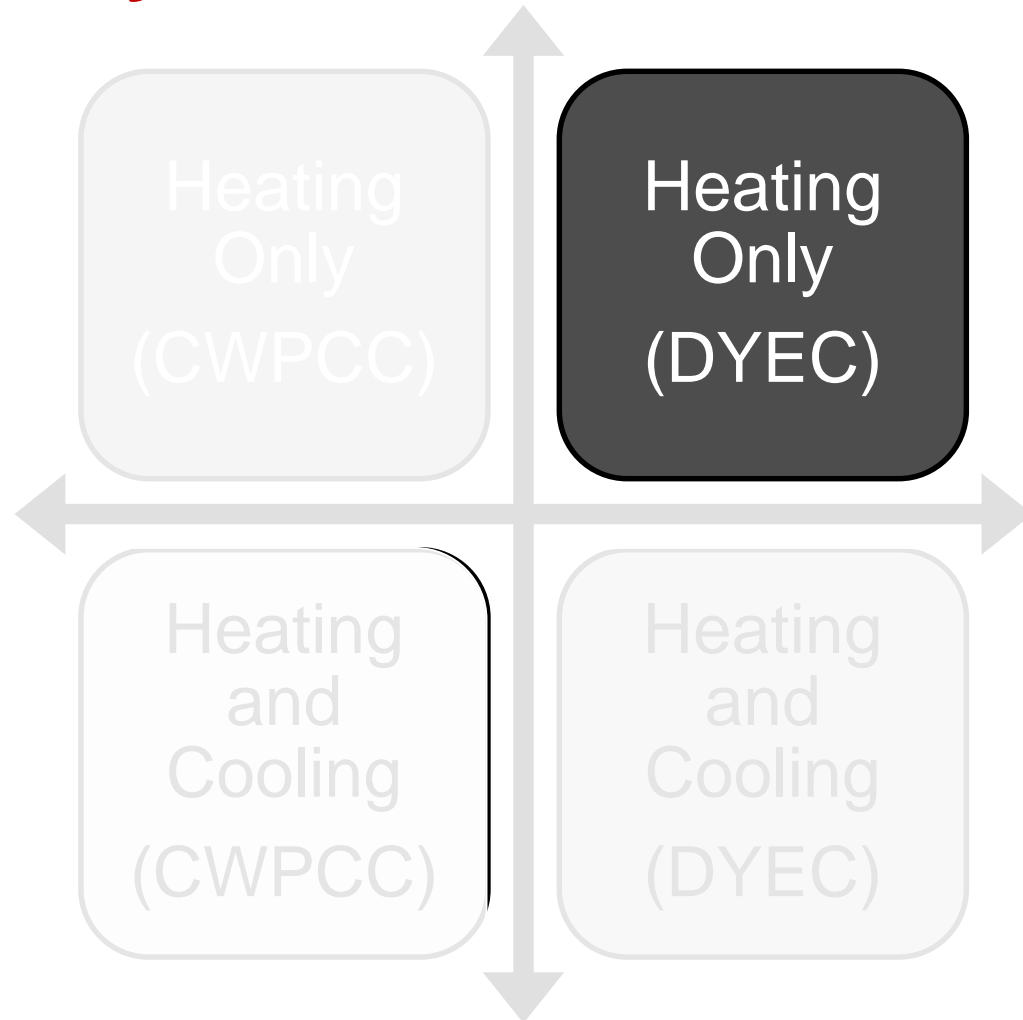
Courtice Transit Oriented Community (CTOC)  
Preliminary Land Budget 2023/10/16

# District Energy Options Evaluated



- Four technical concepts were developed based on the following variations:
  - Heating only
  - Heating and cooling
  - Low-carbon energy from Durham York Energy Centre (DYEC)
  - Low-carbon energy from Courtice Water Pollution Control Centre (CWPPCC)

# District Energy Options Evaluated-Heating Only



A heating-only system with heat from DYEC is the preferred DES concept and the basis of the DE business case because it:

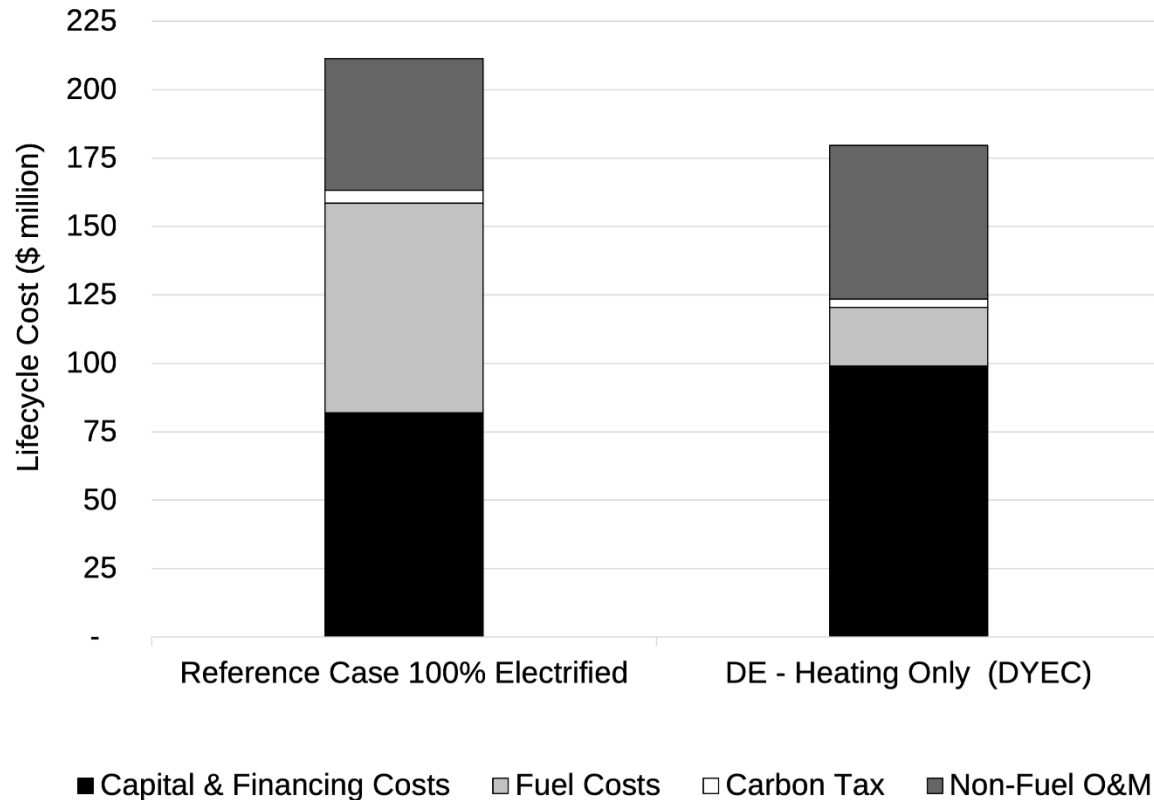
- Has the lowest capital and lifecycle cost<sup>1</sup>
- Results in an 75% reduction in GHG emissions from gas boiler BAU over analysis period.
- Results in the lowest cost per tonne of avoided GHG emissions.

1. Including the capital and lifecycle costs of in-building cooling systems

# DYEC Heating Only - DES Business Case



Lifecycle Cost of DE vs. Reference Case



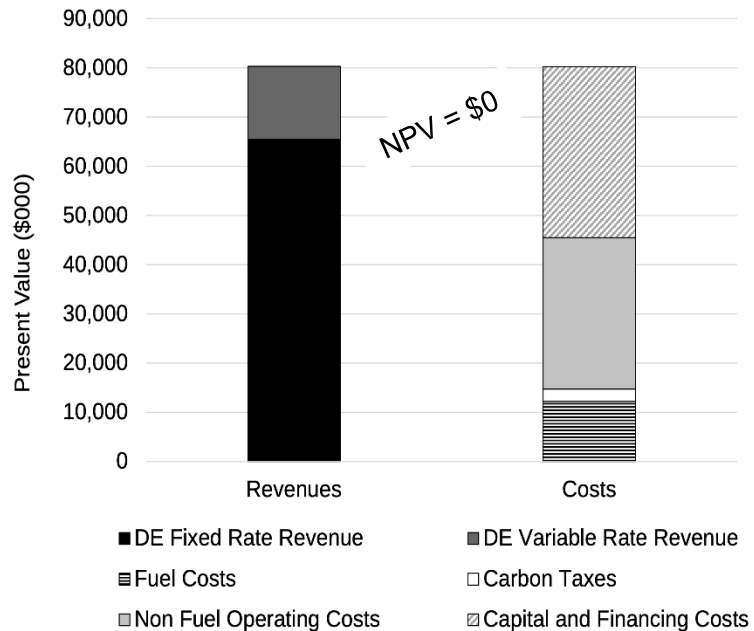
- To achieve similar GHG outcomes without the DES, all buildings in the Courtyce MTSA would need to have 100% electrified heating (Reference case).
- The lifecycle cost of low-carbon heating in the Courtyce MTSA supplied by DE is lower than electrification of heating at the building level.
- In the reference case, fuel costs are ~40% of the lifecycle cost and capital is ~40%. In the DE case, capital and financing costs are 55% of the total lifecycle cost and the fuel cost is 12%.
  - DE provides greater energy cost stability to MTSA residents, relative to building electrification, due to reduced exposure to escalating electricity rates.

# DES Business Case

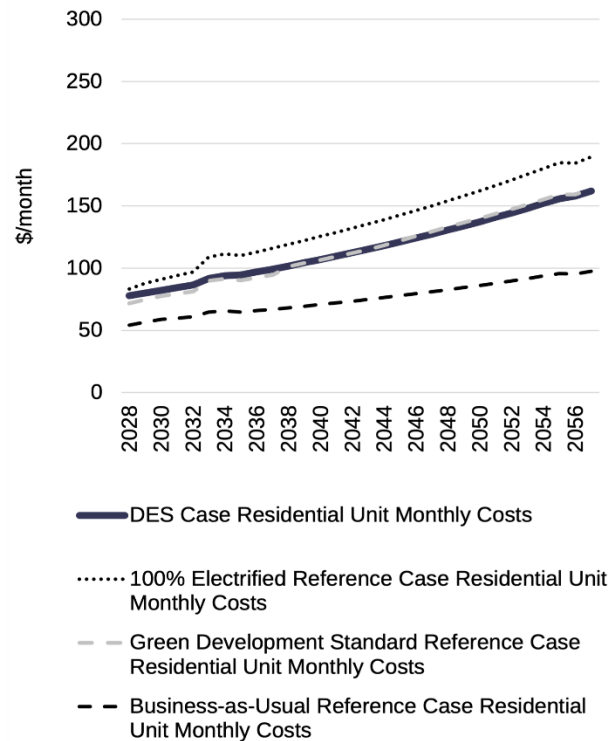


Business case is presented as cost neutral from the DE Utility, with lower energy costs for DE rate payers and lower capital costs for landowners than the 100% electrified reference case.

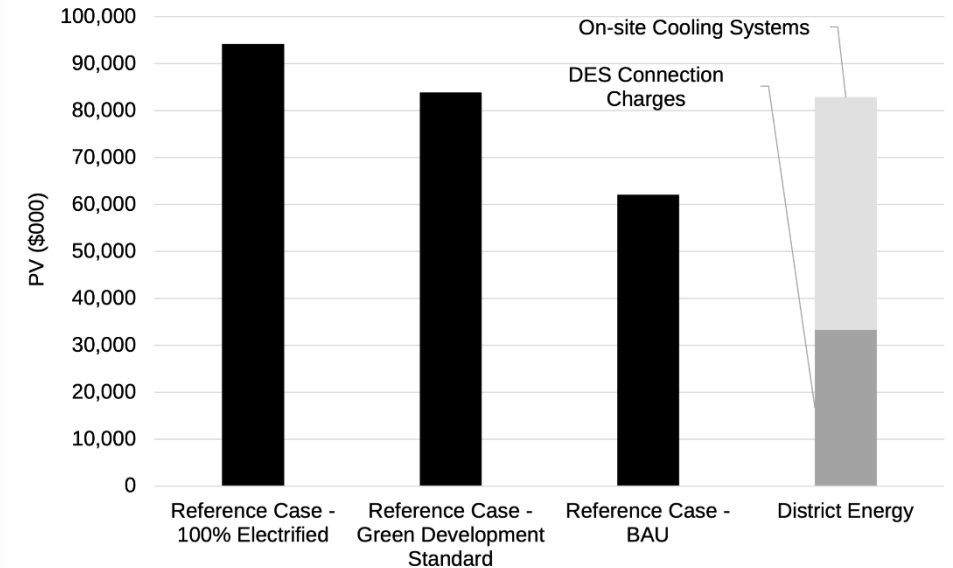
**DE Utility Cost Recovery**  
DE Utility Revenues Equal to Costs on PV Basis



**Rate Payer Costs**  
Monthly Heating and Cooling for Typical Residential Unit lower with DE than with



**Landowner Costs**  
DE Connection Fees Lower than Cost



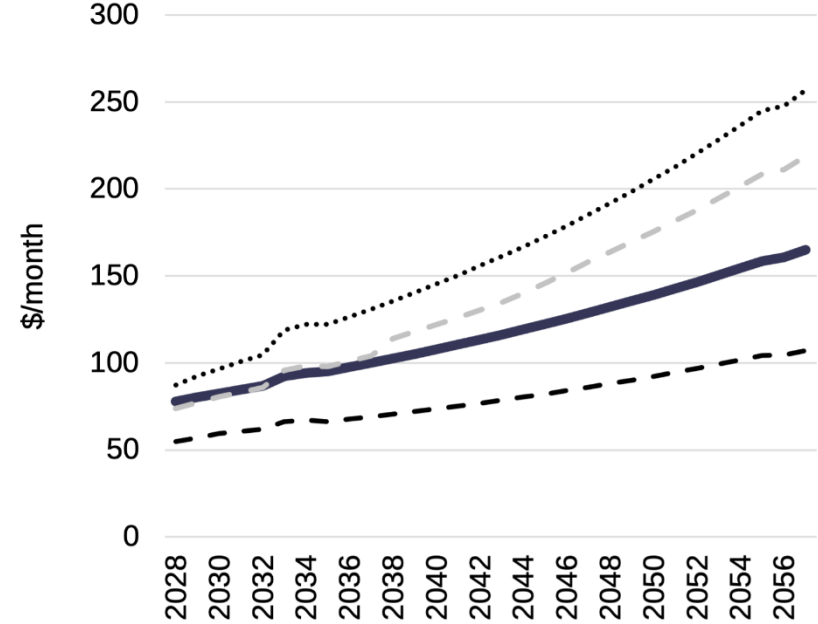
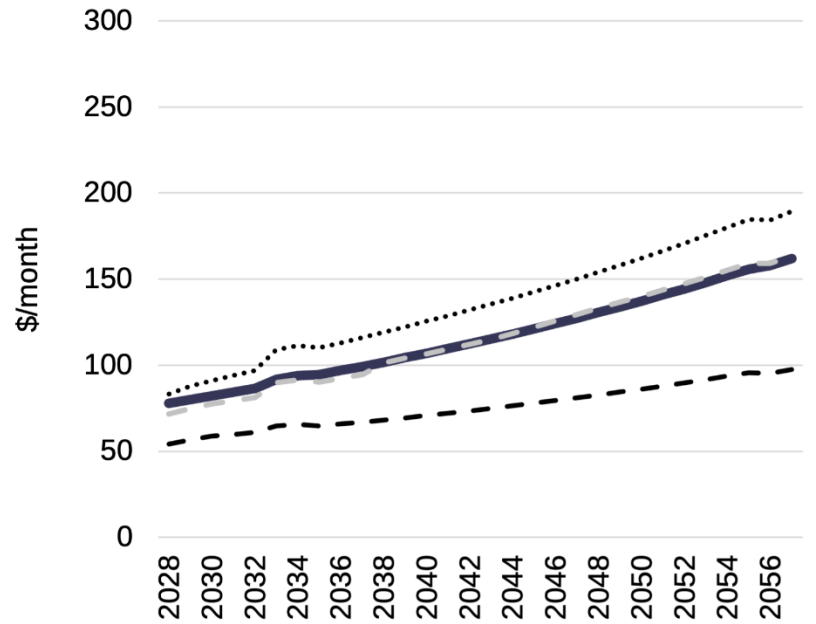


# Sensitivity to Electricity Rate Escalation



Electricity Rate Escalation at 2.6% (Base Case)

Electricity Rate Escalation at 4%



- DES Case Residential Unit Monthly Costs
- ..... 100% Electrified Reference Case Residential Unit Monthly Costs
- - Green Development Standard Reference Case Residential Unit Monthly Costs
- - Business-as-Usual Reference Case Residential Unit Monthly Costs

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# Potential for Low-cost Financing and Grants



- Over the past 2 years Canada Infrastructure Bank has entered into financing agreements with three DES utilities totaling more than a billion dollars.
- Many low-carbon DE projects secure lesser amounts as grants through the Green Municipal Fund.

## Selection of Funding and Financing Recipients (non-exhaustive)

Name of Program	Recipient Project	Grant Amount (\$ million)	Financing Amount (\$ million)
Canadian Infrastructure Bank (CIB)	Markham Centre District Energy		135
Canadian Infrastructure Bank (CIB)	Enwave Energy Corporation		600
Green Municipal Fund (GMF)	Markham Centre District Energy	1	7.2
Green Municipal Fund (GMF)	Zibi Community Utility	3	20
Green Municipal Fund (GMF)	City of Vancouver NEU	1.5	15
Green Municipal Fund (GMF)	Lonsdale Energy Corporation	2	2
Low Carbon Economy Fund	Enwave Energy Corporation - PEI	3.5	

# DISTRICT ENERGY OWNERSHIP MODELS



- ◆ Mandatory Connection Bylaw in DE Service Area
- ▲ Economic Regulation by Utilities Commission

***Under any ownership model, the Municipalities will have a key role in mitigating connection risk***



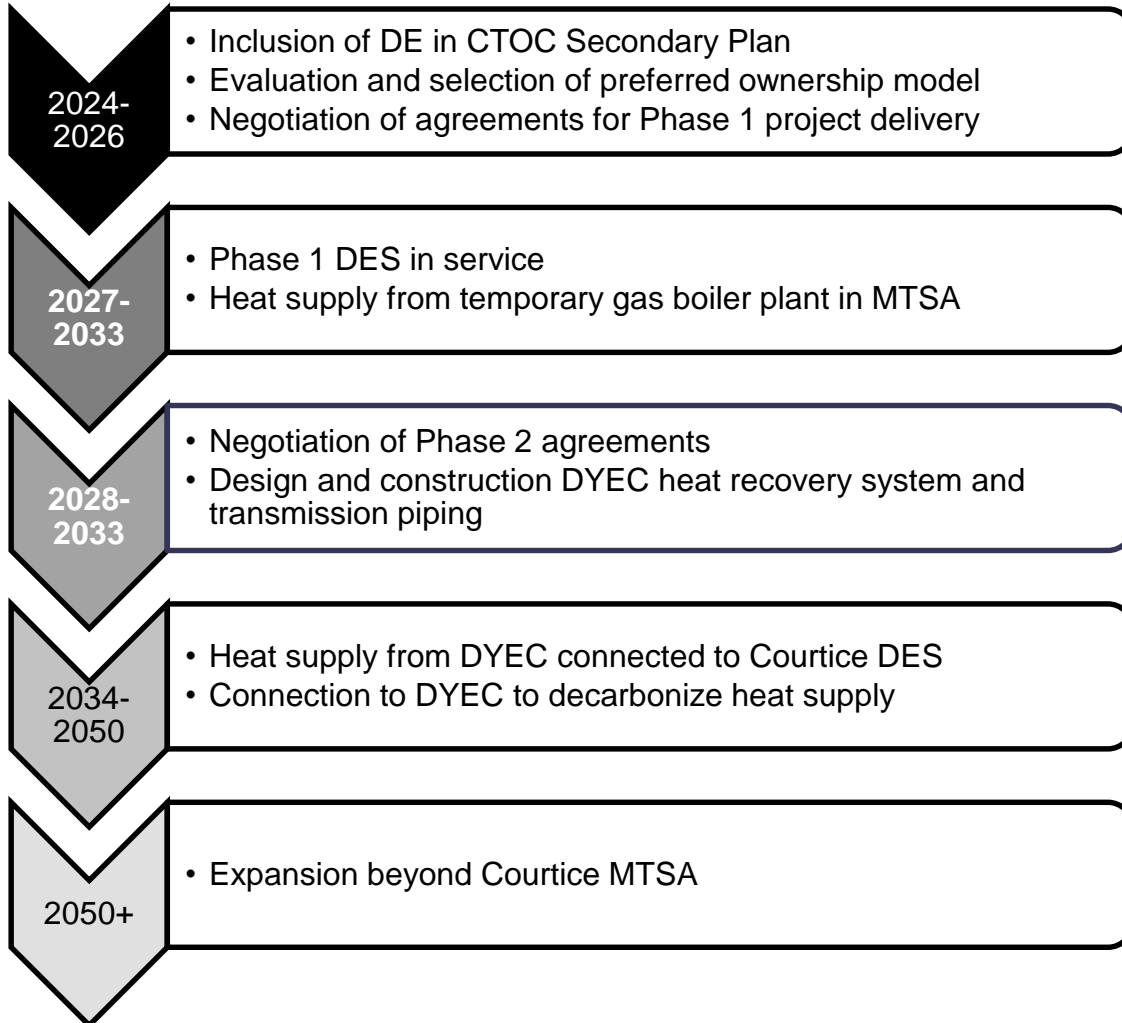
# Municipal District Energy Supportive Policies



As part of developing and implementing a DES strategy **it will be important to ensure that the Official Plan framework of the Municipalities contemplates and supports the DES strategy....** The “Planning Act” precludes municipalities from proceeding with public works or passing by-laws unless they conform with their Official Plans.

It will also be important to incorporate DES supportive policies into the Courtice Transit-Oriented Community (CTOC) Secondary Plan to support future implementation of a DES focused on serving new development in the CTOC MTSA.

# Target Project Development Timeline & Process



- Near term priority is to include enabling policy for DE in the CTOC Secondary Plan.
- The objective is to have DE service available in time for the first buildings in the CTOC to connect.
- The DE Service Area and Phasing Plan will be developed in coordination with Landowner's Group.
- To manage investment risk, the first phase of the DES is planned to be served by a temporary gas boiler plant (or plant integrated with a municipal facility).
- Once sufficient load is connected to the DES, the connection to DYEC will be completed, decarbonizing the heat supply to all buildings connected to the DES.
- Depending on growth outside the MTSA, the DES may be expanded to serve additional areas.



# Regional Council Direction...

- A. Endorse in principle the concept of a district energy system in the Courtice Transit-Oriented Community as presented in Report #2024-COW-1
- B. Direct staff to collaborate with Clarington to integrate DES concept into CTOC Secondary Plan, including definition of a DES service area focused on the MTSA.
- C. Support engagement with funding/ financing agencies to pursue potential financing sources such as FCM/ GMF and CIB, as well as explore additional financial tools and options to help capitalize the DES project.
- D. Support evaluation of ownership and governance models for the Courtice DES, and direct staff to report back to Council with a recommendation and updated business case.



# Thank You!

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