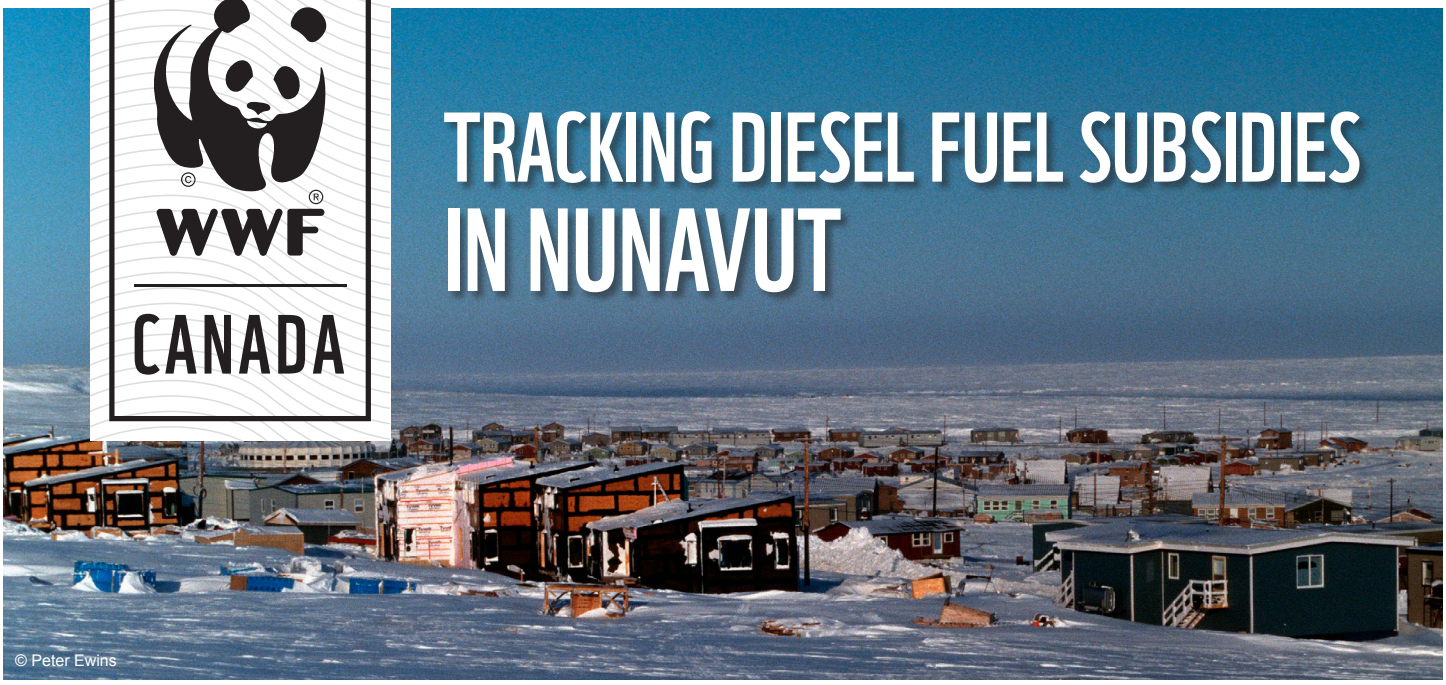
TRACKING DIESEL FUEL SUBSIDIES IN NUNAVUT



THE INCREASING COST OF FOSSIL FUEL SUBSIDIES IN NUNAVUT

WWF-Canada is committed to supporting remote northern communities realize their full potential to lead the transition to habitat-friendly renewable power.

Nunavummiut rely mainly on diesel fuel for their energy needs, which is costly, dirty and needs to be shipped into communities at great risk and expense. Astronomical energy costs – domestic electricity rates up to $1.14/kWh compared with Ontario's peak domestic rate of $0.13/kWh, for example – are subsidized by the Government of Nunavut through various programs that bring energy prices down to a more affordable rate for consumers.

To clarify the cost of fossil fuels and create a more reliable business case for future investments in renewable energy and energy efficiency projects, WWF-Canada commissioned a report detailing diesel subsidies across Nunavut from the International Institute for Sustainable Development.

RESULTS – DIESEL FUEL SUBSIDIES

The Government of Nunavut spends on average $60.5 million each year to subsidize the use of diesel fuel in the territory.

In Nunavut, the agency that imports fossil fuels into the territory – the Petroleum Products Division – is required to run at-cost, which means the full cost of fuel is paid by residential and commercial customers. Nunavummiut are then subsidized for their high fuel consumption costs through a variety of government programs largely supplied by the Department of Finance, the Department of Family Services, and the Nunavut Housing Corporation (NHC).

Of the money spent on diesel subsidies in Nunavut, well over half, $36.6 million on average, is spent on electricity subsidies. Of all the departments paying energy subsidies, the NHC is by far paying the most --$45.9 million/year on average between 2012 and 2016, over 75 per cent of all fossil fuel subsidies in Nunavut. Green initiatives that reduce the cost of heating and electricity have the added benefit of greatly improving the NHC's bottom line.

NEXT STEPS

WWF's next steps will be on the ground, assisting communities as they build capacity and choose appropriate, environmentally and financially sound projects that work for their community.

WWF-Canada's feasibility studies done with the University of Waterloo showed that renewable energy projects are both reliable and economically viable for communities in the Canadian Arctic. This latest study clearly lays out how much money government is spending to subsidize a dirty and harmful fuel source – money that could be reallocated to a clean energy source, with potential savings for communities left over.

With a price on carbon quickly approaching that will further increase the cost of fossil fuels, and new federal funding streams now available to assist with the transition away from diesel, this is the ideal time to make changes that will lead to a more sustainable future.

FOR MORE INFORMATION

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Costing Energy and Fossil Fuel Subsidies in Nunavut: A mapping exercise

IISD REPORT

IISD
International Institute for Sustainable Development

WWF

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Costing Energy and Fossil Fuel Subsidies in Nunavut: A mapping exercise

April 2017

Written by Yanick Touchette, Philip Gass and Daniella Echeverría

Executive Summary

Almost all of Nunavut's electricity is currently generated from fossil fuels, resulting in great expenses for the Government of Nunavut (GN), in part through a number of programs that incentivize or support the consumption of fossil fuels in one way or another. As part of its ongoing effort to demonstrate the viability of renewable energy in the Canadian Arctic, World Wildlife Fund Canada (WWF-Canada) commissioned IISD to map these policies, in order to better comprehend Nunavut's unique energy system. Through that process, two main categories of policies were identified: first, in Nunavut, an arms-length government agency, the Petroleum Products Division (PPD) is responsible for purchasing, importing and distributing all of the fuel consumed in the territory. Every year, the PPD is mandated to break even in its operations, meaning that it should sell the fuel it purchases to Nunavummiut at the correct price to prevent any structural deficit or surplus and adjust its prices over time accordingly. Technically, the fuel sold by the PPD is not a subsidy.

However, the GN, along with other arms-length government agencies such as the Qulliq Power Corporation (QEC) and the Nunavut Housing Corporation (NHC), has programs and policies in place that do subsidize fossil fuel consumption by Nunavummiut, primarily for heating and electricity purposes to assist with high fuel and living costs. Between 2012 and 2016, conservative estimates find that an annual average of CAD 60.5 million was allocated as support to Nunavummiut for their fossil fuel consumption, with the caveat that some policies could be identified, yet impossible to quantify.

With this mapping exercise complete, IISD, building on a renewable energy deployment study prepared for WWF-Canada by the University of Waterloo Institute of Sustainable Energy (Das & Canizares, 2016), estimated the cost of electricity generation in Nunavut over the next 20 years (2016–2036) under three different scenarios for five Nunavummiut communities: Arviat, Baker Lake, Iqaluit, Rankin Inlet and Sanikiluaq. First, IISD outlined the average annual electricity generation costs based on current and projected levels of energy consumption provided by Das & Canizares, given that 100 per cent of electricity generation in Nunavut currently comes from diesel fuel. Second, IISD modelled the implementation of a carbon price in Nunavut based on the Pan-Canadian Framework for Clean Growth and Climate Change, which outlines that with the implementation of a carbon tax, from 2022 each tonne of greenhouse gas (GHG) emissions across Canada would cost CAD 50.

Third, a last scenario was modelled in which the RE penetration would also bring about GHG emissions reduction in each community, bringing down the energy costs provided that the carbon cost of electricity generation would also be reduced. Energy modelling shows that a concerted effort at renewable energy penetration could reduce GHG emissions by between 26.17 per cent and 74.24 per cent in the five communities of interest over the next two decades, and the potential associated carbon costs by as much. In conclusion, adopting RE in Nunavut may be accompanied by a reduction in the cost of electricity generation simply by reducing the GHG emissions of the territory if some form of carbon price were adopted.

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Introduction

A variety of measures are in place across Nunavut to make electricity more affordable to Nunavummiut, including subsidizing a portion of the electricity rates that residents would normally pay. Community electricity distribution in Nunavut is the responsibility of Qulliq Energy Corporation (QEC). As shown in Table 1, reproduced from QEC's own documents, electricity rates in Nunavut are based on each community's generation costs, which can be affected significantly by the transport required to get the energy source (i.e., diesel fuel) to the community. The Community Based Rate Structure is a remnant of the Northwest Territories Power Corporation rate structure that, for now, Nunavut has decided to keep after revisiting different options such as blended rate or a territorial rate structure (QEC, 2004). This means that the base rate can vary greatly from one community to another.

This structure means that residents of a community are technically, before any subsidy is distributed, solely responsible to ensure that QEC breaks even when selling electricity to that community. For instance, in the early 2000s, a new power plant was constructed in the community of Whale Cove (QEC, 2004), where 435 people resided in 2016 (Nunavut Bureau of Statistics, 2017). The small population is, in a way, paying for the high cost of the recent plant on its own. In Grise Fiord, where the population declined from 141 people in 2006 to 129 in 2016, the QEC had already pointed out in 2004 that building a new power plant in the community would cause a dramatic spike in electricity rates. Whereas the average rate in Grise Fiord was CAD 0.57 per kilowatt hour (kWh) at the time, since 2014 it has ranged from CAD 0.9209 to CAD 1.1079 per kWh. In Iqaluit, the largest community in Nunavut, the base rate is also the lowest, as the non-government domestic customer rate is CAD 0.6029 per kWh, whereas in Kugaaruk (where the base rate is the highest), the non-government domestic customer rate is CAD 1.1416/kWh.

In some communities, QEC also applies higher rates to residential customers who live in government-owned dwellings. In Whale Cove, whereas a home owner's electricity rate is CAD 0.9042/kWh, the rate applied to residents of government-owned dwellings' electricity consumption is CAD 1.4480/kWh, the most expensive rate in Nunavut. The non-government residential rates in Nunavut are significantly and comparably high compared to other jurisdictions: in Nunavik (Northern Québec), where residents pay higher second-tier rates than their counterparts living down south, the second-tier rate is CAD 0.3762 per kWh (Hydro Québec, 2016); in the Northwest Territories, the pre-subsidy generation costs of non-government residential electricity never exceed CAD 0.8586 per kWh (Northland Utilities [Yellowknife] Limited, 2016). The main reason for such high rates in Nunavut is that in all communities, electricity is still 100 per cent generated from diesel fuel (see Figure 1) that the territory needs to import during summer months when it can be brought in by sea (see the Section 1 on the Petroleum Products Division for more details). Although the QEC does have plans to eventually shift some of its electricity generation from diesel fuel to renewable energy, until this can be implemented, electricity costs are likely to remain high.

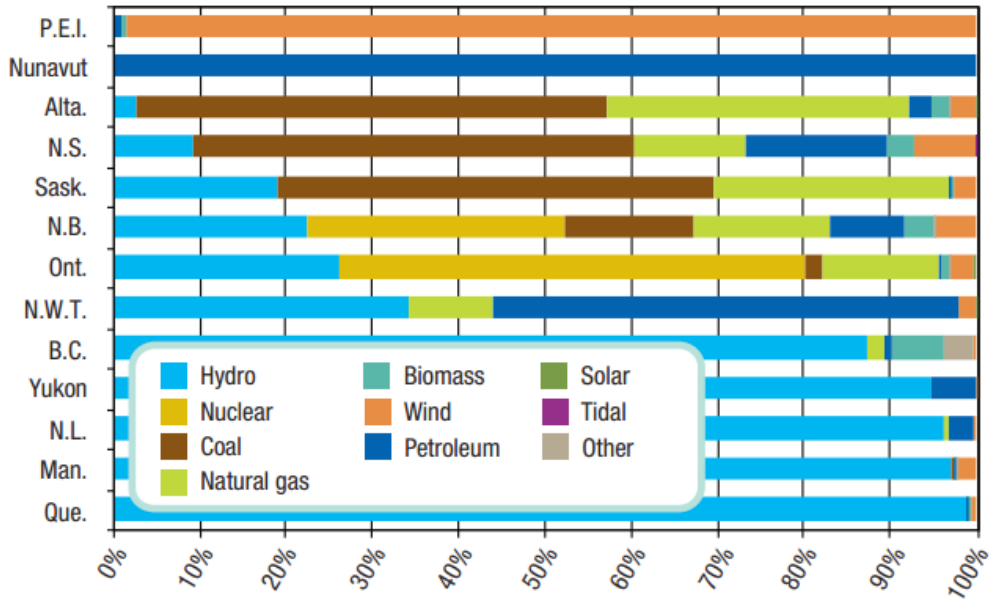

Figure 1: Electricity Generation by Fuel Type, by Province and Territory

Source: Natural Resources Canada, 2015.

The high electricity rates in Nunavut are mitigated through an array of measures that reduce the end cost for consumers. These are managed either directly by the government (for instance through the Department of Finance or the Department of Family Services) or by government agencies such as QEC or the Nunavut Housing Corporation (NHC). In some instances, the full cost of electricity can be subsidized by the government, as explored in Section 2.

Table 1. **Qulliq Energy Corporation's Rate Schedules Effective May 1, 2014**

	Domestic		Commercial	
	Non-Government	Government	Non-Government	Government
Plant Name	(cent/kWh)	(cent/kWh)	(cent/kWh)	(cent/kWh)
Cambridge Bay	76.06	76.06	66.07	66.07
Gjoa Haven	89.45	92.28	85.96	85.96
Taloyoak	98.36	106.46	96.78	96.78
Kugaaruk	114.16	114.16	101.77	101.77
Kugluktuk	93.32	98.68	87.19	87.19
Rankin Inlet	62.23	62.23	55.04	60.64
Baker Lake	70.31	70.31	66.09	66.09
Arviat	79.14	79.14	74.03	74.03
Coral Harbour	94.66	94.66	87.11	87.11
Chesterfield Inlet	97.54	97.54	91.14	91.14
Whale Cove	90.42	144.80	111.18	122.71
Repulse Bay	85.06	85.06	75.30	75.30
Iqaluit	60.29	60.29	50.68	52.04
Pangnirtung	65.74	70.13	58.66	64.26
Cape Dorset	68.59	71.87	64.47	71.87
Resolute Bay	101.35	103.15	96.81	96.81
Pond Inlet	89.95	97.29	82.88	82.88
Igloolik	62.23	63.23	58.35	58.35
Hall Beach	89.03	92.32	85.91	85.91
Qikiqtarjuaq	77.92	88.71	74.06	88.71
Kimmirut	103.74	103.51	87.70	88.13
Arctic Bay	87.87	87.87	78.97	78.97
Clyde River	78.19	78.67	69.66	69.66
Grise Fiord	92.09	110.79	105.92	105.92
Sanikiluaq	82.25	82.25	79.01	79.01

Source: Extracted from http://www.qec.nu.ca/customer-care/accounts-and-billing/customer-types.

This report is split into three main sections: Section 1 addresses the process and costs of importing fossil fuels (mainly diesel fuel) in Nunavut, which is then combusted for electricity and heating, or used for transportation needs; Section 2 explores the different programs that subsidize energy consumption in Nunavut, mainly for electricity generation and heating purposes (see Table 2); and Section 3 estimates how implementing a carbon price in Nunavut would affect the cost of electricity based on whether it is generated only from diesel fuel, as it is now, or a portion of it comes from renewable energy.

Table 2. Fossil Fuel Subsidies (2012–2017) in Millions CAD

Policy	2012-13	2013-14	2014-15	2015-16	2016-17*
Fuel Tax Rebate	0.07	4.3	3.8	0.01	N/A
NHC O&M costs for public housing—Power	25.4	25.8	27.3	27.9	18.5
NHC O&M costs for public housing—Fuel	17.6	19	20.3	20.2	12.1
NHC Staff Housing program—Fuel	N/A	N/A	N/A	3.3	1.2
NHC Staff Housing program—Power	N/A	N/A	N/A	1.2	0.3
NHC Heating Oil Tank Replacement Program	N/A	0.3	0.6	0.7	0.16
Electricity and head provided to government-owned buildings by GN	N/A	N/A	N/A	N/A	N/A
Nunavut Electricity Subsidy Program	8.8	9	10.1	10.5	10.7
Income Support Program—Electricity†	N/A	N/A	N/A	N/A	0.5
Income Support Program—Heating Fuel†	N/A	N/A	N/A	N/A	0.08
Senior Fuel Subsidy†	N/A	0.5	N/A	N/A	0.14
Subtotal, Power only	**34.2**	**34.8**	**37.4**	**39.6**	**30**
Subtotal, Fuel only	**17.67**	**24.1**	**24.7**	**24.2**	**13.68**
Subtotal of all subsidies	**51.87**	**54.68**	**58.3**	**63.8**	**43.68**
PPD Deficit (Surplus)	13.6	3.2	1.3	(12.5)	(8.1)
Total‡	**65.5**	**62.2**	**63.4**	**51.2**	**34.9**

**Figures for 2016–2017 are for year-to-date and were provided to IISD by public officials in Nunavut through direct correspondence.*

†Figures provided by the Department of Family Services are reported for calendar year 2016, as opposed to fiscal year (FY) 2016–2017.

‡ Sum may differ due to rounding up of values.

Methodology

This study was conducted through an in-depth literature review of government documents, focusing on budgetary documents of the Government of Nunavut, as well as policies of government and QEC that affect energy purchase, distribution and consumption.[1] Agencies of government that have authority over energy policies, energy pricing or energy subsidies, such as NHC and Petroleum Products Division (PPD) were also examined.

For this report, IISD defines a subsidy based on the World Trade Organization's Agreement on Subsidies and Countervailing Measures (ASCM) (Beaton, Gerasimchuk, Laan, Lang, Vis-Dunbar, & Wooders, 2013). Using this guidance, a subsidy is in place where governments:

1. Provide a direct transfer of funds or potential direct transfer of funds or liabilities
2. Forego or otherwise fail to collect revenue
3. Provide goods or services below market rates or purchase goods above market rates
4. Provide income or price supports.

IISD initially built a spreadsheet inventory of policies and other measures of the Government of Nunavut, NHC and QEC that could lead to energy subsidies. Where readily available, the amounts or impacts of these subsidies were included in the inventory, covering the 2012–2017 period. Where these items could not be initially quantified, IISD followed up with requests for interviews with Government of Nunavut officials. Where these figures were identified, they have been added to the inventory.

This initial inventory may not capture all of the policies and actions that are in place in Nunavut that could affect fuel prices, but it is as extensive as possible, and every item identified (even if not quantified) is included in the inventory. Because there are non-quantified items in the inventory, the overall estimates of the level of subsidies in Nunavut should be considered to be conservative, and could in reality be higher.

In terms of the potential impacts of carbon pricing on energy in Nunavut, IISD relies on the carbon pricing framework outlined in the Pan-Canadian Framework on Clean Growth and Climate Change (Government of Canada, 2017) as well as a renewable energy deployment study prepared for the World Wildlife Fund (WWF) by the University of Waterloo Institute of Sustainable Energy (WISE) (Das & Canizares, 2016).

[1] There is currently no energy production in the Territory of Nunavut. This may change in the future through the ongoing consultation process that came out of the 2015 Oil and Gas Summit in Nunavut, but as this report uses the years 2012–2017 as a baseline, domestic energy production is not considered, and is not part of the scenarios identified in the carbon pricing section.

1.0 Nunavut Energy: Role of petroleum products division and the financial management board

The Nunavut Petroleum Products Division (PPD) is solely responsible for purchase, transportation, storage and distribution of all petroleum products in Nunavut, including fuels for transport and heating (GN, 2010). PPD's responsibilities include:

- Bulk purchasing of annual resupply
- Fuel storage
- Local delivery contracts
- Overhead and administration
- Policy and planning.

PPD provides four fuel products for Nunavut, including jet fuel and aviation gasoline; diesel fuel for heating, electricity, aviation and motive uses; and gasoline for motive use. PPD negotiates the bulk purchase of all fuel for the territory, and since one purchase is made, the cost of fuel is known for the entire year at the time of purchase.

This single purchase model is unique in relation to other jurisdictions as it allows for setting a single price for fuels—for example transport fuels—at a set price on 12-month intervals. The Financial Management Board has the authority to set retail prices for communities served by PPD. The price determined by the board is a result of considering the following factors (GN, 2010):

- Actual product cost
- Actual transportation cost
- Commissions for local fuel sales, dispensing and delivery services
- Operations and maintenance expenses
- Product evaporation/shrinkage
- Taxes.

Generally, PPD does not subsidize fossil fuels sales in Nunavut. The intent of PPD is to recover the cost of fuel purchase as well as its expenses through the sale of the fuel purchased. Overall, the cost of fuel purchased has ranged between CAD 170 million and CAD 195 million over the 2012–2017 period, fluctuating based on bulk market prices. Revenues from fuel sales over the same period have ranged from roughly CAD 205 million to CAD 223 million, indicating a markup that is intended to cover elements such as salaries of PPD staff as well as other operations and maintenance costs.

PPD is expected to have performance against budget within CAD 10 million above or below break-even. In years of surpluses, the extra funds are deposited into a Petroleum Products Stabilization Fund (PPSF). In some specific years (e.g., 2012–2013) there may be a minor deficit for PPD, covered by the PPSF. However if this deficit lingers, retail prices are adjusted to recoup losses and ensure that a structural deficit/subsidy does not emerge. This was the case in 2013 Nunavut, where fuel prices were adjusted for the first time since 2008 to address a recurring deficit (CBC News, 2013). With the deficit eliminated and fund replenished as international oil prices fell, prices were lowered again in 2015 (Oudshoom, 2015).

Based on the goal of recouping expenses and bulk fuel costs, PPD is not considered to be providing subsidies for fossil fuels in Nunavut. While fuel sales may result in minor deficits in some years, the intention overall is to purchase and distribute fuel at a cost that will present a break-even position for Nunavut.

While PPD is not responsible for fossil fuel subsidies in Nunavut, IISD did identify several other programs and policies in place that can be considered subsidies, examined in Section 2.

2.0 Fossil Fuel Subsidies

According to 2016 Census data, 35,944 people resided in Nunavut in 2016 (Nunavut Bureau of Statistics, 2017). For these residents, there are three main categories of dwellings in Nunavut:

- Public housing (managed by the NHC)
- GN's Staff Housing Program (managed by the NHC)
- Private dwellings split into two categories:
  - Owner
  - Renter.

For each category of residents, the territory has differently tailored programs and measures aimed at reducing the cost of electricity and heating fuel. These are explored and described individually below:

2.1 Nunavut Electricity Subsidy Program

2.2 Public Housing Power Support Program

2.3 Department of Family Services Programs

2.3.1 Income Assistance Program

2.3.2 Senior Fuel Subsidy

2.4 Other Nunavut Housing Corporation Measures (excluding PHPSP):

2.4.1 O&M costs for Public Housing—Heating Fuel component

2.4.2 Staff Housing Policy —Power & Fuel

2.4.3 Heating Oil Tank Replacement Program

2.5 Department of Finance Programs:

2.5.1 Government-Owned Buildings

2.5.2 Fuel Tax Rebate.

2.1 Nunavut Electricity Subsidy Program

The Nunavut Electricity Subsidy Program (NESP) came into effect in its current form on 1 April 2005. The program was implemented to offset a portion of the high cost of energy in remote communities and to bring it more in line with the rate that Nunavummiut pay in Iqaluit (GN, 2005a). Through the NESP, for which the funds are administered by the Department of Finance, the GN thus considers the rate that the QEC charges in a community and subsidizes 50 per cent of this rate to eligible customers. Two types of electricity customers in Nunavut are eligible to receive the NESP based on the GN's policy: residents who own their own home (residential customers) small commercial enterprises whose annual gross revenues do not exceed CAD 2 million (commercial customers). However, QEC officials have confirmed to IISD that only residential customers, as well as several churches, are actual beneficiaries (QEC officials, personal communication, 2017). In March 2016, the QEC had 4,192 residential customers (including churches) on record benefiting from the program (QEC officials, personal communication, 2017).

The official purpose of the NESP is thus to "support the development of northern business and encourage home ownership" by providing for "equitable power rates" (GN, 2005a). The criteria and modalities for residential customers are outlined below. In Nunavut, high monthly energy bills can be considered a barrier to home ownership for Nunavummiut; the fact that 60 per cent of Nunavummiut live in public housing is a telling indicator of this challenge (see Section 2.2). To make home ownership more accessible, the NESP brings down the rate that all eligible Nunavummiut pay to half of the Iqaluit's base rate (for more information on how the policy works, see GN [2005b]).

That said, not all of a customer's electricity consumption may be eligible for the NESP: from April to September, residential customers can benefit from the subsidized rate only for the first 700 kWh of electricity consumed each month, after which point a customer would have to pay the full rate applied by QEC in their community. From October to March, the threshold is increased to 1,000 kWh (GN, 2005a).

Currently, the policy translates into a "fixed" non-government domestic rate for ratepayers of CAD 0.3015/kWh for the eligible portion of electricity consumption per month across Nunavut. This means that any cost of energy above this above is effectively a subsidy. In Kugaaruk, where the rate is the highest, the subsidy costs the government CAD 0.8401/kWh, while in Iqualuit, where the rate is the cheapest, the subsidy costs CAD 0.3014/kWh (see Table 3 for a breakdown by community, the subsidy is cost minus the NESP rate). To be eligible, a residential customer only needs to be responsible for paying their own power bills, which means that they will have an account with the QEC. In turn, the program works in two steps: first, the QEC will charge private residential customers for their eligible electricity consumption at the "flat" rate of CAD 0.3015/kWh each month (QEC, 2016).

This means that private residential customers are in the end only responsible for the post-subsidy cost of their eligible electricity consumption. Second, the QEC invoices the GN for the remainder of the corresponding electricity rates for each community. For qualifying residential customers, the subsidy is applied directly to their bill each month as a deduction of the whole amount owed to the QEC and is denoted as the NESP. For qualifying commercial customers, they receive a payment for the subsidy within 20 days of the Department of Finance receiving their annual application (GN, 2005a). The GN centrally administers the NESP, and estimated that the measure would cost CAD 10,722,000 in 2016–2017 (GN, 2016a).

Table 3. Pre-NESP electricity rates and cost of subsidy by community

	Domestic (private ownership)		
	Pre-NESP cost	NESP rate	Cost of subsidy
Plant Name	(cent/kWh)	(cent/kWh)	(cent/kWh)
Cambridge Bay	76.06	30.15	45.91
Gjoa Haven	89.45	30.15	59.30
Taloyoak	98.36	30.15	68.21
Kugaaruk	114.16	30.15	84.01
Kugluktuk	93.32	30.15	63.17
Rankin Inlet	62.23	30.15	32.08
Baker Lake	70.31	30.15	40.16
Arviat	79.14	30.15	48.99
Coral Harbour	94.66	30.15	64.51
Chesterfield Inlet	97.54	30.15	67.39
Whale Cove	90.42	30.15	60.27
Repulse Bay	85.06	30.15	54.91
Iqaluit	60.29	30.15	30.14
Pangnirtung	65.74	30.15	35.59
Cape Dorset	68.59	30.15	38.44
Resolute Bay	101.35	30.15	71.20
Pond Inlet	89.95	30.15	59.80
Igloolik	62.23	30.15	32.08
Hall Beach	89.03	30.15	58.88
Qikiqtarjuaq	77.92	30.15	47.77
Kimmirut	103.74	30.15	73.59
Arctic Bay	87.87	30.15	57.72
Clyde River	78.19	30.15	48.04
Grise Fiord	92.09	30.15	61.94
Sanikiluaq	82.25	30.15	52.10

** This column represents the amount of money that could be saved in these communities by shifting to renewable energy. See Section 3 and the Annex to this report for complete details on the potential for the adoption of Renewable Energy in five communities in Nunavut. This figure is only available for the selected communities included in a study of renewable energy in Nunavut.*

Policy. Nunavut Electricity Subsidy Program, 2015–2016: CAD 10,722,000.

2.2 Public Housing Power Support Program

The Public Housing Power Support Program (PHPSP) is the GN's largest singular measure to reduce the cost of electricity for Nunavummiut. The government incurs this expenditure through its housing agency, the NHC. In 2015, the NHC served 21,213 Nunavummiut tenants out of a population of approximately 36,000 residents in Nunavut (Nunavut Bureau of Statistics, 2017), excluding tenants from the GN's Staff Housing Program. This means that roughly three out of five residents in the territory were public housing tenants in 2015. The GN does not have a low-income "threshold," as the cost of living vary amongst communities (Nunavut Roundtable for Poverty Reduction, 2012). Although 84.4 per cent of NHC's tenants earned less than CAD 40,001 a year in 2015, 13.5 per cent of public housing tenants earned between CAD 40,001 and CAD 100,000 that same year, and an additional 2.1 per cent earned more than CAD 100,000 (NHC, 2016).

All of NHC's public housing tenants are eligible to benefit from the GN's PHPSP. Staff tenants are responsible for their own power bills, although they could be eligible for power subsidies that would likely be centrally managed by the Department of Finance (see Section 2.5.2). The program works in two steps. First, the QEC will keep track of NHC public housing tenants' electricity consumption as it normally would for any other customers. However, instead of charging these tenants 50 per cent of the Iqaluit rate as it does for beneficiaries of the NESP, the QEC charges public housing tenants a flat rate of CAD 0.06/kWh across the territory, regardless of the community they live in (QEC, 2016) and regardless of the amount of electricity they consume within a month (QEC officials, personal communication, 2017). Public housing tenants are then presented with a monthly electricity bill at a rate of CAD 0.06/kWh for which they are responsible.

However, public housing tenants who are also Income Assistance beneficiaries are eligible for additional support from the Department of Family Services (DFS) to pay the electricity bill they receive from the QEC (see Section 2.3.1.1). Second, to make up for the difference between CAD 0.06/kWh and the actual rate the QEC charges to a domestic customer from a government-owned dwelling as shown in Table 1, the corporation in turn invoices the NHC directly every month for the rest of the electricity consumption coming from its public housing tenants.

In absolute terms, this means that the subsidy level varies greatly amongst communities. For instance, in Whale Cove the domestic electricity rate for a government-owned dwelling is CAD 1.4480/kWh, which means that the PHPSP in that community will cost the government's housing corporation CAD 1.3880/kWh. In Iqaluit, where the domestic electricity rate for a government-owned dwelling is CAD 0.6029/kWh, the subsidy will be CAD 0.5429/kWh (see Table 4 for a breakdown by community).

Table 4. Pre-PHPSP electricity rates and cost of subsidy by community

	Domestic (government-owned)		
	Pre-PHPSP cost	PHPSP rate	Cost of subsidy
Plant Name	(cent/kWh)	(cent/kWh)	(cent/kWh)
Cambridge Bay	76.06	6	70.06
Gjoa Haven	92.28	6	86.28
Taloyoak	106.46	6	100.46
Kugaaruk	114.16	6	108.16
Kugluktuk	98.68	6	92.68
Rankin Inlet	62.23	6	56.23
Baker Lake	70.31	6	64.31
Arviat	79.14	6	73.14
Coral Harbour	94.66	6	88.66
Chesterfield Inlet	97.54	6	91.54
Whale Cove	144.80	6	138.80
Repulse Bay	85.06	6	79.06
Iqaluit	60.29	6	54.29
Pangnirtung	70.13	6	64.13
Cape Dorset	71.87	6	65.87
Resolute Bay	103.15	6	97.15
Pond Inlet	97.29	6	91.29
Igloolik	63.23	6	57.23
Hall Beach	92.32	6	86.32
Qikiqtarjuaq	88.71	6	82.71
Kimmirut	103.51	6	97.51
Arctic Bay	87.87	6	81.87
Clyde River	78.67	6	72.67
Grise Fiord	110.79	6	104.79
Sanikiluaq	82.25	6	76.25

In 2015–2016, QEC collected CAD 25,714,000 from the NHC to manage the PHPSP (QEC, 2016). The NHC is also responsible for managing vacant units owned by the government. In 2015–2016, the housing corporation reported CAD 27.9 million in operation and maintenance (O&M) costs for public housing power, which includes the revenues collected by QEC. As of late January 2017, the NHC had spent CAD 18.5 million on the PHPSP for FY 2016–2017 (NHC, personal communication, 27 January, 2017).

***Policy**. Public Housing Power Support Program, 2015–2016: CAD 27,900,000*

2.3 Department of Family Services

2.3.1 Income Assistance Program

Through the Income Assistance Program, the Department of Family Services manages two policies that target electricity and fuel consumption. As of late January 2017, the Department was providing Income Assistance to over 14,000 Nunavummiut (Government of Nunavut, personal communication, 16 January 2017; 2014a, p. 49), or approximately 40 per cent of Nunavut's residents.

2.3.1.1 Electricity Component

The electricity component is the largest of the two measures that fall under Income Assistance. It is closely related to the PHPSP, explored in Section 2.2. As mentioned, once the NHC takes care of a portion of the monthly electricity charges stemming from its public housing tenants' consumption, the tenants are charged a remaining CAD 0.06/kWh by the QEC on their electricity consumption, for which they are technically responsible themselves. However, residents who are also Income Assistance beneficiaries can be eligible for additional financial support to cover for their electricity bill, with only a few exceptions (for instance, residents living in shelters, paying room and board, or if the electricity consumption is included in the rent) (Government of Nunavut, personal communication, 16 January 2017;). As long as the DFS is presented with an electricity bill paid for by the resident, the program will apply. In the end, the DFS reimburses almost all public housing tenants' monthly electricity bill.

The electricity component of Income Assistance is also closely related to the NESP, explored in Section 2.1. In this case, it was observed that QEC charges eligible homeowners only 50 per cent of the Iqaluit rate, and charges the GN for the other half of electricity consumption. In the event that a homeowner also benefits from the Income Assistance Program, and assuming that they pay their electricity bill themselves, they too would be eligible to receive assistance from the DSF for the 50 per cent for which they are responsible themselves, also in the form of a refund.

During the calendar year of 2016, the DFS estimates that it refunded CAD 534,374 in electricity payments directly to ratepayers who are Income Assistance beneficiaries. At the moment, it is still somewhat difficult to report accurate figures, as 12 communities representing approximately 30 per cent of the beneficiaries still report their expenses manually to the DFS. However, the DFS is in the process of finalizing the deployment of an electronic delivery system that currently reaches 70 per cent of its caseload.

***Policy**. Income Assistance Program, electricity component, 2016 calendar year: CAD 534,374.*

2.3.1.2 Heating Fuel Component

Income Assistance recipients are also eligible to receive fuel payments, as Nunavummiut heat their homes with fuel. However, most of the time heating expenses will be included in the rent that a resident pays. This is the case in public housing, as observed in Section 2.4.1. In the event that either a homeowner or renter who is eligible for income assistance pays for their own fuel, these expenses will be refunded by the DFS's fuel payments under the Income Assistance Program. In all cases, a beneficiary is required to present a bill for the fuel purchased, and renters are required to demonstrate that the fuel is purchased over and above their rent by presenting a lease that specifies that fuel is not included in their monthly rent (Government of Nunavut, personal communication, 16 January 2017). With regards to fuel

payments, the DFS electronic delivery system has only been partially deployed as of late January 2017, and payments figures for communities submitting manually were not readily available for the calendar year 2016. Only partial data are thus presented below.

Policy. *Income Assistance Program, fuel component, 2016 calendar year: CAD 78,636.*

2.3.2 Senior Fuel Subsidy

Nunavummiut who are at least 60 years old and are permanent Nunavut residents are eligible to receive support on heating fuel purchases for up to 3,500 litres annually, given that they own and live in their own home (GN, 2017b). The residents must also not be receiving any form of social assistance, such as electricity or fuel payments under the Income Assistance Program. This subsidy thus only applies to senior residents who do not fall under any other support program administered by the DFS specifically. Residents whose total net income is below CAD 75,001 annually may be eligible for a 100 per cent subsidy. The measure is reduced by half for residents whose total net income ranges between CAD 75,000 and CAD 100,000. Over the CAD 100,000 threshold, senior residents who are also homeowners are not eligible for any heating fuel subsidy. Residents are required to apply each year for the subsidy.

Policy. *Senior Fuel Subsidy, 2016 calendar year: CAD 137,208.*

2.4 Nunavut Housing Corporation (Excluding PHPSP)

In addition to providing electricity to public housing tenants, the NHC is responsible for providing heating fuel to its public housing tenants and to GN staff living in NHC units. GN staff are responsible for paying for their own power, unless their leases state otherwise (see Section 2.5.2), whereas the NHC is responsible for paying for the power in vacant units (NHC, personal communication, 27 January 2017). Finally, the NHC is in charge of an energy-efficiency program that subsidizes modern heating oil tanks for home owners.

2.4.1 O&M Costs for Public Housing—Heating fuel component

The NHC provides heating fuel to its public housing tenants as part of their rent, which means that tenants are not responsible for any heating fuel expenses. In 2015–2016, the NHC reported CAD 20,200,000 in O&M costs related to public housing heating fuel expenses (NHC, 2016, p.29). As of late January 2017, the NHC had spent CAD 12.1 million on heating fuel for FY 2016–2017 (NHC, personal communication, 27 January 2017).

Policy. *NHC's O&M costs for Public Housing, Heating Fuel component, 2015–2016: CAD 20,200,000.*

2.4.2 Staff Housing Policy—Power & fuel

The Government of Nunavut offers a staff housing program that includes subsidized rental housing to term and indeterminate employees that is designed to assist in the recruitment and retention of staff (NHC, 2015). A portion of the subsidized expenses goes to cover the cost of heating fuel, and sometimes other utilities including power. Fuel costs are calculated based on the method outlined in Schedule E of the GN Staff Housing Policy, which also provides a calculation method for leases in which other utility costs such as power are included in the rent (NHC, 2009).

A stipend is added to the base rent calculation (to determine the tenant's final rent amount) based on the size of the rental unit. For fuel, this figure is CAD 0.91 per m^2 and for electricity it is CAD 1.08 per m^2. As of late February 2017, the 2009 method still applied, although the GN is planning to review the Staff Housing Policy. Since, on average, a tenant only pays 20–30 per cent of their base rent (inclusive of utilities) their energy consumption is also partially subsidized under the program.

It is unclear under what circumstances power would be included in the lease. During an interview with officials at the NHC, IISD addressed with the agency the energy costs associated with staff housing. The Staff Housing Policy explicitly states that heating fuel costs are covered by the GN, and these amounted to CAD 3,306,756 in 2015–2016, or approximately 75 per cent of all energy costs reported by the NHC for staff housing that year. In turn, NHC officials confirmed to IISD that the standard policy is for staff to be responsible for their own power consumption, clarifying that the power component of energy costs that the NHC reports and is associated with staff housing is attributable only to vacant units (NHC, personal communication, 27 January 2017).

It also appears that staff are not eligible to have part of their electricity bills covered by the NHC under the PHPSP. In the event that some staffs' leases include utility costs such as power, these expenses would likely be covered by the GN, either directly through centrally managed funds by the Department of Finance (see, for instance, Section 2.5.2), or indirectly by the QEC in a similar fashion as the NESP or the PHPSP. IISD has not been able to clarify either with GN officials or agencies exactly how the policy would be managed.

***Policy**. Staff Housing Program—Power & Fuel, 2015–2016: CAD 4,463,457.*

2.4.3 Heating Oil Tank Replacement Program (HOTRP)

Administered by NHC, the HOTRP has two main objectives: to support current Nunavummiut homeowners who may need to replace their heating oil tanks, as all heating or electricity in Nunavut comes from fuel, and prevent environmental hazards that could be caused by aging and faulty oil tanks (NHC, 2014). The program is thus an addition to the measures explored so far that incentivize homeownership over public housing. Eligible homeowners can receive a grant of up to CAD 7,500 from NHC to replace their oil tank. This includes the costs of materials, freight and labour for replacement or refurbishment (NHC, 2014). In some circumstances (e.g., in remoter communities or in communities where proper labour is lacking) it is also possible for recipients to have the costs of having a contractor travelling to their community covered by NHC on top of the regular grant. In 2015–2016, NHC approved exactly 100 HOTRP applications across Nunavut, for total reported expenditures of CAD 657,960. As of late January 2017, the program had cost NHC CAD 163,932 for FY 2016–2017.

***Policy**. Heating Oil Tank Replacement Program, 2015–2016: CAD 657,960.*

2.5 Department of Finance

2.5.1 Government-Owned Buildings

Nunavut's Energy Secretariat reports that in 2012–2013, the GN spent approximately CAD 21.6 million on electricity and CAD 6.7 million on fuel (GN, 2016b). However, it is not clear exactly where these funds would have been spent, or whether they include other centrally managed funds such as the

NESP[2]. Given that the NHC is not in charge of covering power expenses for staff housing, a portion of the CAD 21.6 million may be associated with this specific government expenditure. According to QEC officials, between 1 March 2016 and 28 February 2017, the power corporation billed for 195.9 million kWh of electricity consumption to government-owned or leased buildings (QEC officials, personal communication, 2017). This electricity consumption also included housing properties owned or leased by the GN. It is unclear how much this would amount to in terms of dollar value, and how much exactly would not be captured by either the PHPSP or the NESP.

Policy. *Government-Owned Buildings. Unknown.*

2.5.2 Fuel Tax Rebate

The Fuel Tax Rebate program is centrally administered by the Department of Finance as well. It targets two specific categories of fossil fuel consumers: Nunavummiut engaged in traditional activities such as hunting, fishing, trapping, gathering and outfitting, on the one hand, and the mining industry on the other (GN, 2014b). Eligible beneficiaries receive a rebate for the fuel tax that they had to pay either for fuel purchases made in Nunavut or for fuel that they imported. Furthermore, the rebate is only applicable to fuel that was used off-road in vehicles and machinery. The Department of Finance notes that since the program was created in 2006, the mining industry has benefited from almost all of the rebates processed (99.81 per cent as of November 2016) (GN, 2016d). Since 2013–14, no application for the rebate has been denied by the Department. In 2014–15, the most recent year for which data are complete, the Department reported CAD 3,836,672 in Fuel Tax Rebate. Although only CAD 11,432 had been approved by November 2016 for the year 2015–16, one pending application was worth CAD 3,375,000 in rebate (GN, 2016d).

Policy. *Fuel Tax Rebate Program, 2014-15: 3,836,672; 2015-16: CAD 11,432.*

[2] IISD was unable to conduct an interview with the Department of Finance, in part due to the Director of Fiscal Policy being away most of January and February 2017.

3.0 Carbon Pricing and Renewable Energy Penetration

In an attempt to understand how carbon pricing may affect future energy use costs, IISD has applied an estimated carbon price (based on the Pan-Canadian Framework on Clean Growth and Climate Change model) on energy use projections developed for Nunavut in the coming decades. Because the exact model of carbon pricing in Nunavut may be subject to change, this is for illustrative purposes only, indicating the impact a carbon pricing model may have. IISD also estimates how expansion of renewable energy in the territory may reduce power generation expenditures related to the hypothetical implementation of a carbon price, and provides some visual representation on the trend in fossil fuel subsidies in Nunavut over recent years. Specific scenarios and details on the models are available in the Annex, but the following figures highlight the impact that a shift to renewables can have on energy prices and avoided carbon pricing.

Cost Comparison on Energy Use Under Carbon Pricing

There are a number of programs that provide subsidies for various energy users in Nunavut. While not all of these have been quantified, the ones that could be quantified identify between CAD 35 and CAD 66 million in subsidies each year (Figure 2). In reality, this should be considered a conservative estimate, since including those that could not be quantified could drive the number much higher. The trend in recent years has been a decline, in part driven by lower bulk energy costs on the global energy market. This trend may or may not continue, but is driven by fluctuations in the energy market.

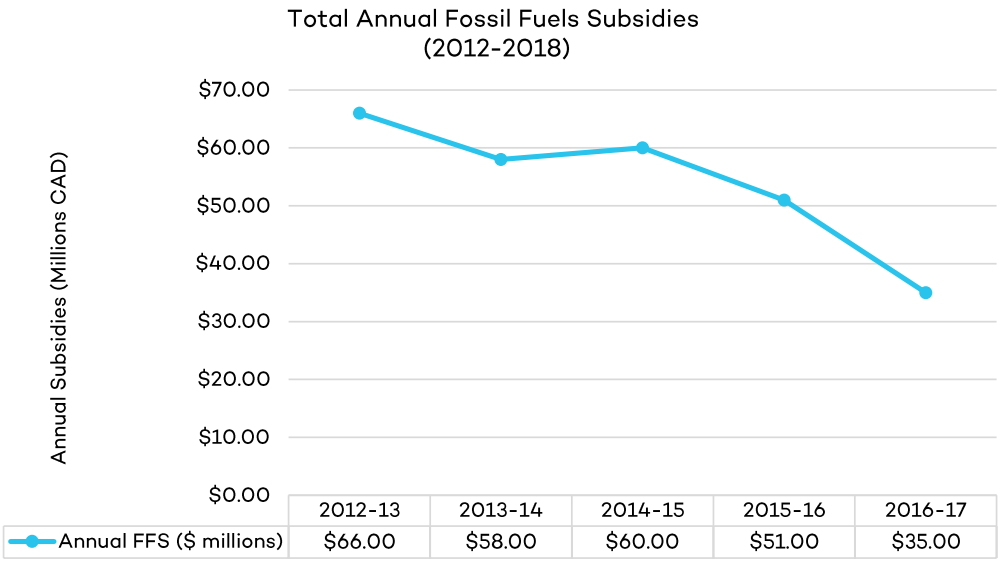

Figure 2. Annual Cost of fossil fuel subsidies

Nunavut already pays high annual costs on fossil fuels to supply electricity and space heating to its residential and commercial buildings. IISD has simulated what the cost of energy may be under a carbon pricing scenario for five communities chosen as a territorial sample (Figure 3). Using annual energy projections and the implementation of the Pan-Canadian Framework on Clean Growth and Climate Change as a guide, IISD estimates that greenhouse gas emissions emitted by fossil fuels will add on average roughly CAD 2.8 million to the cost of energy annually between 2016 and 2036.

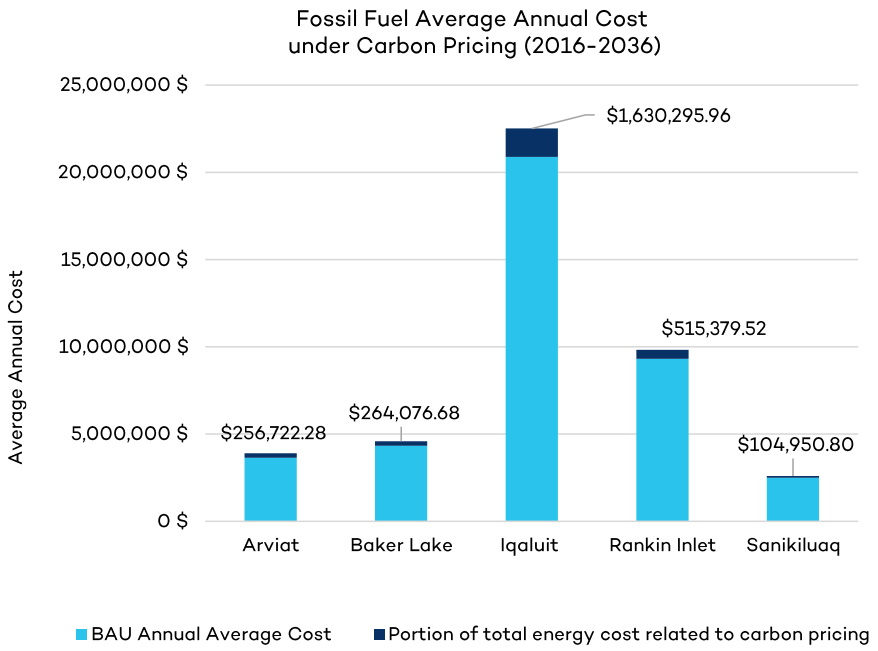

Figure 3. Annual average cost of fossil fuels under a carbon pricing system within the Pan-Canadian Framework on Clean Growth and Climate Change scenario for the years 2016–2036[3]

Greenhouse gas emissions can be reduced by replacing a portion of the electricity generated by fossil fuels with renewable energy (i.e., the RE penetration scenario). In addition, the annual cost of fuel is lowered as it decreases the amount of diesel imported into Nunavut. IISD has estimated (Figure 4) what the annual GHG emissions would be for the same five communities under scenarios that continue to mainly rely on diesel (BAU) versus a scenario for a realistic expansion of renewable energy.

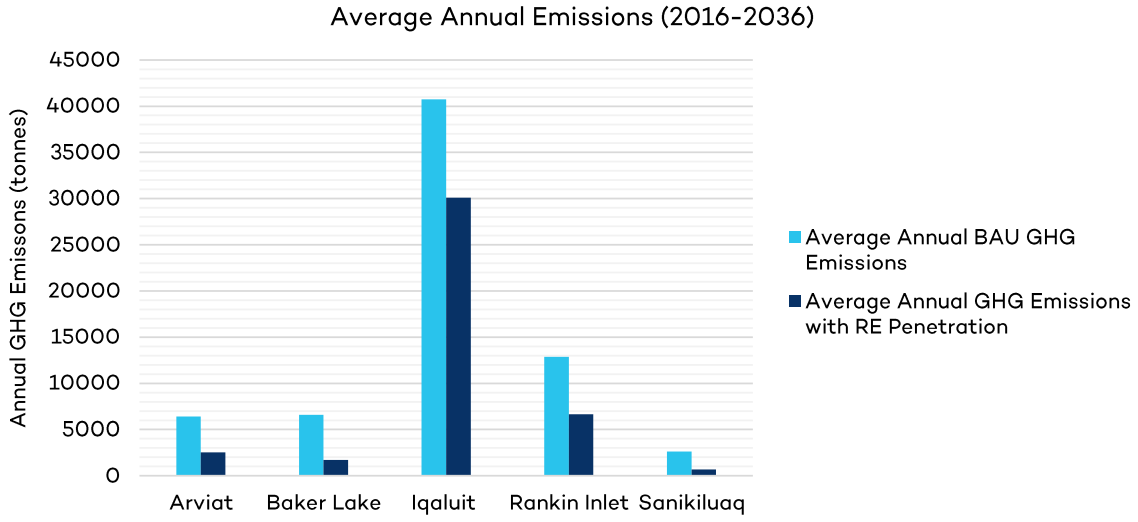

Figure 4. Average annual GHG emissions under BAU and renewable energy penetration scenarios

[3] Retrieved from https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html

In summary, IISD estimates that under a business-as-usual energy use scenario carbon pricing could result in increased costs of as much as CAD 2.8 million on average annually over the 2016–2036 timeframe amongst Arviat, Baker Lake, Iqaluit, Rankin Inlet and Sanikiluaq.[4] However, if a more aggressive renewable energy strategy were to be undertaken, emissions can be reduced by 27,616 tonnes of CO_2e on average annually amongst the five communities, resulting in carbon cost savings alone of CAD 1.1 million on average annually. Given the already high costs of energy, and the significant level of consumption subsidies in place in Nunavut, the addition of carbon pricing will increase pressure on government financial resources, and should motivate thinking on how to integrate renewables into the energy system. Integration of renewables across the territory would be a way to avoid significant price increases associated with fossil fuel imports, as well as lowering the amount of public money that would have to be spent subsidizing fossil fuels that can have negative environmental and climate impacts.

[4] These are the communities where IISD had sufficient information to make this analysis.

Conclusion

In mapping Nunavut's bulk fuel purchase practices and various supports for its residents fossil fuel consumption, this exercise makes it clear that Nunavut's energy system is unique compared to its Canadian counterparts, both territories and provinces. Through its Petroleum Products Division (PPD) Nunavut purchases fuel once per year, and subsequently set fuel costs at a fixed rate at 12-month intervals. Nunavut has no territory-wide energy grid, which means that each community has its own generation system, currently driven entirely by diesel fuel. Nunavut's 25 communities are spread across the vastest jurisdiction in Canada, without road access between one another, relying primarily on air transportation year-round, and sea transportation during the few summer months, with vast distances to travel. This system means that transport costs are high, but only influenced by market rates in a very limited way (once per year). PPD can use the latter as an advantage and ensures that fuel is sold at break-even prices, taking into account the additional costs and overhead associated with fuel prices. Therefore, since fuel is sold at a break-even price, there are no structural consumption subsidies coming directly from PPD.

However, due to its high energy prices and a need to ensure energy access, Nunavut has adopted a model where it does subsidize energy consumption for many residents through a number of government programs, including those for homeowners, public housing residents, seniors and others. Nearly all residents of Nunavut are eligible to receive some form of subsidy for energy, and in some cases the subsidy covers the full cost of electricity and heating fuels. As a result, while PPD does not structurally sell fuel at below costs, the subsidies and benefits available lead to significant consumption subsidies. These subsidies are in place primarily to ensure energy access, encourage home ownership and to attract and retain key government staff. In total, these subsidies provide an estimated value of CAD 63.7 million per year. It should be kept in mind that this total is split amongst only roughly 36,000 residents.

The pressure on government budgets to maintain subsidies to ensure affordable energy to residents will only increase when a carbon price is introduced, if the model is consistent with the Pan-Canadian Framework on Clean Growth and Climate Change. Over the next two decades, carbon pricing could add CAD 55.4 million to the cost of energy in Arviat, Baker Lake, Iqaluit, Rankin Inlet and Sanikiluaq alone.

This study does not necessarily recommend removal of the subsidies, knowing energy access is key for Nunavummiut. However, what we do show is that an increased investment in renewable energy could have multiple co-benefits. It would reduce carbon emissions (and associated costs), reduce the amount of energy that has to be purchased and transported to remote communities, and therefore can reduce the cost of both energy and the resultant subsidies. A good next step would be a renewed focus on feasibility studies for renewables, analyzing the full cost of energy, including carbon pricing, fuel transport costs, raw fuel costs, costs of subsidies, and ideally taking it even further, taking into account the cost of externalities such as the environmental impacts and health impacts of fossil fuels.

Another area of potential focus would be looking at how some of the subsidies in place for fossil fuel may be reformed, for example by reducing subsidies, but putting these funds to use for energy efficiency or social programming. These types of programs would help strengthen the social safety net, but would not be directly related to subsidizing fossil fuels, which have negative impacts on the environment and public health, and lock in technologies and fuels that contribute to climate change. This study does not offer concrete examples, but with a partial fossil fuel subsidy inventory now developed, the scale of potential revenues for programming such as efficiency and social welfare is at least somewhat identified.

It goes without saying that providing affordable energy access is a necessity in extreme cold climates. In the short term, this will be met through the current system, but in the future, increased investment in renewables and a focus on social programs and efficiency will reduce fossil fuel needs and costs

References

Beaton, C., Gerasimchuk, I., Laan, T., Lang, K., Vis-Dunbar, D., & Wooders, P. (2013). *A guidebook to fossil fuel subsidy reform for policy-makers in Southeast Asia*. Winnipeg: IISD. Retrieved from https://www.iisd.org/gsi/sites/default/files/ffs_guidebook.pdf

CBC News. (2013, December 31). *Nunavut Prices go up 20 cents a litre Jan. 1*. Retrieved from http://www.cbc.ca/news/canada/north/nunavut-gas-prices-go-up-20-cents-a-litre-jan-1-1.2479955

Das, I., & Canizares, C. (2016). *Renewable energy deployment in Canadian Arctic*. Toronto: WWF.

Government of Canada. (2017, January 25). *The Pan-Canadian Framework on Clean Growth and Climate Change*. Retrieved from https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html

Government of Nunavut. (n.d.). *Household Allowance*. Retrieved from http://www.gov.nu.ca/finance/information/household-allowance

Government of Nunavut (GN). (2005a). *Nunavut Electricity Subsidy Program: Contribution Policy*. Retrieved from http://www.gov.nu.ca/sites/default/files/files/Finance/Forms/Nunavut%20Electricity%20Subsidy%20Program%20Contribution%20Policy.pdf

Government of Nunavut. (2005b). *Backgrounder: Nunavut Electricity Subsidy Program*. Retrieved from http://www.news.gov.nu.ca/2005/february/feb28b.pdf

Government of Nunavut. (2010). *Petroleum Products Division*. Retrieved from Community and Government Services: http://cgs.gov.nu.ca/en/petroleum.aspx

Government of Nunavut. (2014a). *Minister's Annual Report on Poverty Reduction*. Retrieved from http://www.gov.nu.ca/sites/default/files/povreduct2013-14_eng_0.pdf

Government of Nunavut. (2014b). *Fuel Tax Rebate Program: Summary Report for 2012-12 and 2013-14*. Retrieved from http://www.gov.nu.ca/sites/default/files/ftr_report_2012-13_and_2013-14_-_final.pdf

Government of Nunavut. (2016a). *Main Estimates 2016–2017*. Retrieved from http://www.gov.nu.ca/sites/default/files/files/Finance/Budgets/main_estimates_2016-2017_english.pdf

Government of Nunavut. (2016b). *Cost of Energy*. Retrieved from http://www.nunavutenergy.ca/en/Cost_of_Energy

Government of Nunavut. (2016c). *Communities*. Retrieved from http://www.nunavutenergy.ca/en/communities

Government of Nunavut. (2016d). Fuel Tax Rebate Program: Summary Report for 2014-15 and 2015-16. Retrieved from http://www.gov.nu.ca/sites/default/files/ftr_annual_report_14-15_and_15-16.pdf

Government of Nunavut. (2017, January 10). *Senior Fuel Subsidy (SFS)*. Retrieved from http://gov.nu.ca/family-services/information/senior-fuel-subsidy-sfs

Hydro Québec. (2016). *Electricity Rates: Effective April 1, 2016*. Retrieved from http://www.hydroquebec.com/publications/en/docs/distribution-tariff/distribution_tariff.pdf

Natural Resources Canada. (2015). *Energy Fact Book 2015–2016*. Retrieved from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/files/pdf/EnergyFactBook2015-Eng_Web.pdf

Northland Utilities [Yellowknife] Limited. (2016). *Rate schedules.* Retrieved from http://www.northlandutilities.com/Documents/Yellowknife%20Regulatory/2016-09-01%20NUYL%20Rate%20Schedules.pdf

Nunavut Housing Corporation (NHC). (2009). *The GN Staff Housing Policy*. Iqaluit: Government of Nunavut.

Nunavut Housing Corporation. (2014). *Heating Oil Tank Replacement Program Guidelines*. Retrieved from http://www.nunavuthousing.ca/docs/hotrp-guidelines.pdf

Nunavut Housing Corporation. (2015). *Staff Housing*. Retrieved from http://www.nunavuthousing.ca/staffhousing?&lang=en

Nunavut Housing Corporation. (2016). *2015–2016 Annual Report*. Retrieved from https://s3.amazonaws.com/nhcweb/publications/annualreport_2015-16_0.pdf

Nunavut Bureau of Statistics. (2017). *Nunavut Population Counts by Region and Community, 1981 to 2016 Censuses*. Retrieved from http://www.stats.gov.nu.ca/Publications/census/2016/Nunavut%20Census%20Population%20by%20Region%20and%20Community,%201981%20to%202016%20(2%20tables).xls

Nunavut Roundtable for Poverty Reduction. (2012). *Understanding poverty in Nunavut*. Retrieved from http://makiliqta.ca/sites/default/files/anti-poverty_content_april18.pdf

Oudshoom, K. (2015, December 21). *Nunavut gas, diesel prices set to drop in new year*. Retrieved from http://www.cbc.ca/news/canada/north/nunavut-gas-price-drop-2016-1.3375317

Qulliq Power Corporation (QEC). (2004). *Recommendation of a rate structure*. Retrieved from http://assembly.nu.ca/library/GNedocs/2004/000566-e.pdf

Qulliq Power Corporation. (2016). *15th Annual Report: 2015–2016*. Retrieved from http://www.qec.nu.ca/sites/default/files/2015-2016_qec_annual_report_eng_final.pdf

Turbotax. (2016, August 30). *Nunavut: Tax rates and the most popular credits, deductions, programs and rebates*. Retrieved from https://turbotax.intuit.ca/tips/nunavut-tax-rates-and-the-most-popular-credits-deductions-programs-and-rebates-572

Annex

In order to complete Section 3: Carbon Pricing and Renewable Energy Penetration, IISD made the following assumptions:

- GHG emissions baseline:
  - The GHG emissions baseline for 2016–2036 is based on WISE's projection for the 20-year period (Das & Canizares, 2016), which in turn is based on the 2012–2013 GHG emissions provided by the GN's Energy Secretariat (GN, 2016c).
  - The projection data were provided directly by WISE's researchers in a Microsoft Excel spreadsheets format.
- Business-as-usual (BAU) scenario (Scenario 1):
  - WISE estimated the BAU costs of producing electricity for the 2016–2036 period at net present value that takes into account an annual 8 per cent discount rate. A backgrounder on net present value and discount rates is available here: https://hbr.org/2014/11/a-refresher-on-net-present-value.
  - Based on personal correspondence between IISD and a co-author of the Das & Canizares study, IISD computed the BAU annual average costs by applying the following formula: Equivalent annual cost = (1 + 1/1.08 + 1/(1.08)2 + 1/(1.08)3 +… + 1/(1.08)^19) = NPV of 20-year cost.
- The BAU energy costs for each community are the following:
  - Arviat: CAD 38,660,000 over 2016–2036; CAD 3,645,932 annual average costs
  - Baker Lake: CAD 45,880,000 over 2016–2036; CAD 4,326,833 annual average costs
  - Iqaluit: CAD 221,420,000 over 2016–2036; CAD 20,881,589 annual average costs
  - Rankin Inlet: CAD 98,810,000 over 2016–2036; CAD 9,318,534 annual average costs
  - Sanikiluaq: CAD 26,460,000 over 2016–2036; CAD 2,495,379 annual average costs.
- BAU scenario + carbon price (Scenario 2):
  - Under the Pan-Canadian Framework on Clean Growth and Climate Change, carbon price starts at CAD 10 per tonne of CO2e by 2018, increasing by CAD 10 every year and reaching CAD 50 per tonne by 2022. For this study, the carbon price averaged CAD 40 between 2016 and 2036, as it takes into consideration the initial years where there is no carbon pricing, the gradual CAD 10 increment between 2018 and 2021, and a price cap at CAD 50 between 2022–2036.

- From 2022, IISD assumed that each community would need to pay their respective annual average costs from Scenario 1, on top of which a carbon price of CAD 50 per tonne of carbon dioxide equivalent (tCO_2e) would be applied.
- The carbon costs from the implementation of a carbon price were estimated based on WISE's GHG emissions baseline for 2016–2036. As of 2022, the assumption is thus that each community would have to pay an average annual carbon cost of:
  - Arviat: CAD 256,722
  - Baker Lake: CAD 264,077
  - Iqaluit: CAD 1,630,296
  - Rankin Inlet: CAD 515,380
  - Sanikiluaq: CAD 104,951.

- Renewable Energy penetration scenario + carbon price (Scenario 3):
  - Scenario 3 is based on WISE estimates of the potential annual average RE penetration, mainly solar and wind, for the five communities in Nunavut based on "high-level data of wind speed and solar insolation, community size, their location and associated transportation costs and energy demand" (Das & Canizares, 2016). WISE also modelled its estimates on a BAU, 20-year annual average (2016–2036) of GHG emissions based on 2012–2013 GHG emissions for each community (GN, 2016b), their existing diesel generator portfolio and projected technologies for diesel generators, wind farms and solar energy.
  - The annual average RE penetration for each community is the following (Das & Canizares, 2016):
    - Arviat: 66.49 per cent
    - Baker Lake: 81.59 per cent
    - Iqaluit: 28.82 per cent
    - Rankin Inlet: 53.32 per cent
    - Sanikiluaq: 81.48 per cent.
  - This results in a reduction of annual average GHG emissions for each community of:
    - Arviat: 60.4 per cent
    - Baker Lake: 74.12 per cent
    - Iqaluit: 26.17 per cent
    - Rankin Inlet: 48.35 per cent
    - Sanikiluaq: 74.24 per cent.

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