FINANCING AND ACCELERATING RENEWABLE ENERGY DEPLOYMENT IN THE ARCTIC

A FRAMEWORK FOR NUNAVUT

World Wildlife Fund Canada has developed a financing framework for renewable energy projects in the Arctic

More than 170 remote Indigenous communities in Canada rely almost completely on diesel power plants for electricity. Most of these communities rely on small, local microgrids and are served by publicly owned utilities, as mandated under provincial or territorial legislation. While these laws ensure these communities have reliable power, they also establish status quo costs, subsidies and investments for diesel power plants. Reliance on these plants comes with harmful economic, social and environmental impacts that do not reflect traditional ways of Indigenous life.

In 2016, WWF-Canada commissioned the Waterloo Institute for Sustainable Energy (WISE) to perform in-depth feasibility analyses on the costs and economic benefits of renewable energy in Nunavut Territory. The study focused on five communities identified as having the strongest economic and environmental case for renewable energy deployment. However despite a proven business case, Qulliq Energy Corporation's (QEC) monopoly on electricity generation in Nunavut and financing challenges still prevented investment in renewable energy infrastructure. To address these barriers, WWF-Canada commissioned a study by Navigant Consultants to identify a viable and cost-effective framework to accelerate the deployment of renewable energy projects in remote northern communities. While this study focuses on Nunavut, the findings are applicable across the Canadian territories and remote northern regions of Canadian provinces.

BARRIERS TO RENEWABLE ENERGY FINANCING

This study identified three significant barriers to renewable energy financing in northern Canada (in addition to the electricity generation monopoly in Nunavut):

1. The relatively small scale of individual projects limits access to debt and equity capital markets;
2. Access is limited to equity capital for customers, communities and incumbent (government-owned) utilities; and
3. The highly subsidized electricity rates for most customers negatively impacts the economics of self-generation or behind-the-meter generation.

UNLOCKING SAVINGS: FUNDAMENTAL OBJECTIVES

Unlocking the savings potential of renewable energy in the North is contingent on finding a framework that does not rely on upfront investment from utilities or customers who are already facing high costs for electricity generation. Therefore, the framework was developed with the following objectives in mind:

OBJECTIVE 1 - Renewable energy development should not increase costs to the incumbent utility, territorial government or the customer.

1. Effectively, this puts a cap on what the incumbent utility should pay for the output from renewable energy sources. For most of the initial renewable energy projects, this would mean that only savings associated with using less diesel fuel - or the ***avoided cost of the diesel fuel*** - to operate existing generators could be used to pay for renewable energy. However, in some cases, utilities can see more significant avoided costs by relying on renewable energy projects to avoid having to invest in additional diesel generator capacity. In those circumstances, those higher avoided costs – from diesel fuel and capital investment – could justify increased investment in renewable energy projects.

OBJECTIVE 2 - Due to public funding limitations, renewable energy should also be financed using private debt and equity capital, where possible, and leverage public capital as appropriate.

2. This requires a mechanism to secure the revenue (or benefits) associated with the renewable energy project. To achieve this, our framework includes a ***long-term power purchase agreement*** with the incumbent utility. A long-term power purchase agreement will attract private capital by providing visibility into the revenue for a project over an extended period.

3. Given the relatively small scale of renewable energy projects in northern communities, our framework includes an ***entity that provides access to federal funds***, such as grants to support community and Indigenous equity involvement in projects, and loans or loan guarantees to bridge challenges associated with raising debt capital for small projects.

The three items - payments based on avoided costs, a long-term power purchase agreement, and a federal funding

entity to provide grants and loans - form the core elements of our framework to meet the two fundamental objectives of renewable energy financing.

This framework could be applied to renewable projects designed for individual applications (e.g. solar photovoltaics on a residential or commercial building roof) and renewable projects designed for community applications (e.g. larger ground-mounted solar photovoltaics, wind or energy storage). The framework can also help to foster community and Indigenous ownership of renewable energy projects through the provision of federal grants.

RECOMMENDATIONS

Based on this analysis, this report is recommending the following actions to finance renewable energy in northern communities:

- A long-term power purchase agreement (PPA) between an electricity generator and a party who wishes to purchase the electricity is required (in Nunavut, the Qulliq Energy Corporation or QEC is the power purchaser). The secure revenue stream from the PPA is a source of collateral that can be used to raise capital from outside sources.
- Payments made by QEC under a PPA for renewable power should be based on the avoided cost of diesel and capital investment. This will ensure that QEC, the Government of Nunavut and electricity customers across the territory are not burdened with additional costs in the short-term.
- Finally, a federal funding entity should provide grants, loans and/or loan guarantees to individual projects. The provision of direct federal loans overcomes the issue of the small-scale nature of renewable deployments in northern remote communities and the lack of interest and capability from commercial lenders. This financial support can be made at early stages of the project, or for the duration of the project, depending on the economics of the project.

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NAVIGANT

Reducing Barriers to Financing and Accelerating the Deployment of Renewables in the Arctic

A Framework for Nunavut

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October, 2017

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EXECUTIVE SUMMARY

World Wildlife Fund Canada (WWF-Canada) retained Navigant Consulting Ltd. (Navigant) to identify barriers to financing renewable energy projects in remote northern Canadian communities, and to identify a viable and cost-effective framework to accelerate the deployment of renewable energy projects in these areas. This study is focused on Nunavut, however, many of the elements presented in this report are applicable across the Canadian territories and remote northern regions of the provinces.

In 2016, WWF-Canada commissioned the Waterloo Institute for Sustainable Energy (WISE) to perform in-depth feasibility analyses on the costs and economic benefits of renewable energy. The study focused on five communities identified in a pre-feasibility study as having the strongest case for renewable energy deployment. The study performed by Navigant is intended to complement the WISE report by providing a financing framework that enables renewable energy project deployment in the short and long term.

Navigant identified three significant barriers to renewable energy financing in northern Canada:

- The relatively small scale of individual projects limiting access to debt and equity capital markets;
- The limited access to equity capital for customers, communities, and incumbent (government owned) utilities; and
- The highly subsidised electricity rates for most customers, negatively impacting the economics of self-generation or behind-the-meter generation.

To address these barriers, Navigant developed a strawman framework based on two fundamental objectives.

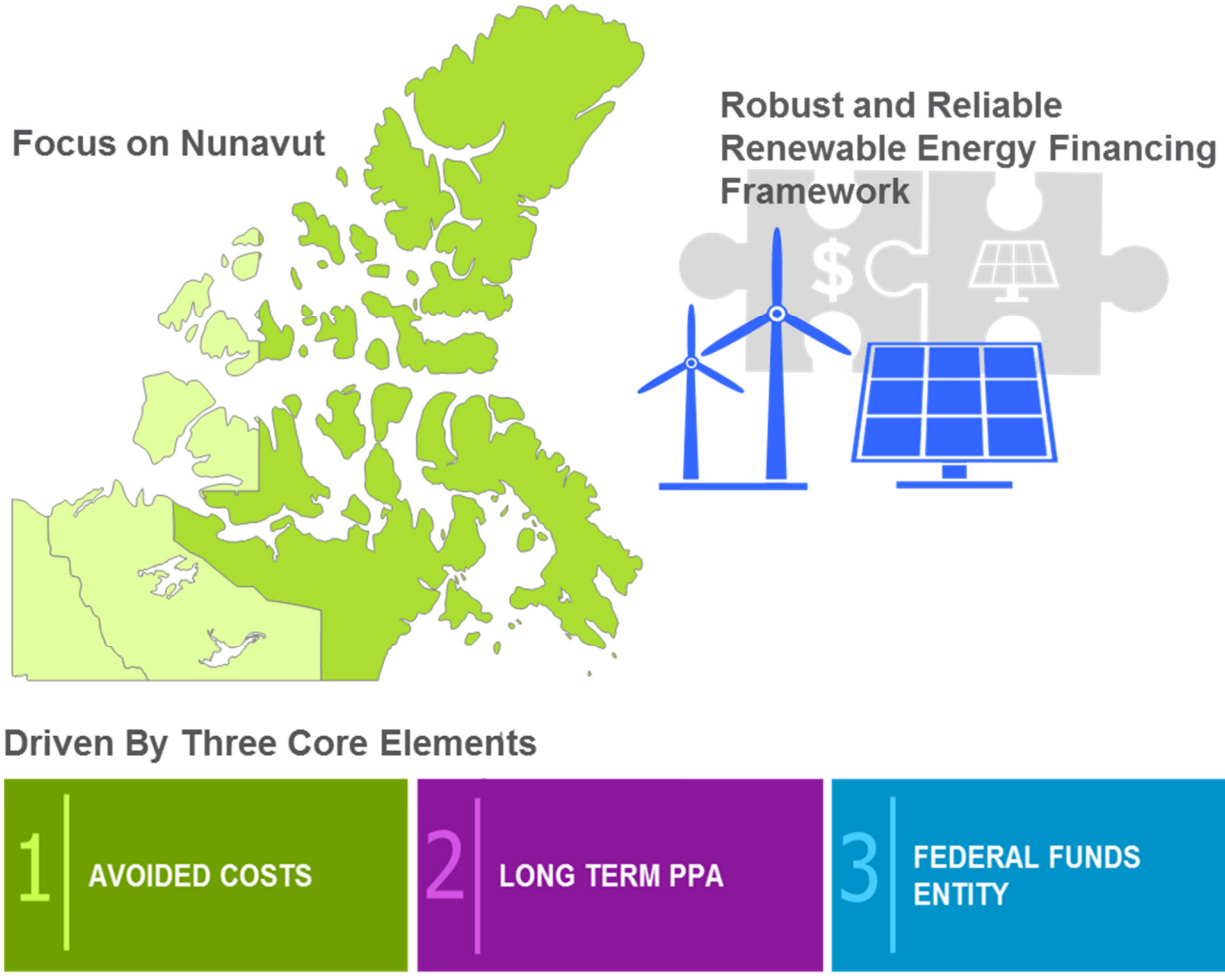
Renewable energy development should not increase costs to the incumbent utility, territorial government, or the customer. Effectively, this puts a "cap" on what the incumbent utility should pay for the output from renewable energy sources at the utility's avoided cost. For most of the initial renewable energy projects, this would be the *avoided cost of the diesel fuel* required to operate existing generators. However, there may be opportunities for renewable energy projects, or renewable energy projects combined with energy storage to also avoid the need for the incumbent utilities to invest in additional diesel generator capacity or refurbish existing diesel generators. In those circumstances, the incumbent utility should pay the avoided costs associated with both the diesel fuel and the capital investment. The territorial or federal government could, justifiably, also provide additional subsidies to reflect non-energy impacts such as improved air quality, community development, etc. These subsidies should be paid directly from government and not through electricity rates and the incumbent utility.

Renewable energy development should be financed using private debt and equity capital, where possible, and leverage public capital as appropriate. This requires a mechanism to securitise the revenue (or benefits) associated with the renewable energy project. To achieve this, Navigant's strawman framework also includes a *long-term power purchase agreement* with the incumbent utility. A long-term power purchase agreement will attract private capital by providing visibility into the revenue for a project over an extended period. Given the relatively small-scale of renewable energy projects in northern communities, Navigant's strawman framework includes an *entity that provides access to federal funds*, both grants to support community and Indigenous equity involvement in projects and loans or loan guarantees to bridge challenges associated with raising debt capital for small projects. When sufficient loans or loan guarantees are in place, they could be bundled and resold to public markets to replenish the initial allocation of public capital.

The three items, payments based on avoided costs, a long-term power purchase agreement, and a federal funds entity to provide grants and loans, form the core elements of Navigant's strawman framework to meet the two fundamental objects described above.

This framework could be applied to renewable projects designed for individual applications (e.g. solar photovoltaics on a residential or commercial building roof, etc.) and renewable projects designed for community applications (e.g., larger ground-mounted or commercial building rooftop solar photovoltaics, wind, energy storage, etc.). The framework would also help to foster community and Indigenous ownership of renewable energy projects through the provision of federal grants.

STRAWMAN FRAMEWORK FOR FINANCING RENEWABLES IN NORTHERN CANADA



1. INTRODUCTION

1.1 Background and Objectives

World Wildlife Fund Canada (WWF-Canada) is committed to finding renewable energy solutions for Canada's Arctic. To do this, WWF-Canada is working with Northern communities and other stakeholders to implement energy solutions that reduce the Arctic's reliance on diesel for electricity and heating. More than 170 remote communities in Canada rely on diesel fuel for electricity and heating. For many communities, trucks transport the diesel fuel across ice roads or it is shipped by sea, and are subject to climate change's impact on the physical landscape. Additionally, the volatility of oil prices has an impact on the Arctic's energy security.

WWF-Canada retained Navigant Consulting Ltd. (Navigant) to identify barriers to financing renewable energy projects in remote Northern communities, and to identify a viable and cost-effective framework to accelerate the deployment of renewable energy projects in these areas. This study is focused on Nunavut, however, many of the elements presented in this report are applicable across the Canadian territories and remote northern regions of the provinces.

1.2 Organisation of Report

This report is divided into four main parts. The first part provides context with respect to electricity supply in Nunavut. This provides background information on how diesel fuel is purchased and distributed. In addition, this section provides information on the various government subsidies that are provided for electricity consumption, and how these subsidies reach customers.

The second part of this report outlines the considerations that financial providers make when choosing to invest in renewable energy projects. In addition, this section identifies a few of the unique considerations and barriers to financing renewable energy projects in Nunavut.

The third part of this report provides a general overview of mechanisms available for financing renewable energy projects. The methods described in this section are commonly used in jurisdictions around the world.

Finally, the fourth section of this report presents Navigant's strawman framework for Nunavut.

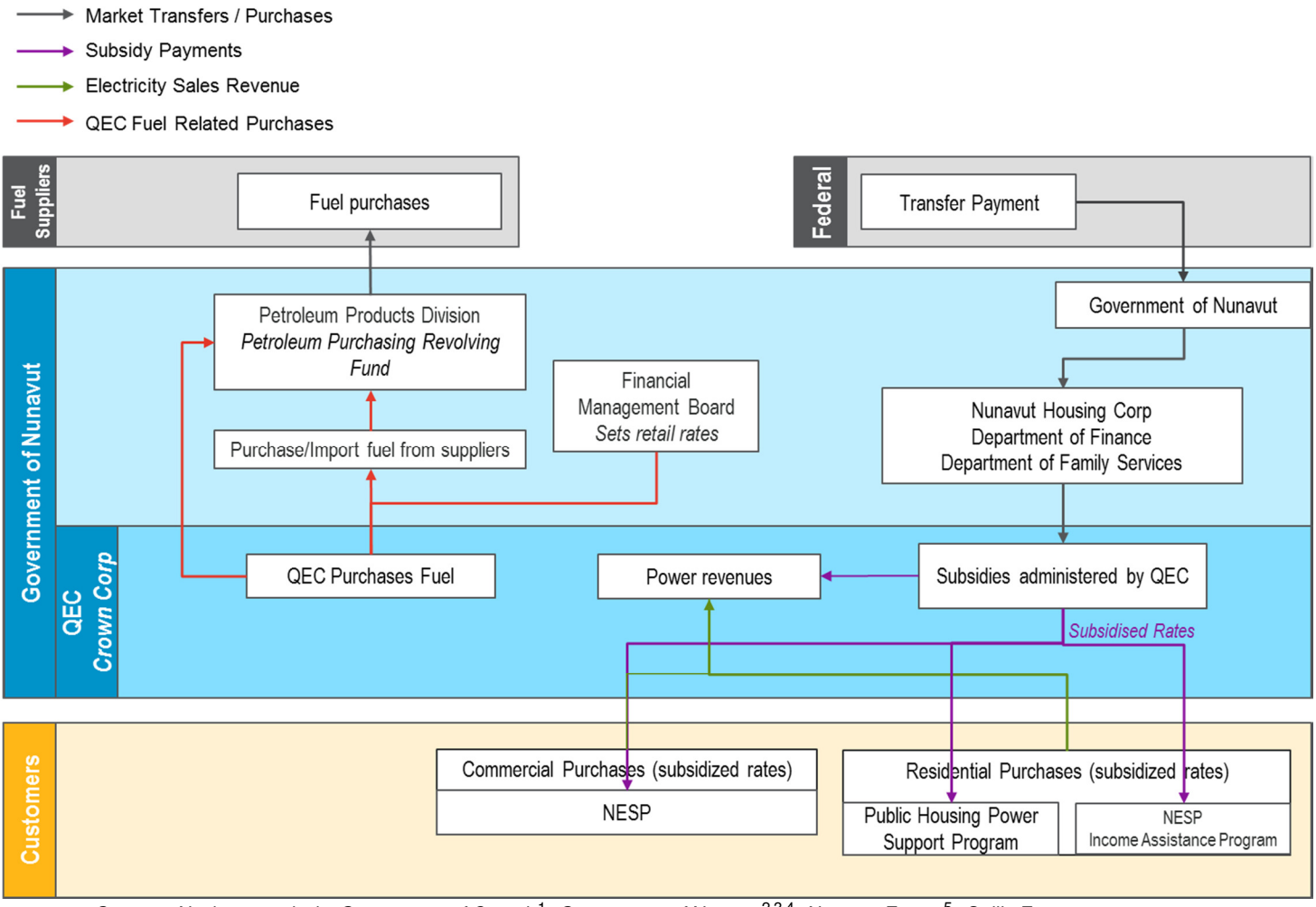
2. POWER SUPPLY IN NUNAVUT

There are 25 organised communities in Nunavut that are spread across the territory. Nunavut does not have a centralised electricity grid, nor is it connected to the grid of neighbouring provinces or territories. Its communities are almost completely reliant on electricity generated by burning diesel fuel, the financial and logistical costs of which are high. The Qulliq Energy Corporation (QEC), a crown corporation, is the monopoly supplier and distributor of electricity in Nunavut.

Nunavut is the only province or territory in Canada that is entirely dependent on diesel fuel to produce electricity. All the diesel fuel used to generate electricity is imported. The volatility in the price of oil affects the territory's energy security. Due to the remoteness of the communities in the territory, the cost of delivered diesel fuel is high, as it must be transported long distances over rough terrain or by sea.

Understanding how diesel is purchased, distributed, priced, and subsidised is necessary to analyse the financial feasibility of renewable energy in Northern communities. Figure 1 illustrates the various components of power supply and cost recovery in Nunavut. The following sections expand on this figure, and provide an overview of how diesel fuel is supplied, and how the cost of the fuel is recovered through electricity rates and subsidies.

Figure 1. Nunavut Electricity Sector Flow of Funds



Sources: Navigant analysis, Government of Canada[1], Government of Nunavut[2,3,4], Nunavut Energy[5], Qulliq Energy Corporation[6,7,8,9], and The Nunavut Housing Corporation[10]

Electricity rates in Nunavut are not subsidized through discounted diesel fuel prices. QEC pays the full cost of the diesel purchased by the Petroleum Purchasing Division. Rather, the Government of Nunavut provides for subsidized electricity rates for consumers. Most domestic (i.e. residential) consumption, representing approximately 40% of total sales, is heavily subsidised. Government commercial consumption represents another 30% consumption. Non-government commercial consumption represents the remaining 30%. Government commercial consumption it not directly subsidized. It is unclear what percentage of the non-government commercial consumption received subsidies.

Table 1. Percentage of Electricity Consumed by Classes of Customers[1]

	Domestic	Commercial
Government	20%	32%
Non-Government	18%	29%

[1] Street Lighting (not presented in this table) represents approximately 1% of total sales
Source: Qulliq Energy Corporation, 2014/15 General Rate Application, *November 2013*

2.1 Diesel Fuel Purchases and Distribution

The Petroleum Products Division, a division of the Government of Nunavut, is responsible for the purchase, transportation, storage, and distribution of all petroleum products in Nunavut. The Petroleum Products Division purchases fuel annually under supply and transportation contracts with Woodward's Oil Limited. Fuel is sourced primarily from Eastern Canada and the United States.

The Petroleum Products Division purchases fuel with funds in the Petroleum Products Revolving Fund. This fund is akin to a line of credit, and provides the working capital required to finance accounts receivable and inventory. Red arrows illustrate the flow of funds related to diesel fuel purchases in Figure 1.

Once fuel is purchased and shipped to Nunavut, it is stored in bulk storage tanks owned by the Petroleum Products Division. The fuel is then sold and dispensed to companies and facilities that service the communities. QEC is one such company that purchases fuel from the Petroleum Products Division. .

The Financial Management Board sets the rate that the Petroleum Products Division charges for diesel fuel annually. The rate reflects the Petroleum Products Division's actual purchase and transportation cost of the diesel fuel. Thus, the cost of diesel fuel for QEC reflects market prices and hence electricity rates are not subsidised at this point in the supply chain.

The rate QEC pays to the Petroleum Products Division for fuel, combined with capital cost recovery requirements and other operations, maintenance, and administrative costs, determine the cost of electricity supply in each of the 25 communities, as well as the pre-subsidy rate for electricity in each community. The pre-subsidy rate is the rate that QEC requires to recover its all-in costs. The following sections provide a more detailed discussion of how rates are set for end-use customers and how QEC's cost are ultimately recovered.

2.2 Cost Recovery through Power Revenues

QEC recovers the full cost of supplying and delivering power in Nunavut. Costs are recovered in three ways:

- From customers through unsubsidised electricity rates;
- From customers through subsidised electricity rates; and
- From the Government of Nunavut through subsidy payments.

Green arrows illustrate the flow of funds related to electricity payments to QEC in Figure 1.

QEC applies to the Utility Rates Review Council to establish non-subsidised electricity rates for each community through a General Rate Application every four years. The rates are designed to allow QEC to recover its full cost of supplying and delivering power. The Utility Rates Review Council approves rates for the various classes of customers in Nunavut. These classes include residential (public housing and private dwellings), government-owned buildings, and commercial.

The most recent Utility Rates Review Council approved rates were effective May 1st, 2014. For domestic (i.e. residential) customers, rates range from approximately $0.60 per kWh in Iqaluit to $1.45 per kWh in Whale Cove, one of the more remote Nunavut communities.[11] For commercial customers, rates range from approximately $1.11 per kWh in Iqaluit to $1.23 per kWh in Whale Cove.

However, most customers in Nunavut do not pay the rates approved by the Utility Rates Review Council. Instead, they pay a rate that is subsidised by the Government of Nunavut. The following section describes the electricity subsidies available in Nunavut.

2.3 Electricity Subsidies

To ensure customers have access to affordable energy, the Government of Nunavut subsidises electricity rates. Subsidies are provided to customers directly by the government through the Department of Finance, Department of Family Services, or indirectly through agencies such as QEC or the Nunavut Housing Corporation. Purple arrows illustrate the cash flows related to government subsidies for electricity in Figure 1.

The Government of Nunavut subsidies are funded by allocations from the Federal Transfer Payment. In 2015/2016, Nunavut received $1.5 billion in Federal Transfer Payments. These funds include transfers for healthcare, social programs (i.e. education, social assistance, social services, etc.), and territorial financing.[12] The black arrow illustrates the flow of funds from the federal to territorial government in Figure 1.

The following sections provide an overview of the subsidy programs.

2.3.1 The Public Housing Power Support Program

QEC administers the Public Housing Power Support Program. Under the program, qualifying customers are charge a flat rate of $0.06 per kWh. This is between five to 10 percent of the pre-subsidy rate of electricity for domestic customers.

QEC invoices the Nunavut Housing Corporation monthly for the difference between the government domestic pre-subsidy rate and the Public Housing Power Support Program rate. This subsidy program is the territory's largest measure to reduce the cost of power to its residents. In 2015/2016, QEC collected over $25 million from the Nunavut Housing Corporation to administer the program.[13]

2.3.2 The Nunavut Electricity Subsidy Program

The Nunavut Electricity Subsidy Program is offered to both eligible residential and commercial customers. Administered by the QEC, the Nunavut Electricity Subsidy Program subsidises 50% of the Iqaluit non-government rate to eligible residential customers who own their own home. The subsidised rate is based on the pre-subsidy rate in Iqaluit, but is applied to eligible customers across the territory. The current Nunavut Electricity Subsidy Program rate is just over $0.30 per kWh.

QEC invoices the Government of Nunavut, Department of Finance for the difference between the non-government domestic pre-subsidy rate the Nunavut Electricity Subsidy Program rate. Unlike the Public Housing Power Support Program, which is applied regardless of consumption level, the Nunavut Electricity Subsidy Program rate is subject to seasonal thresholds. From April to September, the subsidised rate is only applied to the first 700 kWh of consumption. From October to March, it is applied to the first 1,000 kWh. Estimates for 2016/2017 indicate the Government of Nunavut will spend almost $11 million to administer the Nunavut Electricity Subsidy Program.[14]

2.3.3 The Income Assistance Program

The Income Assistance Program, an extension of the Nunavut Electricity Subsidy Program, has two components, heating and electricity. Managed by the Department of Family Services, the Income Assistance Program subsidises the other 50% of energy costs not covered by the Nunavut Electricity Subsidy Program for consumers eligible for income assistance. As of January 2017, over 14,000 Nunavummiut, representing about 40% of residents, received aid through the Income Assistance Program.[15]

3. FINANCING RENEWABLE ENERGY PROJECTS

Any energy project, renewable or otherwise, requires financing. This financing could include both debt and equity capital, sourced either privately, publicly, or from a combination of sources. For many energy projects, debt and equity capital comes from private sources. Even the large vertically integrated provincial-owned utilities obtain debt capital from private sources.

Debt and equity providers consider several factors when deciding whether to deploy capital to projects. This section describes some of the considerations, as well as the unique considerations for financing renewable energy projects in remote northern communities.

3.1 General Financing Considerations

With respect to debt capital, lenders' considerations generally relate to the risk associated with repayment of the loan. This manifests in considerations related to the certainty of revenues and costs, both in terms of tenure and magnitude, and the credit-worthiness of counterparties to major contractual agreements.

Table 2. Considerations for Capital Providers

Debt Capital	Equity Capital
Revenue visibility / certainty	Revenue visibility / certainty
Credit-worthiness of counterparties to major commercial agreements	Positive net present value of equity cash flows
Sufficient debt service coverage ratios	

With respect to equity capital, investor considerations generally relate to the risk associated with the investment and the magnitude of the return expected to be realised. Like debt capital providers, this manifests in considerations related to certainty of revenue and costs, both in terms of tenure and magnitude.

Only financial requirements are identified in Table 2. There are other non-financial requirements that both debt and equity capital providers will consider, such as technical feasibility, social license, legal structure, environmental permissibility, etc.

While the considerations outlined above are applicable to commercial transactions, the considerations also exist for homeowners and business owners who wish to purchase and install their own small scale, distributed projects. For example, a homeowner may wish to install a solar panel on their roof. They may be able to put up half the cost of this project through their personal savings, however, would need to borrow the remaining 50% of the cost. This could be obtained from a line of credit from a bank or a grant from a government or other entity. In the case of a loan, the lending institution would consider the factors outlined above such as revenue and cost certainty and the credit worthiness of the homeowner.

3.2 Financing Considerations for Nunavut

Financing of renewable power generation projects in Nunavut and remote northern communities involves additional, unique, considerations.

Communities in Nunavut are small. The largest community, Iqaluit (and the territory's capital), has a population of 7,740 people.[16] Thus, the electricity requirements are relatively small. Large project developers and large commercial lenders with significant access to capital, and the traditional providers of capital for power generation projects, are less likely to operate in a small community since there are limited investment opportunities, on a relative basis.

Those that are currently active in the power sector in northern communities tend to have capital constraints (i.e. limited access to capital to invest). QEC, for example, gets its equity capital from retained earnings, which may not be sufficient to fund major capital projects, or injections from the Government of Nunavut. The Government of Nunavut has a constrained budget and competing infrastructure priorities, making incremental direct investments in QEC challenging.

Similar constraints exist for communities, businesses, and individual homeowners. Access to equity capital is likely limited, and securing debt may be difficult for individuals, families, or small businesses in remote Northern communities. In addition, many families in Nunavut do not own their home, eliminating access to line of credits or collateral that could be used to secure additional debt capital. Per Statistics Canada, just over 30% of dwellings in Iqaluit were owned in 2015, with the remaining being rented.[17]

4. MECHANISMS TO SUPPORT RENEWABLES FINANCING

Several mechanisms exist and are deployed globally to support the development and financing of renewable energy projects. This section briefly describes some of the most common.

4.1 Competitive Procurement

A competitive renewable energy procurement is a process whereby a utility or other agency runs a structured process and solicits bids from renewable project developers to supply renewable energy. In this process, the utility commonly specifies the type, size, general location, and other characteristics of the renewable power it would like to purchase. Typically, the lowest cost bid (or bids) that meets all the technical and commercial requirements is (are) selected and offered a power purchase agreement.

A power purchase agreement is a financial contract between an electricity generator and a party who wishes to purchase the electricity (e.g. a utility, government agency, etc.). The generator arranges for the design, permitting, financing, and construction of the renewable energy facility and then enters a power purchase agreement to sell the electricity generated to the buyer. The power purchase agreement includes all the necessary terms for the sale of electricity between the two parties. These terms generally include the rate paid for the electricity produced, the schedule for delivery of the electricity, penalties for under delivering, payment terms, and termination, among others.

The length (or term) of the power purchase agreement can vary, depending on the requirements of the buyer or the useful life of the renewable energy facility. The most common term for renewable energy projects is between 15 and 25 years, depending on the type of project and the expected useful life of the asset. For some hydro-electric projects the term can be 40 or 50 years. The longer the term of the power purchase agreement the longer the period over which capital costs are amortised, bringing down the annual payment.

Competitive procurements are often an efficient way of selecting between projects, because they are designed to encourage consistency of offers and competition among suppliers.

4.2 Standard Offer / Feed-in Tariff

A standard offer or a feed-in tariff is a policy mechanism or program that offers a pre-established price to renewable energy producers, typically based on an estimate of the cost of the underlying asset. In addition to a cost-based price, these programs usually provide guaranteed grid access
While the exact forms of standard offer programs vary across jurisdictions, the basic concepts are consistent.

Participation in a standard offer program generally comes with a long-term power purchase agreement that establishes a price for the electricity bought and sold for the term of the agreement. The price offered to new participants on the other hand is usually adjusted on a regular basis to reflect changes in underlying technology and financing costs. However, it is possible for standard offers to be structured with rates that change regularly for both new and existing participants.

Standard offer programs can be designed to encourage participation from a variety of groups, including homeowners, business owners, farmers, and private investors. Standard offer or feed-in tariff programs can also be structured to encourage participation from projects of varying sizes.

4.3 Net Metering

Net metering is a program that allows end-use electricity customers who generate their own on-site electricity to (1) offset their grid-supplied electricity with self-generation and (2) sell excess power back into the grid or alternatively, receive a credit on a future electricity bill.

Net metering is a billing arrangement that credits on-site renewable generation owners for the electricity they produce and, as applicable, exports back to the grid. If a customer self-generates less than they consume, net metering simply results in a lower electricity bill, since the user is only billed for net usage (consumption minus generation).

Under net metering, the self-generated electricity is effectively valued at the rate the consumer would have otherwise paid for electricity. It is generally not guaranteed for an extended period and is subject to change as new rates are approved.

In Nunavut, net metering could result is a transfer of costs from participant to non-participating customers. This occurs because customers could be credited for the electricity they self-generate in a way that allows them to avoid all usage based components of their electricity bill (demand and energy). In Nunavut, the retail tariff skewed to usage-based billing determinants. Residential customers pay an $18/month customer charge, the remainder is billed on a per kilowatt-hour basis. Commercial customers pay an $8/kW demand charge and the remainder is billed on a per kilowatt-hour basis. QEC has noted in its General Rate Application that that the customer service charge and demand charges are lower than they should be on a pure cost allocation basis.[18] As a result, some of the fixed costs associated with providing electricity service are currently being recovered through the per kilowatt-hour usage charge. When a net-metering customer generates enough electricity to offset their consumption, they avoid paying these fixed costs. Since these fixed costs still need to be recovered, rates inevitably go up for everyone, but the impact is most acutely felt by the non-participating customers.

4.4 Grants / Loans / Loan Guarantees

Government grants, loans, or loan guarantees are mechanisms to make renewable energy more cost effective and remove barriers that hinder deployment.

Grants are payments to project owners, generally provided as a lump-sum or multiple instalments until the project is operational. Grants generally do not have to be paid back, however, there may be other conditions imposed by the funding agency.

In this context, loans are credit facilities provided by government to fund eligible clean energy projects. The loans are paid back over time, generally over a term consistent with the power purchase agreement for the facility. Typically, the loans include commercial terms more favourable than available in the private market.

Loan guarantees are a commitment to assume the debt obligation of a borrower if the borrower defaults. Government loan guarantees for renewable energy projects lower the borrowing cost and allow the project company to secure private loans at commercial terms that are more favourable.

Grants, direct loans, and loan guarantees encourage more renewable energy development by lowering the cost of capital, and encouraging renewable energy development by entities who may not have access to capital.

4.5 Tax Credits

Tax credits for renewable energy projects are an instrument that allows the owners of a renewable energy facility to claim some amount associated with a renewable energy project on their taxes, lowering their effective tax bill.

Business tax incentives are available for renewable energy projects in Canada. For example, the Government of Canada (under Class 43.1 and Class 43.2) provides a higher Capital Cost Allowance (CCA) rate, than would otherwise be available, as an incentive to invest in clean energy generation. Tax payers can deduct this higher CCA rate when computing their business or property income.[19]

In addition, the solar tax credit in the United States, also known as the Solar Investment Tax Credit, allows individuals to deduct 30% of the cost of installing a solar energy system from their federal taxes.[20]

5. PROPOSED FINANCING FRAMEWORK

This section describes Navigant's proposed strawman framework to support renewable energy financing and deployment in Nunavut. The framework has three core elements. While the proposed framework was developed specifically for Nunavut, elements and underlying principles can be applied across the territories.

The following sections describe the three core elements, present the proposed framework, and illustrate how it would work for a large and small renewable energy project.

The proposed framework is based on a third-party supplier. That is, an entity other than QEC is designing, building, and operating the renewable power facility. The third-party supplier could be a company, an individual, or a group of individuals. QEC is purchasing the power. This approach was recommended for three reasons:

- QEC and its sole shareholder the Government of Nunavut are capital constrained;
- Community and Indigenous participation is strongly desired; and
- Federal funds, while available, are limited.

5.1 Core Elements

The framework includes three core elements, presented in Figure 2 below.

Figure 2. Core Elements

5.1.1 Payments Based on Avoided Costs

The first element of the framework is that payments made by QEC for renewable power should not exceed QEC's avoided costs. For the most part, this means that payments for renewable power should not exceed the cost of diesel fuel. However, there may be opportunities for renewable energy projects, or renewable energy projects combined with energy storage to also avoid the need for the incumbent utilities to invest in additional diesel generator capacity or refurbish existing diesel generators. In those circumstances, the incumbent utility should pay the avoided costs associated with the diesel fuel, any foregone operating and maintenance expenses, and the capital investment in traditional infrastructure.

This framework element will ensure that QEC, the Government of Nunavut, and electricity customers across the territory are not burdened with additional costs in the short-term. In the long-term as renewable cost continue to decline, this approach will result in lower costs. This element of the framework also means that no changes are required to the way that QEC charges customers and the mechanisms used to pass subsidies from the Government of Nunavut to consumers.

To create a robust renewable energy sector in Nunavut, QEC, the Government of Nunavut, and customers cannot be made worse off from a purely financial perspective. Payments from QEC to

renewable energy producers that exceed the avoided cost will ultimately increase the total cost of the system. This in turn will either lead to higher costs for customers or larger subsidy requirements for the Government of Nunavut.

This does not mean that non-energy benefits (e.g., health, environmental, economic, etc.) should not be reflected in the price paid for renewable power. Rather, under the proposed framework these benefits are explicitly accounted for through the grants and loans provided by the federal funds entity.

5.1.2 Long Term Power Purchase Agreement

The second element of the proposed framework is that payment from QEC for renewable power supply should be secured through a long-term power purchase agreement. A long-term power purchase agreement ensures that the project owner (whether a home or building owner or commercial developer) has a secure revenue stream. The secure revenue stream from the power purchase agreement is a source of collateral that can be used to raise capital from outside sources.

Several considerations around this core element could further enhance the framework. For example, in the case of large projects, the power purchase agreement could be offered through a competitive procurement where prices are capped at avoided costs but could be lower if competitive pressures and individual project circumstances allow. Furthermore, the competitive process could include a requirement for Indigenous or community involvement or ownership in the project.

5.1.3 Federal Funds Entity to Provide Grants and Loans

The third core element of the proposed framework is that an entity be established to provide grants, loans, and/or loan guarantees to individual projects. The federal funds entity supports the framework in several ways.

The grants and loan guarantees are a mechanism to acknowledge the value of the non-energy impacts associated with renewable energy in remote northern communities. The grants and loan guarantees could also provide equity capital to support Indigenous and community ownership in projects.

The provision of direct federal loans overcomes the issue of the small-scale nature of renewable deployments in northern remote communities and the lack of interest and capability from commercial lenders. Furthermore, once a sufficient volume of loans is issued, the entity could bundle the outstanding loans and recapitalise them through private markets. This would help to stretch limited public funds further and reduce the need for additional budget allocations.

Structured this way, over time, the mandate of the federal funds entity could be expanded beyond renewable power to areas such as heating fuels and energy efficiency, and more broadly to support the transition to a low carbon economy in the Arctic.

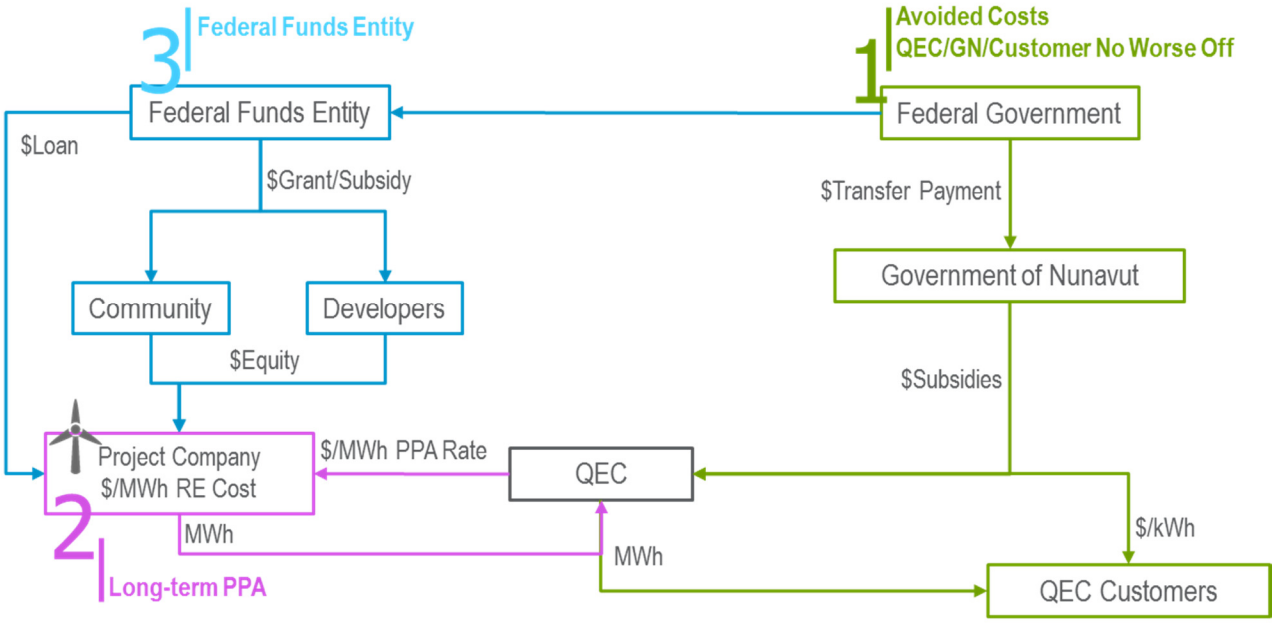
5.2 Structure of Proposed Framework

The proposed framework can be applied to both small and large projects in the short and long term. This section illustrates how the core elements of the framework fit together and apply to a large and small-scale project.

Figure 3 illustrates the inter-dependency between the three core elements of the proposed framework. By capping the rate that QEC pays for renewable power at the avoided cost (Element #1), in the short

term, the flow of funds from the territorial government to customers and to QEC to subsidise current electricity rates, does not need to change. By entering into a long-term power purchase agreement with a project company or individual (Element #2), QEC provides a secure source of revenue that can be used to raise debt and equity capital. The federal funds entity (Element #3), through the provision of grants, loan guarantees, and direct loans, recognises the non-energy impacts, supports Indigenous and community participation, and helps to facilitate access to private debt capital.

Figure 3. Proposed Framework



6. RECOMMENDATIONS

Navigant has developed its strawman framework to meet two fundamental objectives:

1. Renewable energy development should not increase costs to the incumbent utility, territorial government, or the customer, and;
2. Renewable energy development should be financed using private debt and equity capital, where possible, and leverage public capital as appropriate.

To satisfy these objectives, Navigant recommends that payments made by QEC under a PPA for renewable power should be based on avoided costs. This will ensure that QEC, the Government of Nunavut, and electricity customers across the territory are not burdened with additional costs in the short-term. In the long-term as renewable cost continue to decline, this approach will result in lower costs.

In addition, the length of the PPA should be long term. The secure revenue stream from the power purchase agreement is a source of collateral that can be used to raise capital from outside sources.

Finally, Navigant recommends that a federal funds entity provide grants, loans, and/or loan guarantees to individual projects. The provision of direct federal loans overcomes the issue of the small-scale nature of renewable deployments in northern remote communities and the lack of interest and capability from commercial lenders. This financial support can be made at early stages of the project, or for the duration of the project, depending on the economics of the project.

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