

TO: Mayor Savage and Members of Halifax Regional Council

Original Signed by 

SUBMITTED BY:

Jacques Dubé, Chief Administrative Officer

DATE: June 23, 2020

SUBJECT: **By-law D-500, Respecting District Energy**

ORIGIN

On February 21, 2017 the following motion of Regional Council was put and passed:

“Moved by Councillor Mancini, seconded by Councillor Mason that Halifax Regional Council:

1. *Endorse pursuing the requirement that new development within the Cogswell redevelopment area connect to a district energy system if one exists;*
2. *Seek amendments to the HRM Charter and other amendments as required to provide the general authority to implement District Energy Systems, including the Cogswell Redevelopment Area District Energy System; and*
3. *Direct staff to develop the options and mechanisms to effectively implement the requirement for mandatory connection.”*

LEGISLATIVE AUTHORITY

Halifax Regional Municipality Charter

104 (1) The Council may make by-laws imposing, fixing and providing methods of enforcing payment of charges for
(aa) expenditures incurred for the district energy system within the Cogswell District Energy Boundary;

104A (1) The Council may make by-laws imposing, fixing and providing methods of enforcing payment of charges for the financing and installation of any of the following on private property with the consent of the property owner:

(a) equipment installed in respect of a district energy system within the Cogswell District Energy Boundary:

188 (1) The Council may make by-laws, for municipal purposes, respecting

Recommendations on next page

(la) subject to the regulation of the Board, the establishment and operation of a district energy system within the Cogswell District Energy Boundary;

(lb) the authorization of the General Manager of the Halifax Regional Water Commission to exercise the powers and authorities of the General Manager set out in Sections 9 and 10 of the Halifax Regional Water Commission Act in respect of the district energy system;

(lc) the authorization of the Council to require, where the Council considers it necessary or advisable, that a building or other structure, built within the Cogswell District Energy Boundary after the coming into force of the by-law, be connected to the district energy system;

235 (5) Where a municipal planning strategy so provides, a land use by-law may

(ja) require and regulate the establishment of a district energy system within the Cogswell District Energy Boundary;

(jb) require, where the Council considers it necessary or advisable, that a building or other structure, built within the Cogswell District Energy Boundary after the coming into force of the by-law, be connected to the district energy system;

RECOMMENDATION

It is recommended that Halifax Regional Council:

1. Suspend the rules of procedure under Schedule 5, the Environment and Sustainability Standing Committee Terms of Reference, of Administrative Order One, the *Procedures of the Council Administrative Order*, and
2. Adopt By-law D-500, Respecting District Energy, as set out in Attachment A of this report.

BACKGROUND

In October 2018, the Intergovernmental Panel on Climate Change (IPCC) released a special report which stressed the need to limit global warming to 1.5°C above pre-industrial levels by 2030 to prevent irreversible economic, environmental and social impacts.¹ To meet this target, the report stated that governments around the world need to influence aggressive policies to:

- Reduce emissions within the current building stock by 80-90%;
- Reduce emissions within the transport sector by 30%; and
- Generate 75-85% of our electricity through renewables.

On January 29, 2019, Halifax Regional Council declared a climate emergency, emphasising that climate change is a serious and urgent threat to our community. To address this, the Municipality has developed a climate action plan, HalifACT 2050, which received unanimous support from Halifax Regional Council on June 23, 2020. Included among the many actions in the plan is the expansion and decarbonization of District Energy Systems (DES) in high density areas.

DES supply thermal energy or electricity to multiple buildings via a central plant or several interconnected plants. DES are an efficient method of using waste energy to heat or cool surrounding buildings. Across Canada, DES can be both publicly or privately owned and operated. Typically, DES offer consumers energy at lower costs when compared to existing options like electricity, natural gas and fuel oil.

¹ Intergovernmental Panel on Climate Change “Summary for Urban Policy Makers”
<https://www.ipcc.ch/site/assets/uploads/sites/2/2018/12/SPM-for-cities.pdf>

DISCUSSION

The Cogswell Redevelopment project will see the replacement of the Cogswell interchange with a more conventional street grid. The project will better connect surrounding communities to downtown Halifax and open six acres of land for mixed use development. As a future growth area, these lands are viewed by many as an optimal location for district energy (DE) due to the available waste heat being generated at the Halifax Waste Water Treatment Facility located on Upper Water Street. It was determined through a study (Attachment B) conducted by the Halifax Regional Water Commission (Halifax Water) that the waste energy from the facility could adequately heat and cool the proposed future development at a price and emission intensity less than existing fuel options. The study also indicated that the business case for Halifax Water to both own and operate the system would be positive, providing the connection to the DES was mandatory.

Through direction from Regional Council on February 21, 2017², the Municipality sought, and was successful in amending the *Halifax Regional Municipality Charter* (Attachment C). This amendment gives Council the authority to make by-laws regarding mandatory connection to a DES within the defined Cogswell District Energy Boundary. After a by-law review of other Canadian jurisdictions with similar systems and consultation with Halifax Water, By-law D-500 was drafted for consideration by Regional Council. Among other criteria, the by-law outlines the DES service area, service connection criteria and authority for enforcement.

Halifax Water has endorsed the draft By-law D-500 and requested that Regional Council adopt it. On February 7, 2020, Halifax Water applied to the Nova Scotia Utility and Review Board (NSUARB) seeking approval that the Cogswell DES be deemed a regulated utility pursuant to the *Public Utilities Act*. Regulating the DES would protect Halifax Water's current rate base by ensuring utility costs are appropriately allocated and within acceptable limits, and that currently regulated services are not subsidizing the proposed system. It is expected that mandatory connection vis-à-vis a municipal by-law will be a requirement of the NSUARB. On May 19th, 2020 the NSUARB ruled that Halifax Water will be a public utility with respect to ownership and operation of a proposed Ambient Temperature District Energy System if it is completed as proposed.

Next Steps

Halifax Water has completed the 100% detailed design of the linear infrastructure, developed a draft financial model and evaluated the business case of several operating and ownership scenarios for the proposed DES. If By-law D-500, Respecting District Energy is adopted by Regional Council, Halifax Water will update its business model to the satisfaction of its Board of Commissioners and seek final approval from NSUARB. As Halifax Water is a public utility, it must report to the NSUARB under the *Public Utilities Act*. The NSUARB will be responsible for reviewing the technical details of the DES to provide protection to the users within the Cogswell District Energy Boundary. If amendments to the by-law are required, a future recommendation report will be presented to Regional Council for consideration.

Enabling District Energy Elsewhere in the Municipality

Effective energy planning can address energy usage and improve efficiencies at both the community and government level. The primary objective of most energy plans is to reduce the use of fossil fuels through an increase in energy efficiency, renewables, and local energy production like DES. Through the implementation of HalifACT 2050, the approach to community energy and emissions planning will be informed and guided through the framework of Reduce, Improve, Switch, and Generate. District energy is one component of the overall strategy for rapid decarbonization.

Energy planning for DES has been developed in many jurisdictions across Canada including Toronto, Vancouver, and Ottawa. In Toronto, as buildings currently generate about half of the city's emissions,

²Halifax Regional Council Minutes <https://www.halifax.ca/sites/default/files/documents/city-hall/regional-council/170221rc-mins.pdf>

expanding on DES is an integral component of Toronto's climate action plan (Transform TO)³. Guidelines that support the design of DE-ready buildings have been developed by the City of Toronto and are available for building developers, architects and engineers.⁴ Through Vancouver's Greenest City 2020 Action Plan and Renewable City Strategy, the development of neighbourhood energy systems is a key strategy for cutting carbon emissions, reducing dependence on fossil fuels and providing energy security.⁵ Likewise in Ottawa, the expansion of DES and storage is an important factor of Ottawa's Community Energy Transition Strategy.

In Halifax, aside from HalifACT 2050, DES are supported in both the Regional Plan and Centre Plan, Package A. The Regional Plan supports the development, planning, and land use for district energy systems while the Centre Plan encourages district energy facilities in areas of high growth and density, such as centres and future growth nodes. Without additional *HRM Charter* amendments, connection to DES in these areas is voluntary. To catalyze the deployment of DES across the Municipality, increasing awareness on DES and their viability is required. The success of the Cogswell DES will offer an opportunity to show proof of concept and begin gaining public confidence. The Municipality is currently conducting a feasibility assessment on using the waste heat from the BMO Centre for the new Fire Headquarters.

While energy planning, education and proof of concept will support the future deployment of DES, the *Public Utilities Acts* presents a barrier for the proliferation of DES across the municipality. Pertinent to DES, the Act defines a public utility as any person that may now or hereafter own, operate, manage or control:

- any plant or equipment for the production, transmission, delivery or furnishing of electric power or energy, water or steam heat either directly or indirectly to or for the public; and
- any plant or equipment for the extraction, transmission, delivery or furnishing of a geothermal resource or for the production, transmission, delivery or furnishing of geothermal energy or heat either directly or indirectly to or for the public.

As defined, any system, regardless of size, that provides a public utility service offered for compensation either directly or indirectly to or for the public could be a public utility. Best practice for DES is to start with smaller nodes of two to three buildings and build out over time. However, requiring small DES to become public utilities is cost prohibitive and could prevent widespread adoption. Due to the time constraints of adopting By-law D-500, amendments to the *Public Utilities Act* will not be recommended through this report but will instead be investigated through the implementation of HalifACT 2050.

Summary

It is recommended that Regional Council adopt By-law D-500, Respecting District Energy, providing Halifax Water with the assurance they require to proceed with the final business case and recommendation to the NSUARB. Currently, most DES within the municipality are privately owned and operated with energy typically being consumed by the owner at an adjacent facility. While DES are known to provide many benefits to the community, enabling Halifax Water to develop this DES and demonstrate its viability will encourage widespread adoption and assist the Municipality in reducing emissions.

FINANCIAL IMPLICATIONS

There are no financial implications to this recommendation. The HRM costs associated with creating this by-law can be accommodated within the approved 2020/21 operating budget.

³ Toronto "Community Energy Planning" <https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/community-energy-planning/>

⁴ Toronto "District Energy" <https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/district-energy/>

⁵ City of Vancouver "Neighbourhood Energy Strategy" <https://vancouver.ca/green-vancouver/neighbourhood-energy-strategy.aspx>

RISK CONSIDERATION

Halifax Water has expressed that it will not pursue the development of the Cogswell DES without approval and enactment of By-law D-500. A feasible business case for Halifax Water is dependent upon mandatory connection, which is mandated within By-law D-500.

COMMUNITY ENGAGEMENT

The proposed District Energy System was part of the overall Cogswell Redevelopment public consultation process. District energy systems in general were discussed during the HalifACT 2050 stakeholder engagement sessions.

ENVIRONMENTAL IMPLICATIONS

Environmental implications specific to the Cogswell DES are outlined in Attachment B. In general, DES offer consumers energy at a price and carbon emission intensity less than conventional fuels. As with any on-site energy system, DES also offer consumers both energy security and resiliency from climate impacts.

ALTERNATIVES

Halifax Regional Council may:

1. Defer the matter and direct staff to provide further information on By-law D-500, Respecting District Energy
2. Decide not to adopt By-law D-500, Respecting District Energy.

Both alternatives are not recommended for the reasons discussed in this report.

ATTACHMENTS

Attachment A: By-law D-500, Respecting District Energy

Attachment B: Halifax Water District Energy Feasibility Study Executive Summary

Attachment C: Bill 82 – District Energy Amendments to the *HRM Charter*

A copy of this report can be obtained online at halifax.ca or by contacting the Office of the Municipal Clerk at 902.490.4210.

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(Proposed By-law D-500)

HALIFAX REGIONAL MUNICIPALITY
BY-LAW D-500
RESPECTING DISTRICT ENERGY

BE IT ENACTED by the Council of the Halifax Regional Municipality pursuant to section 188 of the *Halifax Regional Municipality Charter* as follows:

1. This By-law may be cited as the *District Energy By-law*.
2. In this By-law,
 - (a) “Act” means the *Halifax Regional Water Commission Act*, 2007 S.N.S., c. 55, as amended;
 - (b) “Charter” means the *Halifax Regional Municipality Charter*, 2008, S.N.S., c. 39, as amended;
 - (c) “Cogswell District Energy Boundary” means the area delineated on Schedule D of the *Charter*;
 - (d) “Commission” means the Halifax Regional Water Commission as governed by the *Act*;
 - (e) “District Energy System” means a district energy system defined by clause 3(va) in the *Charter*;
 - (f) “Energy Service Connection” means the pipes, valves and other infrastructure that convey thermal energy from the District Energy System to an Owner;
 - (g) “General Manager” means the General Manager of the Commission as defined by clause 2(f) in the *Act*; and
 - (h) “Owner” includes
 - (i) a full or part owner, joint owner, tenant in common or joint tenant of the whole or any part of land or a building or other structure,
 - (ii) in the case of the absence or incapacity of the person having title to the land or building or other structure, a trustee, an executor, a guardian, an agent, a mortgagee in possession or a person having the care or control of the land or building or other structure, or
 - (iii) in the absence of proof to the contrary, the person assessed for the property.

Application

3. This By-law applies to the establishment and the operation of a District Energy System located within the Cogswell District Energy Boundary.

Energy Service Connection

4. (1) A building or other structure that is

- (a) heated, cooled or requires hot water, and
- (b) built within the Cogswell District Energy Boundary after the coming into force of this By-law,

shall be connected to the District Energy System by an Energy Service Connection to be used for heating and cooling, and hot water heating.

(2) An Energy Service Connection shall be owned by the Commission.

(3) The construction of the Energy Service Connection is subject to the supervision of the General Manager and shall be constructed in the manner, the size and with the materials approved by the Commission.

(4) The Owner of a building or other structure that is

- (a) heated, cooled or requires hot water; and
- (b) built within the Cogswell District Energy Boundary after the coming into force of this By-law;

is prohibited from offering, using or providing any heating, cooling, or hot water other than from the District Energy System, except as approved by the Commission.

5. (1) No Energy Service Connection shall be covered in or enclosed until it is inspected and approval is granted by the General Manager.

(2) If an Owner, or an agent of an Owner, covers in an Energy Service Connection before it is inspected and approved, the General Manager may:

- (a) open it for inspection;
- (b) refuse to grant approval; or
- (c) open for inspection and, after such inspection, refuse to grant approval or grant approval.

(3) The Owner shall maintain the Energy Service Connection in a manner that is safe and accessible to the Commission at all times.

Authorization to General Manager

6. (1) The General Manager is authorized to exercise all the powers and authorities of the General Manager set out in Sections 9 and 10 of the *Act* in respect of a District Energy System located within the Cogswell District Energy Boundary.

(2) Without limiting Sections 9 and 10 of the *Act*, the powers and authorities the General Manager is authorized to exercise include:

(a) giving notice in writing to an Owner that is served by the District Energy System requiring that the Owner:

(i) install suitable equipment to facilitate observation, sampling and measurement, repair and maintenance of the District Energy System within the time specified by the General Manager in the notice,

(ii) repair, reconstruct or replace the Energy Service Connection within the time specified by the General Manager in the notice, or

(iii) if the Energy Service Connection is causing the District Energy System to malfunction and repairs to that Connection would result in the malfunction being cured, to repair the Connection within the time specified by the General Manager in the notice;

(b) giving notice in writing to an Owner requiring that Owner to connect, reconnect, or disconnect a building or other structure to the District Energy System by an Energy Service Connection within the time specified and as directed by the General Manager in the notice;

(c) constructing, opening, maintaining or repairing a District Energy System upon property adjoining a street and for such purposes may, at any time and from time to time, enter such property;

(d) entering in or upon a property or building or other structure without a warrant at

(i) a reasonable hour upon reasonable notice to the Owner and any occupier of the property, or

(ii) any time in the event of an emergency,

for the purposes of inspection, enforcement, investigation, observation, measurement, sampling, testing or work to be done in accordance with this By-law, or another enactment; and

(e) if the General Manager gives notice that an action is to be taken and

(i) no action has been taken,

(ii) the action has not been completed by the date specified in the notice,

(iii) the action has not been completed to the satisfaction of the General Manager within the time specified in the notice, or

(iv) any combination subclauses (i), (ii), and (iii),

the General Manager may take such action as deemed appropriate, including but not limited to causing the necessary work to be done at the expense of the person or organization in default.

Occupancy Permit

7. In accordance with the *Building By-law*, an occupancy permit may be withheld until the Municipality has received confirmation that the General Manager is satisfied that the provisions of this By-law have been complied with.

Offences

8. (1) No person shall:

(a) hinder or obstruct the General Manager or the Commission in the exercise of a power or authority conferred by the *Act* or this By-law;

(b) injure, damage, or remove any portion of the District Energy System or Energy Service Connection, except as directed by the General Manager; or

(c) refuse or fail to take an action when directed or notified to do so by the General Manager pursuant to the *Act* or this By-law.

(2) A person who

(a) hinders or obstructs the General Manager or the Commission in the exercise of a power or authority conferred by the *Act* or this By-law;

(b) injures or removes any portion of the District Energy System or Energy Service Connection without the direction of the General Manager;

(c) refuses or fails to take an action when directed or notified to do so by the General Manager pursuant to the *Act* or this By-law; or

(d) violates any provision of this By-law;

is guilty of an offence.

Penalty

9. (1) A person who commits an offence under this By-law is liable, upon summary conviction, to a penalty of not less than one hundred dollars and not more than ten thousand dollars and, in default of payment, to imprisonment for a term of not more than two months.

(2) Every day during which an offence pursuant to subsection (1) continues is a separate offence.

Done and passed this day of 20 ,

Mayor

Municipal Clerk

COGSWELL DES FEASIBILITY STUDY

DEC PROJECT#: D16-009

PREPARED FOR:

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JUN 16, 2016

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LIST OF ABBREVIATIONS

COP:	Coefficient of Performance
DES:	District Energy System
DHW:	Domestic Hot Water
DHS:	District Heating System
DND:	Department of National Defense
DPS:	Distribution Piping System
ETS:	Energy Transfer Station
EUI:	Energy use intensity
HDPE:	High-density Polyethylene
HRM:	Halifax Regional Municipality
HVAC:	Heating Ventilation and Air Conditioning
HW:	Halifax Water
NPV:	Net Present Value
PV:	Present Value
ROE:	Return on Equity
ROI:	Return on Investment
UARB:	Utility and Review Board
UV:	Ultraviolet
WACC:	Weighted Average Cost of Capital
WWTF:	Waste Water Treatment Facility

LIST OF REFERENCES

Ekistics Planning and Design. *Cogswell Transformed*, April 2014.

Province of Nova Scotia. *Public Utilities Act*. RS 1989 with amendments.

Province of Nova Scotia. *Municipal Government Act*. 1998 c. 18, s. 1.

Nova Scotia Utility and Review board. "Halifax Regional Municipality District Energy Systems." Letter to Martin Ward, HRM. March 30, 2010.

ACKNOWLEDGEMENTS

Halifax Water would like to recognize the contributions of QUEST and the Nova Scotia Department of Energy for their contributions to the preparation of this report.



EXECUTIVE SUMMARY

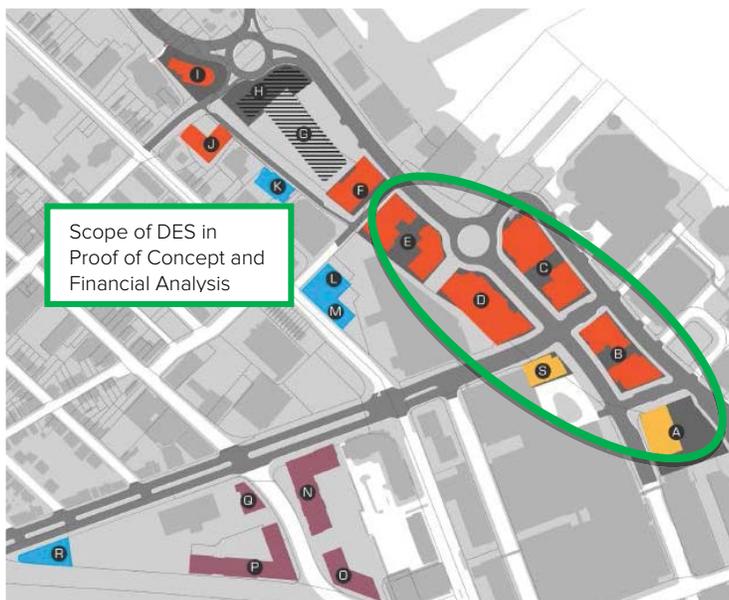
This study has developed a concept design for a wastewater heat recovery based district energy system (DES) that recovers waste heat from the Halifax Wastewater Treatment Facility (WWTF) effluent stream and provides heating, cooling, and domestic hot water to six blocks of buildings in the Cogswell Redevelopment.

A number of technologies exist for extracting thermal energy from wastewater — both untreated sewage and effluent from treatment plants. This report has presented technology options for effluent heat recovery and has selected plate frame heat exchangers as the most cost effective, space conservative, and energy efficient heat exchange technology.

The proposed DES concept works by direct heat exchange between the effluent and ambient temperature water running through the DES piping. Ambient temperature water is piped to mechanical rooms in each building where heat pumps are used to extract heat from the water and provide high-grade thermal energy for building loads such as domestic hot water (DHW) pre-heating and make-up-air heating. Water source heat pumps in each residential or commercial unit provide space heating and cooling. In the winter, energy is transferred from the DES to the building water-source heat pump (WSHP) loop; in summer, excess energy from cooling is rejected to the DES from the WSHP loop through a heat exchanger.

A group of six blocks (green circle) in the Cogswell Redevelopment plan were selected for connection to the DES and development of a business case. The six blocks were chosen because of their central location, high density, and close proximity to the WWTF. As the largest blocks proposed for development under the Cogswell plan, these blocks present the greatest opportunity for a positive business case. A plan showing the proposed blocks and DES concept is provided at right.

The six identified buildings (blocks “A” through “E” and “S”) have a combined expected floor area of 162,000m² which is assumed to be 8% retail, 15% office, and 77% residential. Based on energy use intensities for Halifax, these buildings are expected to have a peak heating demand of 12 MW and a peak space cooling demand of 7.8MW.



Background Graphic from *Cogswell Transformed*, Ekistics. April 2014.

Figure 1: Cogswell DES Concept Service Area

The capacity of the WWTF effluent for heat exchange was assessed. The effluent 3-year average monthly temperature ranges from a low of 11.5°C in March to a high of 22.3°C in September. Minute by minute flow rate data was charted and a minimum night time dry-weather effluent flow rate of 2,000 m³/h was observed. Average dry weather flow rates of 3,500 m³/h were observed. The heat capacity of the effluent at various flow rates and temperatures is presented in Table 1.

Table 1: Effluent Heat Capacity

Effluent Temperature	Heat Capacity @ Flow	
	2,000 m ³ /h	3,500 m ³ /h
14 °C	17 MW	31 MW
12 °C	13 MW	22 MW
10 °C	8 MW	14 MW
8 °C	3 MW	6 MW

The effluent heat capacity table shows, even with below average effluent temperature of 10°C (a condition which typically occurs less than 5 days per year) and worst-case dry-weather flow, the effluent still contains **8 MW** of heating capacity, based on maintaining a minimum effluent temperature of 6.5°C. At the average January condition (12°C and 3,500 m³/h) the effluent contains **over 22 MW** of heating capacity. Based on this analysis, it is expected that the WWTF effluent would be sufficient to meet the proposed Cogswell DES thermal energy needs over 99% of the year. Under the proposed concept, the mechanical room in each building would be provided with a natural gas boiler for peaking and backup in order to meet the customer heating loads if the DES energy is not available.

A comparison of DES to other typical heating sources was provided. Table 2 shows that DES can provide a unit of heat with significantly lower fuel inputs and GHG emissions than other heating options.



Table 2: Halifax Heating Energy Sources Comparison

	Electric Baseboard	Air Source Heat Pump	Gas Hydronic Heating	Oil Hydronic Heating	DES Heating
Space Heating	1 MWh				
Fuel Source	Electricity	Electricity	Natural Gas	Heating Oil	Electricity/DES
Efficiency	100%	240%	85%	80%	420%
Fuel Use	1.00 MWh electricity	0.42 MWh electricity	1.18 MWh Nat. Gas	1.25 MWh Oil	0.24 MWh (electricity) 0.76 MWh (DES)
Fuel Rate (\$/MWh)	\$149.54	\$149.54	\$50.40	\$69.70	\$149.54 (electricity)
Fuel Cost (\$/MWh delivered heat)	\$149.54	\$62.81	\$59.47	\$87.13	\$35.60
Fuel GHG Intensity (tCO₂e/MWh)	0.652	0.652	0.180	0.250	0.652 (electricity) 0.013 (DES)
GHG Emissions (tCO₂e/MWh delivered heat)	0.652	0.274	0.212	0.313	0.166

Capital and operating costs of the DES concept were compared against three possible “business-as-usual” (BAU) systems for the six blocks. The BAU options considered were:

- Electric heat
- Water-source heat pump (WSHP) with natural gas heat
- WSHP with oil heat

The fuel costs of the three BAU cases were compared to the fuel costs of the DES option and are presented in Table 3.

Table 3: Fuel Input Costs for DES and 3 BAUs

Location	BAU 1 – Electric	BAU 2 – Nat. Gas	BAU 3 - Oil	DES
Energy Centre	-	-	-	\$ 44,000
Bld. Mechanical Rooms	\$ 640,000	\$1,098,000	\$1,495,000	\$ 274,000
Customer HVAC System	\$2,039,000	\$ 579,000	\$ 579,000	\$ 601,000
Total	\$2,679,000	\$1,677,000	\$2,074,000	\$919,000

The DES option is shown to have significantly lower fuel use and fuel cost among the three options based on 2016 energy rates—nearly 50% lower energy cost than the lowest cost BAU option (natural gas boilers).

The fuel costs for the DES and BAU options are based on three year average natural gas and heating oil prices in Halifax and current Nova Scotia Power electricity prices as detailed in Table 4.

Table 4: Commodity Price Assumptions

Commodity	Rate
Electricity, Rate 2, Domestic	\$149.54 /MWh
Electricity, Rate 11, General (blended rate)	\$121.00 /MWh
Natural Gas, Rate Class 1 (DES)	\$22.60 /GJ plus \$22 /month
Natural Gas, Rate Class 2 (BAU)	\$14.00 /GJ plus \$563 /month
#2 Heating Oil	\$0.75 /L

Class D capital cost estimates for the DES Concept are presented in Table 5 and compared to the cost of an equivalently sized BAU system (natural gas boilers) for the six Cogswell blocks. Capital costs presented include soft costs but exclude HST and contingency.

Table 5: Total Capital Cost for DES and BAU (\$'000s)

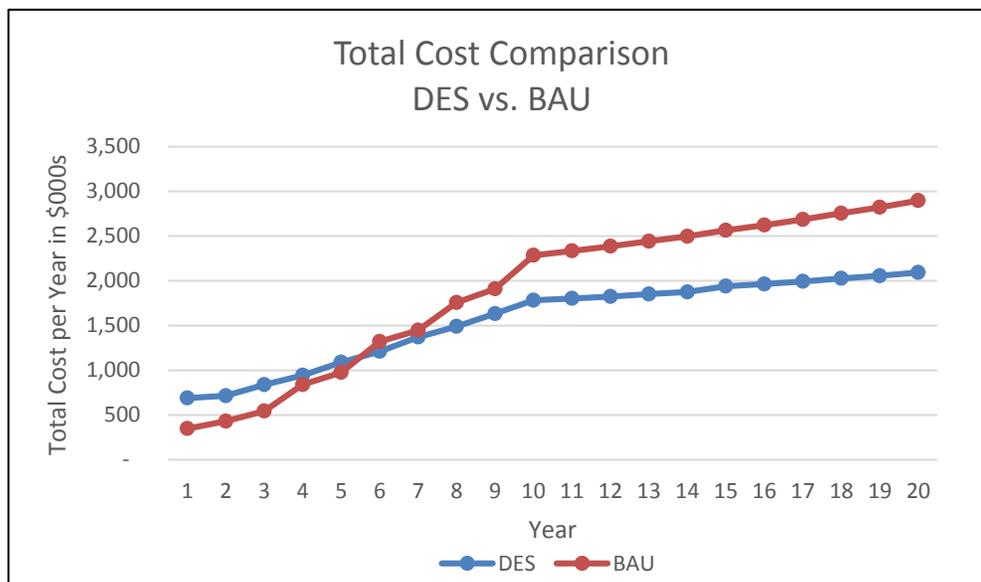
Systems / Components	DES	BAU 2
1. ENERGY CENTRE	\$ 3,955	-
2. DISTRIBUTION PIPING SYSTEM	\$ 1,326	-
3. ENERGY TRANSFER STATIONS IN (6) BLOCKS	\$ 762	-
4. BUILDING MECHANICAL ROOMS IN (6) BLOCKS	\$ 5,956	\$ 5,489
5. CUSTOMER BUILDING HVAC SYSTEM	\$ 27,763	\$ 27,207
TOTALS	\$ 39,762	\$ 32,696

The DES option has a capital cost premium of **\$7.1 million** over the natural gas boiler BAU scenario. The majority of this capital cost premium is due to the cost of the energy centre, distribution piping system (DPS), and energy transfer stations (ETs) for the 6 Cogswell blocks. The estimated cost of the customer heating ventilation and air conditioning (HVAC) systems is similar under both DES and BAU options.

A 20 year financial analysis for the proposed DES concept has been created. It is assumed, initially, that the DES including the energy centre, distribution piping system, and building mechanical rooms in the six blocks would be owned and operated by Halifax Water as a regulated thermal energy utility. The utility sells thermal energy to the customer at a set rate (\$/kWh).

The total cost of owning and operating the DES was compared to the total cost of owning and operating an equivalent BAU system (gas boiler and cooling tower) for the six Cogswell buildings over 20 years. The present value of the total costs of the DES is \$19.8M which is less expensive than the present value of total cost of the BAU at \$23.2M. The annual total costs for the first 20 years of the project are presented in Figure 2 for both DES and BAU.

Figure 2: Total Cost Comparison by Year



This demonstrates that, over the course of a 20 year analysis, the DES can be delivered more cost effectively than the BAU while also creating a valuable non-tax based, revenue-generating asset and also lowering GHG emissions of the community. An initial DES thermal energy rate set at \$0.079/kWh of thermal energy would cover the DES utility costs and also be lower than the total cost per kWh for an equivalent BAU system at \$0.092/kWh.

At these rates and based on initial assumptions, the DES utility could be created with a positive net present value (NPV) of \$2.28M and in internal rate of return (IRR) of 5.7%. The financial modelling indicates that the utility would achieve positive cumulative cash flow in year 17 (5 years after the 6th Cogswell building is complete).

This is a very positive business case for a renewable energy utility. The proposed DES concept could be delivered successfully at Cogswell and HW could create a thermal energy utility that provides renewable energy to customers at lower cost than the BAU system.

The business case for the DES depends on developers connecting to the system. Connection to the DES should be made mandatory for buildings in the identified service area through use of restrictive covenants, developer agreements, or municipal by-laws put in place by Halifax Regional Municipality. Mandatory connection protects the business case for the utility and makes energy rates lower for all connected customers.



BILL NO. 82

Government Bill

*1st Session, 63rd General Assembly
Nova Scotia
67 Elizabeth II, 2018*

**An Act to Amend Chapter 39
of the Acts of 2008,
the Halifax Regional Municipality Charter,
Respecting a District Energy System**

CHAPTER 9
ACTS OF 2018

**AS ASSENTED TO BY THE ADMINISTRATOR OF THE PROVINCE
APRIL 18, 2018**

The Honourable Derek Mombourquette
Minister of Municipal Affairs

*Halifax, Nova Scotia
Printed by Authority of the Speaker of the House of Assembly*

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**An Act to Amend Chapter 39
of the Acts of 2008,
the Halifax Regional Municipality Charter,
Respecting a District Energy System**

Be it enacted by the Governor and Assembly as follows:

1 Section 3 of Chapter 39 of the Acts of 2008, the *Halifax Regional Municipality Charter*, as amended by Chapters 16 and 64 of the Acts of 2010, Chapter 4 of the Acts of 2011, Chapter 63 of the Acts of 2012 and Chapter 13 of the Acts of 2017, is further amended by

(a) adding immediately after clause (ja) the following clause:

(jb) “Cogswell District Energy Boundary” means the area delineated in the map in Schedule D to this Act;

and

(b) adding immediately after clause (v) the following clause:

(va) “district energy system” means a system designed to supply heating or cooling by continuously circulating, to more than one building, through a system of interconnected pipes, steam or water that is heated or cooled using thermal energy recovered from wastewater;

2 (1) Subsection 104(1) of Chapter 39, as amended by Chapter 49 of the Acts of 2014, is further amended by adding immediately after clause (a) the following clause:

(aa) expenditures incurred for the district energy system within the Cogswell District Energy Boundary;

(2) Section 104 of Chapter 39, as amended by Chapter 49 of the Acts of 2014, is further amended by adding immediately after subsection (7) the following subsection:

(8) Subsection (7) does not apply in respect of any by-law made and any charge imposed or fixed pursuant to clause 104(1)(aa).

3 Subsection 104A(1) of Chapter 39, as enacted by Chapter 52 of the Acts of 2010 and amended by Chapter 25 of the Acts of 2016, is further amended by relettering clause (a) as (ab) and adding immediately before that clause the following clauses:

(a) equipment installed pursuant to an expenditure under clause 79(1)(ac) in respect of a district energy system within the Cogswell District Energy Boundary;

(aa) equipment installed pursuant to an expenditure under clause 79(1)(ad) in respect of a district energy system within the Cogswell District Energy Boundary;

4 Subsection 188(1) of Chapter 39, as amended by Chapter 64 of the Acts of 2010, is further amended by adding immediately after clause (l) the following clause:

(la) subject to the regulation of the Board, the establishment and operation of a district energy system within the Cogswell District Energy Boundary;

(lb) the authorization of the General Manager of the Halifax Regional Water Commission to exercise the powers and authorities of the General Manager set out in Sections 9 and 10 of the *Halifax Regional Water Commission Act* in respect of the district energy system;

(lc) the authorization of the Council to require, where the Council considers it necessary or advisable, that a building or other structure, built within the Cogswell District Energy Boundary after the coming into force of the by-law, be connected to the district energy system;

5 Subsection 235(5) of Chapter 39, as amended by Chapter 41 of the Acts of 2008, Chapter 16 of the Acts of 2009, Chapter 18 of the Acts of 2013 and Chapter 16 of the Acts of 2014, is further amended by adding immediately after clause (j) the following clauses:

(ja) require and regulate the establishment of a district energy system within the Cogswell District Energy Boundary;

(jb) require, where the Council considers it necessary or advisable, that a building or other structure, built within the Cogswell District Energy Boundary after the coming into force of the by-law, be connected to the district energy system;

6 Chapter 39 is further amended by adding immediately after Schedule C the following Schedule:

SCHEDULE D

