

POSSIBLE UTILITY STRUCTURES FOR NEW GLASGOW DHS

The New Glasgow DHS will operate as a heat utility, with heat customers billed on a regular (e.g., monthly) basis. For the purposes of Stage 1 of the feasibility study, the entity owning the heat network is called the Heat Distribution Company (HDC). The structure, ownership, financing, and operation of the HDC will have a significant impact on the economic performance, benefits and benefit distribution, and build-out pathway of the utility. While not assessed in detail at this stage of the study, installation of new subsurface electricity distribution infrastructure could also permit establishment of a new electricity distribution utility, typically termed a local distribution company (LDC). This section describes a variety of business, ownership, operating, and financing models that could be utilized for the New Glasgow biomass DHS.

Key questions that need to be answered in the next phase of the feasibility study include:

- Will all three major components of the DHS – the energy centre, the heat network, and the in-building heat transfer units – be owned by the same entity?
- Will the DHS and its components be owned publicly, privately, by a public-private partnership, or a co-operative?
- Will the HDC be a for-profit or not-for-profit enterprise?
- Will operations of the energy centre and/or heat network be operated by the owner(s) or by a specialized operations company under contract?
- Will electricity from the combined heat and power plant be sold to an LDC, to Nova Scotia Power, or to a few large buyers?
- What will be the governance structure and who will serve as a member of board of directors?
- Will federal and/or provincial infrastructure grant financing be required and to what level of total capital cost?
- Who will provide the equity portion of financing?
- Will low cost (rate) debt financing be available from federal or provincial organizations?

1.1 COMPREHENSIVE VS COMPONENT OWNERSHIP

Comprehensive Ownership – All aspects of the DHS, including the three main components of the energy centre(s), the heat network, and the in-building heat transfer units (HTUs), are owned by a single company.

Component Ownership – The energy centre can be owned by a separate company than the heat network. In this scenario, heat is sold by the energy centre owner to the HDC under a long-term (30+ year) agreement. The HTUs can be owned by the HDC or by the building owners.

1.1.1 CONSIDERATIONS

With comprehensive ownership, the HDC is responsible for all aspects of the DHS, including fuel sourcing, biomass CHP operation, and HDC operation. While many municipalities in the Nordic countries of Europe have comprehensive ownership structures, it is highly unusual in Canada for a municipality to own and/or operate a

thermal energy plant. There are historical examples, such as the DHS in Toronto previously owned by the City of Toronto, but these have generally relied on natural gas for fuel.

Component ownership eliminates HDC responsibility for a biomass CHP plant/energy centre. If the owners of the HDC are uncomfortable with biomass procurement for a thermal energy plant, it is a preferable model. However, it is essential that the agreement between the HDC and the energy be designed to ensure energy supply is highly reliable (99.99% uptime) and remains affordable. It is generally preferable for the interests of biomass fuel suppliers to be aligned with the interests of the biomass energy plant owner/operator, which could be possible with component ownership.

Building owner ownership of the HTUs would generally be expected if the building owners were required to provide upfront payment for connection to the system. If building owners do not need to pay to connect, it may still be possible for ownership of the HTUs to transfer to building owners. However, this is not the model used by other utilities, such as gas or electric, where the meter is owned by the utility.

1.2 PUBLIC VS. PRIVATE VS P3 VS CO-OPERATIVE OWNERSHIP

Public Ownership – The HDC is a utility company owned by the Town of New Glasgow. This may be for all assets of the DHS (Comprehensive) or for only one or two of the three main components (Component). If Component, Public ownership was chosen, it is likely the publicly-owned component would be the heat network, with or without the HTUs. In this case, the energy centre(s) would be privately or co-operatively owned.

Private Ownership – The HDC is privately owned and operated, similarly to the natural gas utility (Eastward Energy) currently operating in New Glasgow. The involvement of the Town of New Glasgow would be similar to the permitting and planning role it currently plays with natural gas. The private owner would be responsible for energy supply from the biomass CHP, whether it is owned by the same company or a supplier.

P3 (Public Private Partnership) Ownership – The HDC would be owned by both the Town of New Glasgow and one or more private sector companies, with shares equally or unequally divided between public and private sector owners. A P3 could also be used for development of the infrastructure assets but does not need to result in long-term P3 ownership. Examples of P3 development include BOT (build-operate-transfer), BTO (build-transfer-operate), and DBFO (design-build-finance-operate).

Co-operative Ownership – In a co-operatively-owned HDC, the heat customers of the HDC own the HDC. By definition, it is operated as a not-for-profit. The heat network may be owned by the HDC while HTUs could be owned by the co-operative or building owners. While the energy centre(s) may be owned by the same co-operative as the HDC and HTUs, a separate co-operative, composed of woodland owners, or a private company could supply heat to the co-operative HDC under a long-term supply agreement. **Co-operative ownership is recommended to be explored as the preferred structure for the New Glasgow DHS.**

1.2.1 CONSIDERATIONS

Ownership will have a strong influence on financing, which will have a significant impact on delivered cost of heat. In general, private ownership implies a greater percentage of private sector financing and therefore a higher weighted average cost of capital than public ownership and financing. Pension and insurance capital are the primary private sources of equity financing for private owners and expected return on equity will be much higher than public capital. Capital cost is by far the largest contributor to levelized cost of heat (LCOH). This



makes the weighted average cost of capital, combined with amortization period, the most important financial consideration for utility ownership structure.

Public (municipal) ownership is a very common model for DHS', particularly for the heat network and HTU components. The heat network is a complementary asset to the municipality-owned subsurface infrastructure utilities of water and sewer. Since the heat network is a closed water system, it is generally easier to operate than water and sewer networks. A municipality-owned HDC would be eligible for low-cost financing and grants from higher levels of government. In addition, most of the utility oversight systems and structures will already be in place. There is strong alignment between the interests of the Town of New Glasgow and HDC customers.

Private ownership transfers all risk for utility development and operation to the private sector. This risk transfer could be attractive for the Town of New Glasgow. However, private ownership is likely to reduce the 'social license' for DHS development and while the development may still be economically viable compared to the baseline, the delivered price of heat is likely to be much higher than for a not-for-profit public or co-operative development. Private ownership would likely limit system access to low-cost financing from the Canada Infrastructure Bank and will certainly limit the Government of Canada and Government of Nova Scotia infrastructure grant funding access. Private ownership could have a negative impact on perception of the HDC and make agreements to connect more challenging to secure.

P3 ownership, considered separately from P3 development, could permit public majority ownership while benefiting from the expertise of experienced private sector DHS owners. However, it is likely the private sector owner would want a similar, or even higher, return on capital to a privately-owned system. In other words, a premium would be paid for private sector participation in a majority publicly-owned utility.

Co-operative ownership is the most common ownership model in countries such as Denmark, particularly for systems outside of major cities. With customers as owners, there is no question that the utility will operate in the best interests of its customers. In contrast, private ownership is intended to benefit the owners, not necessarily the heat customers. Even with public ownership, there can be divergence between the interests of the municipality and the interests of the heat customers, despite likely alignment on most issues. Co-operative ownership is likely to garner the greatest 'social license' of the options considered and potentially the greatest likelihood of securing agreements to connect. However, co-operative ownership is generally the most complex form of ownership and requires consideration of the greatest number of shareholders. Strong governance for such a significant and essential service infrastructure asset is essential, necessitating a competent professional board of directors. A Town of New Glasgow representative could serve as a director of the co-operative but the Town would not have control of the utility. Since a new co-operative would not have any assets other than member agreements to connect, it is likely public (provincial) participation in financing would be required.

For biomass energy facilities, it can be very valuable to align the interest of fuel suppliers and the biomass energy facility owner and operator. This ensures fuel that meets the needs of the energy facility is delivered. One major consideration for a biomass DHS in New Glasgow is security of fuel supply. The large capital cost for the system, which far exceeds the value of the sawmills in the region, means offtake agreements with sawmills are unlikely to be sufficiently secure for project financing. This means security of feedstock supply requires agreement with the timberland owners. Since two thirds of timberlands in Nova Scotia are privately owned, a large number of agreements may be required to ensure all the fuel needs of the system are secure.

Establishment of a woodland owners co-operative, which could own the biomass energy centre(s), would enable aggregation of wood fuel and ensure sustainability requirements are met. In addition, it would mean

local woodland owners significantly benefit from development of the DHS. For a DHS at the scale of New Glasgow, it is unusual for woodland owners to own the heat network or HTUs.

Other organizations and entities may have desire to own components of the DHS. This could include local First Nations, such as the Pictou Landing First Nation. There may be better alignment for a local First Nation to own the energy centre(s), in whole or in part, than the heat network or HTUs.

1.3 FOR PROFIT VS NOT FOR PROFIT

For Profit – The HDC aims to generate profits for its owners, whether those are private or public.

Not For Profit – The HDC does not aim to generate profits while ensuring adequate capital reserves are maintained for planned and unexpected expenses. All money earned goes back into running the HDC.

1.3.1 CONSIDERATIONS

A privately-owned or P3-owned HDC will be a for-profit company while a co-operatively-owned HDC will be a not-for-profit company. A publicly-owned HDC can be a for-profit or not-for-profit company. Should an HDC owned by a municipality be a for-profit company, it could generate income for the municipality to pay for other public services. All other things being equal, a not-for-profit company will supply heat at a lower cost than a for-profit company.

1.4 OWN-OPERATE VS CONTRACT OPERATION

Own-Operate – An HDC with an Own-Operate model means staff of the HDC operate the utility.

Contract Operation – A company specializing in infrastructure asset operations can be contracted to operate one or all components of a DHS.

1.4.1 CONSIDERATIONS

For a Comprehensively-owned HDC, an Own-Operate model could apply to all owned district heating components or only some of the components, such as the heat network and HTUs. The energy centre(s) could still be owned by the same entity but operation could be contracted to a private company.

HDC staff do not necessarily need to be municipal employees if the HDC is municipality owned but it is likely there would be similarities in the employment agreements and benefits. In comparison, contract operation employees would not be subject to the same employment agreements or benefits.

1.5 ELECTRICITY SALES: LDC VS PPA

Local Distribution Company (LDC) – An LDC is responsible for low voltage electricity distribution from the biomass CHP and provincial transmission grid to electricity consumers within the geographic boundaries of the service area.

Power Purchase Agreement (PPA) – The biomass CHP sells electricity under a long-term purchase agreement to the transmission grid operator and/or large consumers of electricity such as existing LDCs or heavy industry.

1.5.1 CONSIDERATIONS

There are currently five LDCs in Nova Scotia. These are owned by the Towns of Lunenburg, Mahone Bay, Riverport, Berwick, and Antigonish. The LDCs were grandfathered in when Nova Scotia Power was privatized in

1992. At the time, this was the largest privatization in Canadian history. The five LDCs operated under the Municipal Electric Utilities of Nova Scotia Co-operative between 1997 and 2017. There have been no new LDCs formed since the privatization of Nova Scotia Power, which has a near monopoly over the electricity market in Nova Scotia. Due to this ‘natural’ monopoly, Nova Scotia Power is regulated by the Nova Scotia Utility and Review Board (UARB).

The existing electricity distribution system in New Glasgow is owned by Nova Scotia Power. It is unlikely the Government of Nova Scotia would support the municipalization (expropriation) of private electricity distribution assets from Nova Scotia Power to the Town of New Glasgow. This leaves only two options to establish an LDC in New Glasgow for sale of electricity from the biomass CHP: 1) purchase of the existing electricity distribution assets from Nova Scotia Power; 2) development of parallel, subsurface electricity distribution assets. As part of the DHS development, option 2 is deemed by far the most likely.

If a new electricity LDC, using new subsurface electricity distribution infrastructure, is not established, the electricity generated by the biomass CHP must be sold under a long-term power purchase agreement (PPA) with one or more bankable buyers. While Nova Scotia Power the most obvious buyer, there are other potential options including the existing LDCs and industrial consumers. The Nova Scotia Electricity Reform (2013) Act established a mechanism for selling directly to large electricity consumers using ‘Renewable to Retail’ regulations. A transmission and distribution fee is paid to Nova Scotia Power for delivering the electricity generated. Unfortunately, the regulations are written assuming that renewable electricity is intermittent and an unnecessary (for biomass) standby backup charge is mandated.

In general, financing a biomass CHP plant is not possible without a long-term electricity purchase agreement in place. The New Glasgow DHS relies upon co-generation of electricity for economic supply of heat, meaning the entire project depends upon a long-term electricity purchase agreement.

1.6 COMPANY VS ASSET ONLY

Company – The HDC is owned by a for-profit or not-for-profit company with a board of directors accountable to the shareholders.

Asset Only – The HDC is not incorporated and functions as a utility asset of a larger for-profit or not-for-profit company.

1.6.1 CONSIDERATIONS

The choice of establishing a company for the purposes of owning all or some of the New Glasgow DHS assets will be strongly influenced by the desired governance of the owners and investors. In general, for an asset with the capital value of a community-wide network in New Glasgow, a ‘special purpose vehicle’ (SPV) company is often established. This is particularly true if the value exceeds the current assets of the owners.

A new company will be required if the HDC is to be owned by a co-operative or P3. It is also highly likely that a SPV company, functioning as a subsidiary of a larger asset owner, would be incorporated if the HDC is privately owned. The only ownership structure that would not necessarily require a new company is municipality-owned. Just as water and sewer infrastructure assets do not need to be owned by a dedicated utility company and can be owned by the municipal corporation directly, the HDC could be owned by the Town of New Glasgow directly. In this case, Mayor and Council would be responsible for governance of the utility.

Should one or more new utility companies be established for ownership of the project, directors for one or more boards of directors would need to be chosen. The choice of directors will be determined primarily by the shareholders but could also be strongly influenced by the other financiers. Vice-versa is also true, with the choice of directors, reflecting HDC governance, impacting the willingness of heat customers to connect the system and investors and financiers to provide capital for development.

1.7 VOLUNTARY VS MANDATORY VS NECESSITY CONNECTION

Voluntary Connection – Building owners commit to connecting to the heat network by signing an intention to connect followed by a utility service agreement. Penalties for disconnection or not consuming heat can be used to ensure capital costs are recovered.

Mandatory Connection – A municipal bylaw or provincial law is passed to require connection of buildings to the heat network, with similarities to mandatory electricity and water/sewer connections.

Necessity Connection – A municipal bylaw or provincial law is passed that makes use of alternatives economically or regulatory challenging, leaving building owners with little option but to connect.

1.7.1 CONSIDERATIONS

Mandatory connection can be viewed as anti-free market in North America but mandatory, or necessity, connection to several utilities is common in urban areas of Canada and the US. Examples include potable water, sewer/wastewater, and electricity. Necessity connection is when it is so onerous not to connect that building owners have, in actual fact, little choice. This can occur by banning alternatives or putting regulations or economic policies in place that make non-connection very difficult. It is more the illusion of choice. An example of necessity utility connection is banning septic tanks and wells, which is a common bylaw in urban areas. There is little alternative to connecting to the water and sewer utilities. Electricity utilities are natural monopolies and it is extremely rare to have a building connected to more than one electricity distribution system. While operating 'off-grid' with solar panels and batteries may be technically possible for some buildings, the extremely high cost makes connection to the monopoly electricity grid required for all intents and purposes.

In Nova Scotia, policies that would result in necessity DHS connection include a ban on oil and propane boiler/furnaces, a ban on oil and propane tanks, a ban on fossil fuel heating in homes, and/or a demand charge for electricity. The latter would reflect the actual costs of supplying electricity for home heating, which significantly increase peak demand on the grid and would dominate electricity demand charges. Demand-based pricing is the standard pricing approach for larger (e.g., industrial) consumers of electricity and large electricity consumers in New Brunswick are lobbying for homeowners using electricity for heating to be subject to a demand charge.

Mandatory DHS connection has been used by European governments in the past, but very rarely. The most obvious example was during the oil embargo energy crises in the 1970's and 1980's when the national Government of Denmark, due to the country's reliance on oil heating, required network connection. This is no longer the case and voluntary connection, using voluntary commitment to connect agreements, are the norm. In general, mandatory connection would be seen as heavy-handed. Economic policies are used to strongly encourage district heating connection.

If there are no policies or regulations necessitating or requiring connection to the biomass DHS, voluntary connection must be relied upon. This would require a critical number of building owners signing an intention-to-connect before any part of the heat network could be developed. Under the In Tandem scenario, no energy centre development could occur without sufficient connection commitments in place. In the Supply First scenario, the biomass CHP could be developed and then intention-to-connect commitments could be secured on a street-by-street (line-by-line) basis because heat supply would already be in place. The presence of an existing energy supply is likely to increase the confidence of building owners that heat supply via district heating is viable. In addition, from a planning perspective, it would reduce cost of heat uncertainties.

1.8 PRIVATE EQUITY VS GRANT-BASED EQUITY

Private Equity – The equity portion of project financing comes from a non-government source of capital such as a private equity firm, a pension fund, a strategic corporate investor, or a family office (high net worth individual or family).

Grant-Based Equity – The equity portion of project financing can come from government (federal, provincial) grants. This in turn can be used to secure project debt financing from public or private lenders.

1.8.1 CONSIDERATIONS

Project financing generally requires both equity and debt capital. Returns on equity are defined by the income of the project and distributed to shareholders while debt must be serviced over the loan period.

Non-repayable federal and provincial grants, typically provided in the form of a cost sharing contribution agreement, reduce the delivered cost of heat and are highly attractive from a financial perspective. The most likely source of grant funding for the New Glasgow district heating system is the Investing in Canada Infrastructure Program (ICIP) and/or its replacement, since ICIP concludes in 2028. Under the terms of the ICIP agreement between the Governments of Canada and Nova Scotia, if funds are for a municipality-owned project, the Government of Canada will contribute 40% while the Government of Nova Scotia will contribute 33.3%. In some provinces (e.g., British Columbia), a not-for-profit, such as a co-operative, can receive the same level of funding as a municipality. This is not currently the case in Nova Scotia, so the Government of Nova Scotia would need to amend its eligibility criteria. Given the scale of the New Glasgow DHS and the limited funds available for the whole province, it is unlikely 73.3% of the entire capital cost could be sourced as a grant. It is also not required for the project to be attractive from a levelized cost of heat perspective. First Nations are eligible to receive up to 100% of the capital cost from the Government of Canada, although this level of support is not typical.

Grant funds can be used by a not-for-profit organization, such as a co-operative or municipality-owned corporation, as project equity. This project equity can then be used to secure debt financing from a public (e.g., Canada Infrastructure Bank) or private (e.g., pension fund capital) entity. Private equity is sourced from private and public sector investors in the project. Investors expect a return on capital provided. This may be in the form of distributions but it could also be from capital gains realized upon sale of their ownership in the project company (SPV).

A combination of grants and private equity could be used. One option for this dual-source approach is to establish different classes of shares to ensure private equity receives priority for income distributions while public/co-operative shareholders maintain SPV majority voting rights with reduced priority for income.