

HAMLET OF AKLAVIK

Aklavik is located on the west side of the Mackenzie Delta, and accessible by ice road during the winter and by air and boat over the rest of the year.

Fossil fuels from external sources (e.g., diesel and other oil fuels) are relied on for electricity generation, heating and transportation. Most buildings are heated with heating oil, with some use of cord wood.¹



Source: A Vision for the NWT Power System Plan (December 2013)

EXISTING AKLAVIK GRID SYSTEM

With regard to electricity generation, Aklavik is one of 20 thermal rate zone communities served by NTPC.² Similar to other Beaufort Delta communities, there is no transmission connection between Aklavik and any other communities.

Consequently, it has its own isolated diesel power plant. In 2017, a new variable speed generator (VSG) was installed in the diesel plant along with 55 kW of photovoltaic (PV) solar.

In order to ensure grid stability, the GNWT Net Metering Program limits the amount of intermittent renewable capacity that can be added to the isolated grid system. The current allowed intermittent renewable energy capacity for Aklavik is reviewed in Table 1. Aklavik currently has approximately 26 kW of solar installed throughout the community (at the recreation complex, the SAO’s residence and the bed and breakfast);³ as well as 55 kW installed by NTPC. The Aklavik Community Energy Plan (2017) notes that the maximum allowable capacity for grid-connected microgeneration in Aklavik has been met.

Table 1: Allowed Intermittent Renewable Energy Capacity (kW) by Community (August 2019)

	Community Average Load	Intermittent Renewable Energy Capacity Allowed (kW)	Current Solar Capacity Installed (kW)		Planned Projects*	Currently Available Capacity (kW)**
			Net Metering Program	Other		
Aklavik	363	73	21	55	0	0

* Includes solar projects in the planning stage.

** Includes all solar capacity installed whether under the Net Metering Program or not.

The VSG installed in 2017 is expected to allow for integration of additional intermittent renewable generation on the Aklavik grid. In order to demonstrate the capabilities of the VSG, NTPC would like to install an additional 150 kW of additional solar near its diesel generation plant. Successful demonstration may allow for further integration of renewable generation on the Aklavik grid.

¹ Aklavik Community Energy Plan Update (2017), page 7.

² The balance of thermal rate zone communities are served by ATCO’s Northland Utilities [NUL].

³ Aklavik Community Energy Plan Update (2017), page 26. The community plan indicates 26 kW while the NWT allowed intermittent renewable energy capacity indicates 21 kW.

2018 BEAUFORT DELTA OFF-GRID FOSSIL FUEL COSTS STUDY

In 2018, Gwich'in Council International (GCI) completed a study that reviewed fossil fuel uses, costs and GHG emissions by sector for each community in the Beaufort Delta region, and options to reduce fossil fuel uses (the “Beaufort Delta Off-Grid Fossil Fuel Costs Study” or “2018 Beaufort Delta Study”). While there were limitations with regard to transportation and heating fuel uses in certain communities, the study provides a basis for understanding fossil fuel uses in the electricity, heating and transportation sectors across the Beaufort Delta.

The Aklavik Community Energy Profile summarizes the information currently available from the 2018 Beaufort Delta Study. It is expected that this information will be updated and refined as part of the update work to be undertaken in winter 2020.

Overall fossil fuel use by sector for Beaufort Delta communities is summarized in Figure 1.

Figure 1: Total Fossil Fuel Use by Community and By Sector

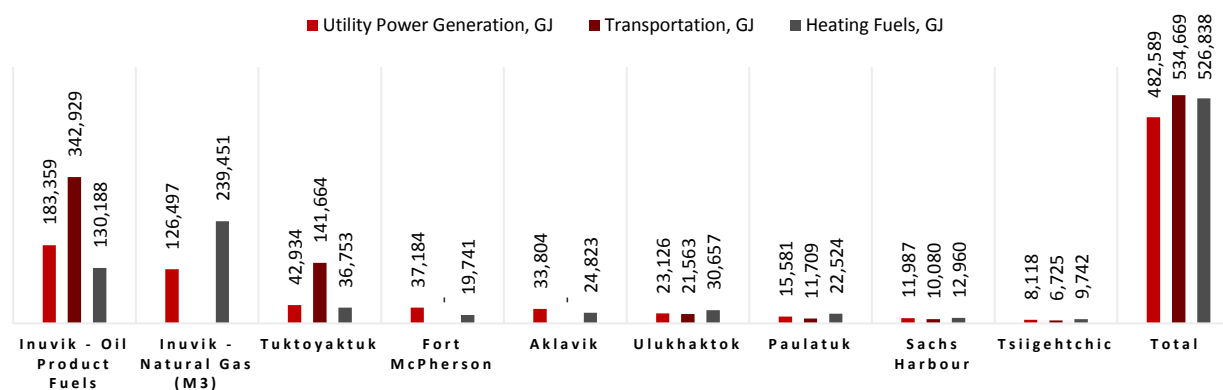


Figure 1 notes as follows regarding Aklavik fossil fuel use:

- Aklavik fossil fuel use related to utility power generation (33,804 GJ) is 7.0% of total utility power generation fossil fuel use in the Beaufort Delta.
- Due to limitations of data, Aklavik fossil fuel use related to the transportation sector was not determined in the 2018 Beaufort Delta Study.⁴
- Aklavik fossil fuel use related to heating fuels (24,823 GJ) is about 4.7% of total heating fuel fossil use in the Beaufort Delta.⁵

The sections that follow summarize available information regarding Aklavik fossil fuel uses compared to overall Beaufort Delta fuel uses for each energy sector.

⁴ Transportation fossil fuel volumes in the 2018 Beaufort Delta Study were based on GNWT fuel tax data. The GNWT provided fuel tax data for the “Inuvik Region” consisting of Inuvik, Fort McPherson and Aklavik. This data was only available for these communities at the Inuvik Region level, and separate information by community was not available. This data also did not include territory-wide suppliers that also supply the Beaufort Delta region (Petro-Can, Esso and Shell).

⁵ Total supply of heating oil for private use for the Inuvik Region in the 2018 Beaufort Delta Study was estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to the communities of Inuvik, Fort McPherson and Aklavik. No breakdown by community was available. Accurate heating fuel consumption information was only available for communities supplied by GNWT Fuel Services (Sachs Harbour, Tsiigehtchic, Paulatuk and Ulukhaktok).

AKLAVIK ELECTRICITY FOSSIL FUEL USE

NTPC 2016/17 GRA fossil fuel electricity volumes for Beaufort Delta Region Communities accounted for approximately:

- **57%** of forecast 2016/17 NTPC thermal zone diesel fuel use (16.1 million litres); and
- **60%** of forecast 2016/17 thermal zone fossil fuel generation (including natural gas generation).

Diesel generation for all eight Beaufort Delta communities is summarized in Figure 2 and Table 2 – Aklavik makes up about 7.2% of total thermal generation (MWh) in Beaufort Delta communities; and 9.5% of litres of diesel fuel used.

Figure 2: Total Generation in Beaufort Delta Communities (MWh) (2016/17)

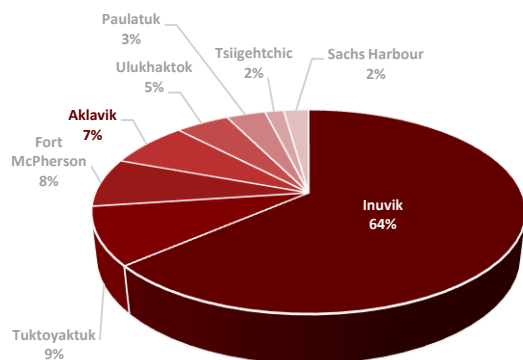


Table 2: Summary of Fossil Fuel Generation for Beaufort Delta Communities (2016/17)

	Fossil Fuel Generation (MWh)	Required Diesel Fuel (000 litres)	Required Natural Gas (m ³)
Inuvik	28,363	4,740	3,397
Tuktoyaktuk	4,096	1,110	
Fort McPherson	3,451	961	
Aklavik	3,216	874	
Ulukhaktok	2,134	598	
Paulatuk	1,547	403	
Sachs Harbour	986	310	
Tsiigehtchic	747	210	
Total	44,540	9,206	3,397

AKLAVIK ELECTRICITY FOSSIL FUEL COSTS

Total utility fossil fuel generation costs are made up of fuel and non-fuel costs. Total forecast 2016/17 generation costs for all Beaufort Delta communities were about \$27.7 million. As summarized in Table 3:

- Aklavik made up 7.6% of total generation fuel costs, and 7.2% of total non-fuel costs.
- Aklavik made up about 7.4% of total utility costs.

Table 3: Comparison of Fossil Fuel Generation Costs (\$000) (2016/17)

	Aklavik	Beaufort Delta
Total Thermal Generation Fossil Fuel Cost	1,048	13,718
Total Non-Fuel Costs	1,008	13,953
Total Utility Costs	2,056	27,671

Total 2016/17 NTPC costs for fossil fuel generation in Beaufort Delta Communities is about \$0.64/kWh for diesel fuel use, and \$0.58/kWh for natural gas use.

Table 4 summarizes the total utility cost per kWh for Aklavik.

- Average Aklavik diesel fuel use accounts for \$0.33/kWh.
- Non-fuel O&M and overhaul costs are about \$0.17/kWh.
- Capital costs are about \$0.15/kWh (includes depreciation and return on rate base for existing facilities).

Table 4: Total Utility Cost (\$/kWh) (2016/17): Aklavik and Beaufort Delta Communities

	Aklavik	Beaufort Delta Average Diesel Cost
Cost/Unit of Generation	\$0.33	\$0.31
Overhaul Cost	\$0.05	\$0.05
Non-Fuel O&M	\$0.12	\$0.12
Capital	\$0.15	\$0.15
Total Utility Cost	\$0.64	\$0.62

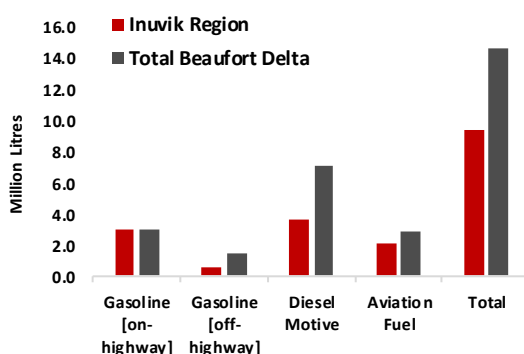
Note: Totals may not add due to rounding.

TRANSPORTATION FOSSIL FUEL USE

Fossil fuel volumes summarized from the 2018 Beaufort Delta Study are provided below.

Figure 3 summarizes total transportation fossil fuel use in the Inuvik Region (includes Inuvik, Aklavik and Fort McPherson) and in the Beaufort Delta. Total 2016 estimated transportation fossil fuel use in Beaufort Delta region communities included 14.6 million litres of diesel fuel, gasoline and aviation fuel.

Figure 3: Summary of Transportation Fossil Fuel Use for Inuvik Region and Beaufort Delta Region Communities - 2016



* Inuvik Region includes Inuvik, Aklavik and Fort McPherson.

** Fuel tax data for 2016 for the "Inuvik Region" was based on fuel tax data reported for units of fuel delivered to Inuvik, Fort McPherson and Aklavik by Inuvik-based suppliers; data was only available at the regional level, and did not include territory-wide suppliers.

Table 5 summarizes available information for total transportation fuel use (litres); and total costs for all Beaufort Delta communities. This shows Inuvik Region transportation fuel use as 65% of total Beaufort Delta litres.

Table 5: Transportation Fuel Use in Inuvik Region & Beaufort Delta Communities

	Inuvik Region, Litres	Beaufort Delta, Litres	Total Fuel Cost (\$000)
Gasoline [on highway]	3,060,129	3,060,129	3,730
Gasoline [off highway]	576,574	1,532,837	1,747
Diesel Motive	3,659,189	7,159,708	8,503
Aviation Fuel	2,171,290	2,839,760	3,220
Total	9,467,182	14,592,434	17,200

HEATING FOSSIL FUEL USE

Heating fuel use and costs summarized from the 2018 Beaufort Delta Study are provided in Tables 6 and 7. This includes available use information for Housing Corporation and GNWT properties.

- Aklavik Housing Corporation Litres are 21% of total Housing Corporation use for Beaufort Delta communities; and 19% of related costs.
- Aklavik GNWT Properties are 12% of total GNWT Properties use for Beaufort Delta communities; and 14% of related costs.
- Estimated Private Use information is not available (see notes on tables 6 and 7).

Table 6: Heating Fuel Oil Use (litres): Aklavik & Beaufort Delta

	Aklavik	Beaufort Delta Communities
Housing Corporation (litres)	452,713	2,133,649
Estimated Private Use (litres)	N/A	3,820,547
GNWT Properties (litres)	223,304	1,872,268
<i>Other Heating Fuel [GJ]</i>		
Propane		10,283
Natural Gas		229,167
Pellets		318
Total Heating Fuel Oil (Litres)	676,017	7,826,464
<i>Total Other (GJ)</i>		239,769

* Supply of heating oil for private use for the Inuvik Region is estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to Inuvik, Fort McPherson, and Aklavik. No breakdown by community was available.

Note: Totals may not add due to rounding.

Table 7: Heating Fuel Costs (\$): Aklavik & Beaufort Delta Communities

	Aklavik	Beaufort Delta Communities
Housing Corporation	768,034	3,993,000
Estimated Private Use	N/A	11,906,545
GNWT Properties		
Heating Oil	378,838	2,674,755
Propane		421,617
Natural Gas		875,240
Pellets		11,804
Total	1,146,871	19,882,960

* Supply of heating oil for private use for the Inuvik Region is estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to Inuvik, Fort McPherson, and Aklavik. No breakdown by community was available.

Note: Totals may not add due to rounding.

GREENHOUSE GAS (GHG) EMISSIONS

Total greenhouse gas (GHG) emissions for Aklavik and other Beaufort Delta Communities are summarized in Figure 4 and Table 8.

Based on data available from the Beaufort Delta Study, Aklavik produced about 4,370 tonnes/year of GHG emissions in the 2016/17 period. This was an approximate 4% share of total Beaufort Delta GHG emissions.

Figure 4: 2016 Total GHG Emissions by Community (tonnes/year)

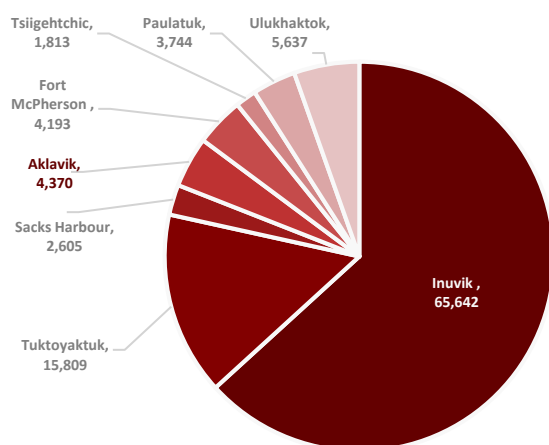


Table 8: Share of GHG Emissions by Community (2016/17)

Community	GHG Emissions (tonnes/yr)	Share of Total GHG Emissions
Inuvik	65,642	63%
Tuktoyaktuk	15,809	15%
Ulukhaktok	5,637	5%
Aklavik	4,370	4%
Fort McPherson	4,193	4%
Paulatuk	3,744	4%
Sachs Harbour	2,605	3%
Tsiigehtchic	1,813	2%
Total	103,814	

Note: Totals may not add due to rounding.

Figure 5 and Table 9 summarize the share of GHG emissions by sector for Aklavik and for total Beaufort Delta communities.

Figure 5: GHG emissions by Sector: Aklavik and Beaufort Delta Communities (tonnes/year)

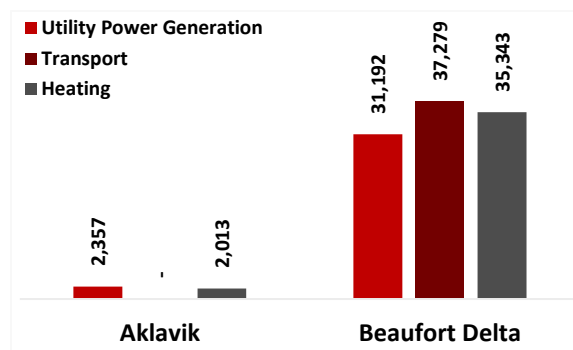


Table 9: GHGs by Sector (tonnes/year): Aklavik and Beaufort Delta Communities

	Aklavik	Beaufort Delta
Utility Power Generation	2,357	31,192
Transportation	N/A	37,279
Heating	2,013	35,343
Total	4,370	103,814

- Utility power generation fossil fuel emissions had a 30% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Aklavik had a 7.6% share of total utility power generation GHG emissions in the Beaufort Delta in 2016/17;
- Transportation fossil fuels had a 36% share of total Beaufort Delta GHG emissions in the 2016/17 period.
- Heating fossil fuels had a 34% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Aklavik had a 5.7% share of total heating GHG emissions in the Beaufort Delta in 2016/17. This does not include consideration of heating fuel for private use (see discussion at page 4).

HAMLET OF FORT MCPHERSON

Fort McPherson is located on the east bank of the Peel River. It is accessible by road most of the year, with the exception of spring break-up and fall freeze-up in the Peel River.

Fossil fuels from external sources (e.g., diesel and other oil fuels) are relied on for electricity generation, heating and transportation. NTPC also sells residual heat created by diesel generation of electricity into small district heat systems in Fort McPherson.



Source: A Vision for the NWT Power System Plan (December 2013)

EXISTING GRID SYSTEM

With regard to electricity generation, Fort McPherson is one of 20 thermal rate zone communities served by NTPC.¹ Similar to other Beaufort Delta communities, there is no transmission connection between Fort McPherson and any other communities. Consequently, it has its own isolated diesel power plant.

In order to ensure grid stability, the GNWT Net Metering Program limits the amount of intermittent renewable capacity that can be added to the isolated grid system. The current allowed intermittent renewable energy capacity for Fort McPherson is reviewed in Table 1. There is currently approximately 5 kW of solar installed in Fort McPherson under the net metering program and 74 kW of renewable capacity available.

Table 1: Allowed Intermittent Renewable Energy Capacity by Community (August 2019)

	Community Average Load	Intermittent Renewable Energy Capacity Allowed (kW)	Current Solar Capacity Installed (kW)		Planned Projects*	Currently Available Capacity (kW)**
			Net Metering Program	Other		
Fort McPherson	397	79	5	0	0	74

* Includes solar projects in the planning stage.

** Includes all solar capacity installed whether under the Net Metering Program or not.

It is understood that a Biomass District Heating Pilot Project has been pursued to supply heat to the Band Office and Community Health Centre [85 kW KOB tri-fuel, including cordwood, pellets or wood chips]; and that the GNWT installed a biomass boiler in the Health Centre in September 2014. The 2013 NWT Power System Plan also previously recommended that the viability of LNG as a supply option for Fort McPherson, Tuktoyaktuk and Tsiigehtchic be investigated.²

¹ The balance of thermal rate zone communities are served by ATCO's Northland Utilities [NUL].

² Beaufort Delta Study, Phase 3 Report, Attachment 6, page 66-67.

2018 BEAUFORT DELTA OFF-GRID FOSSIL FUEL COSTS STUDY

In 2018, Gwich'in Council International (GCI) completed a study that reviewed fossil fuel uses, costs and GHG emissions by sector for each community in the Beaufort Delta region, and options to reduce fossil fuel uses (the “Beaufort Delta Off-Grid Fossil Fuel Costs Study” or “2018 Beaufort Delta Study”). While there were limitations with regard to transportation and heating fuel uses in certain communities, the study provides a basis for understanding fossil fuel uses in the electricity, heating and transportation sectors across the Beaufort Delta.

The Fort McPherson Community Energy Profile summarizes the information currently available from the 2018 Beaufort Delta Study. It is expected that this information will be updated and refined as part of the update work to be undertaken in winter 2020.

Overall fossil fuel use by sector for Beaufort Delta communities is summarized in Figure 1.

Figure 1: Total Fossil Fuel Use by Community and By Sector

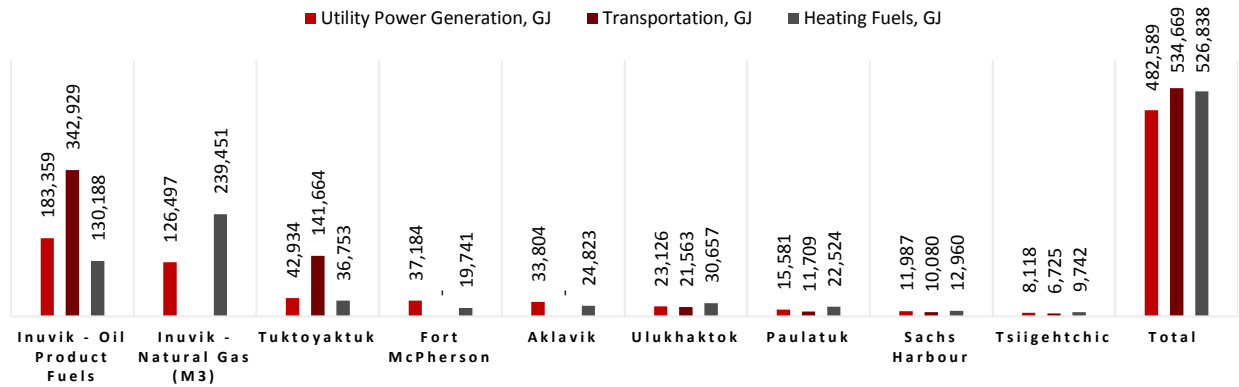


Figure 1 notes as follows regarding Fort McPherson fossil fuel use:

- Fort McPherson fossil fuel use related to utility power generation (37,184 GJ) is 7.7% of total utility power generation fossil fuel use in the Beaufort Delta.
- Due to limitations of data, Fort McPherson fossil fuel use related to the transportation sector was not determined in the 2018 Beaufort Delta Study.³
- Fort McPherson fossil fuel use related to heating fuels (19,741 GJ) is about 3.7% of total heating fuel fossil use in the Beaufort Delta.⁴

The sections that follow summarize available information regarding Fort McPherson fossil fuel uses compared to overall Beaufort Delta fuel uses for each energy sector.

³ Transportation fossil fuel volumes in the 2018 Beaufort Delta Study were based on GNWT fuel tax data. The GNWT provided fuel tax data for the “Inuvik Region” consisting of Inuvik, Fort McPherson and Aklavik. This data was only available for these communities at the Inuvik Region level, and separate information by community was not available. This data also did not include territory-wide suppliers that also supply the Beaufort Delta region (Petro-Can, Esso and Shell).

⁴ Total supply of heating oil for private use for the Inuvik Region in the 2018 Beaufort Delta Study was estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to the communities of Inuvik, Fort McPherson and Aklavik. No breakdown by community was available. More accurate heating fuel consumption information was only available for communities supplied by GNWT Fuel Services (Sachs Harbour, Tsiigehtchic, Paulatuk and Ulukaktok).

ELECTRICITY FOSSIL FUEL USE

NTPC 2016/17 GRA fossil fuel electricity volumes for Beaufort Delta Region Communities accounted for approximately:

- **57%** of forecast 2016/17 NTPC thermal zone diesel fuel use (16.1 million litres); and
- **60%** of forecast 2016/17 thermal zone fossil fuel generation (including natural gas generation).

Diesel generation for all eight Beaufort Delta communities is summarized in Figure 2 and Table 2 – Fort McPherson makes up about 7.7% of total thermal generation (MWh) in Beaufort Delta communities; and 10.4% of litres of diesel fuel used.

Figure 2: Total Generation in Beaufort Delta Communities (MWh) (2016/17)

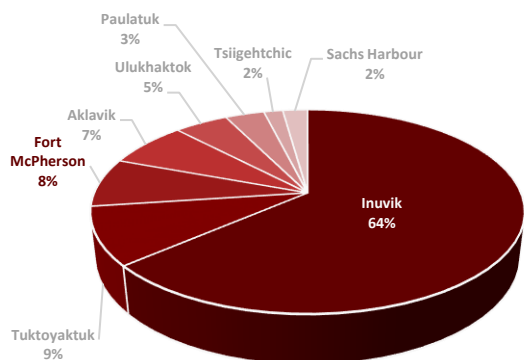


Table 2: Summary of Fossil Fuel Generation for Beaufort Delta Communities (2016/17)

	Fossil Fuel Generation (MWh)	Required Diesel Fuel (000 litres)	Required Natural Gas (m ³)
Inuvik	28,363	4,740	3,397
Tuktoyaktuk	4,096	1,110	
Fort McPherson	3,451	961	
Aklavik	3,216	874	
Ulukhaktok	2,134	598	
Paulatuk	1,547	403	
Sachs Harbour	986	310	
Tsiigehtchic	747	210	
Total	44,540	9,206	3,397

ELECTRICITY FOSSIL FUEL COSTS

Total utility fossil fuel generation costs are made up of fuel and non-fuel costs. Total forecast 2016/17 generation costs for all Beaufort Delta communities were about \$27.7 million. As summarized in Table 3:

- Fort McPherson made up 8.6% of total generation fuel costs, and 7.7% of total non-fuel costs.
- Fort McPherson made up about 8.2% of total utility costs.

Table 3: Comparison of Fossil Fuel Generation Costs (\$000) (2016/17)

	Fort McPherson	Beaufort Delta
Total Thermal Generation Fossil Fuel Cost	1,180	13,718
Total Non-Fuel Costs	1,081	13,953
Total Utility Costs	2,261	27,671

Total 2016/17 NTPC costs for fossil fuel generation in Beaufort Delta Communities is about \$0.64/kWh for diesel fuel use, and \$0.58/kWh for natural gas use.

Table 4 summarizes the total utility cost per kWh for Fort McPherson.

- Average Fort McPherson diesel fuel use accounts for \$0.34/kWh.
- Non-fuel O&M and overhaul costs are about \$0.17/kWh.
- Capital costs are about \$0.15/kWh (includes depreciation and return on rate base for existing facilities).

Table 4: Total Utility Cost (\$/kWh) (2016/17): Fort McPherson and Beaufort Delta Communities

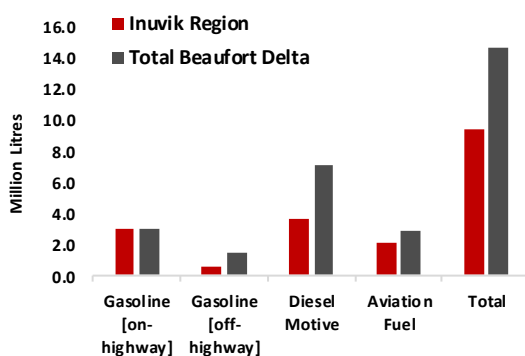
	Fort McPherson	Beaufort Delta Average Diesel Cost
Cost/Unit of Generation	\$0.34	\$0.31
Overhaul Cost	\$0.05	\$0.05
Non-Fuel O&M	\$0.12	\$0.12
Capital	\$0.15	\$0.15
Total Utility Cost	\$0.66	\$0.62

TRANSPORTATION FOSSIL FUEL USE

Fossil fuel volumes summarized from the 2018 Beaufort Delta Study are provided below.

Figure 3 summarizes total transportation fossil fuel use in the Inuvik Region (includes Inuvik, Aklavik and Fort McPherson) and in the Beaufort Delta. Total 2016 estimated transportation fossil fuel use in Beaufort Delta region communities included 14.6 million litres of diesel fuel, gasoline and aviation fuel.

Figure 3: Summary of Transportation Fossil Fuel Use for Inuvik Region and Beaufort Delta Region Communities - 2016



*Inuvik Region includes Inuvik, Aklavik and Fort McPherson.

** Fuel tax data for 2016 for the "Inuvik Region" was based on fuel tax data reported for units of fuel delivered to Inuvik, Fort McPherson and Aklavik by Inuvik-based suppliers; data was only available at the regional level, and did not include territory-wide suppliers.

Table 5 summarizes available information for total transportation fuel use (litres); and total costs for all Beaufort Delta communities. This shows Inuvik Region transportation fuel use as 65% of total Beaufort Delta litres.

Table 5: Transportation Fuel Use in Inuvik Region & Beaufort Delta Communities

	Inuvik Region, Litres	Beaufort Delta, Litres	Total Fuel Cost (\$000)
Gasoline [on highway]	3,060,129	3,060,129	3,730
Gasoline [off highway]	576,574	1,532,837	1,747
Diesel Motive	3,659,189	7,159,708	8,503
Aviation Fuel	2,171,290	2,839,760	3,220
Total	9,467,182	14,592,434	17,200

HEATING FOSSIL FUEL USE

Tables 6 and 7 provide heating fuel use and costs from the 2018 Beaufort Delta Study; and include available use information for Housing Corporation and GNWT properties.

- Fort McPherson Housing Corporation Litres are 16% of total Housing Corporation use for Beaufort Delta communities; and 11% of related costs.
- For McPherson GNWT Properties are 10% of total GNWT Properties' use for Beaufort Delta communities; and 9% of related costs.
- Estimated Private Use information is not available (see notes on tables 6 and 7).

Table 6: Heating Fuel Oil Use (litres): Fort McPherson & Beaufort Delta

	Fort McPherson	Beaufort Delta Communities
Housing Corporation (litres)	346,580	2,133,649
Estimated Private Use (litres)	N/A	3,820,547
GNWT Properties (litres)	191,036	1,872,268
<i>Other Heating Fuel [GJ]</i>		
Propane		10,283
Natural Gas		229,167
Pellets	318	318
Total Heating Fuel Oil (Litres)	537,616	7,826,464
<i>Total Other (GJ)</i>	318	239,769

* Supply of heating oil for private use for the Inuvik Region is estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to Inuvik, Fort McPherson, and Aklavik. No breakdown by community was available.

Note: Totals may not add due to rounding.

Table 7: Heating Fuel Costs (\$): Fort McPherson & Beaufort Delta Communities

	Fort McPherson	Beaufort Delta Communities
Housing Corporation	450,089	3,993,000
Estimated Private Use	N/A	11,906,545
GNWT Properties		
Heating Oil	248,090	2,674,755
Propane		421,617
Natural Gas		875,240
Pellets	11,804	11,804
Total	709,983	19,882,960

* Supply of heating oil for private use for the Inuvik Region is estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to Inuvik, Fort McPherson, and Aklavik. No breakdown by community was available.

Note: Totals may not add due to rounding.

GREENHOUSE GAS (GHG) EMISSIONS

Total greenhouse gas (GHG) emissions for Fort McPherson and other Beaufort Delta Communities are summarized in Figure 4 and Table 8.

Based on data available from the Beaufort Delta Study, Fort McPherson produced about 4,193 tonnes/year of GHG emissions in the 2016/17 period. This was an approximate 4% share of total Beaufort Delta GHG emissions.

Figure 4: 2016 Total GHG Emissions by Community (Tonnes/yr)

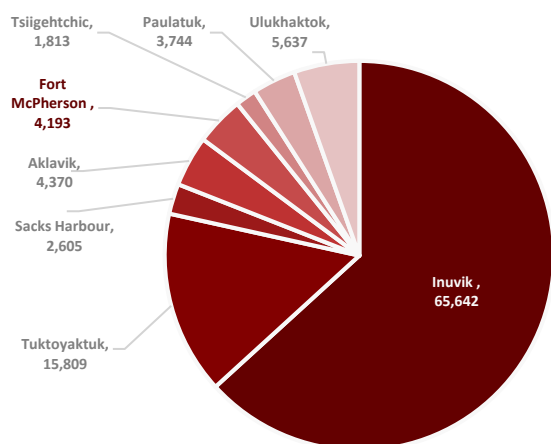


Table 8: Share of GHG Emissions by Community (2016/17)

Community	GHG Emissions (tonnes/yr)	Share of Total GHG Emissions
Inuvik	65,642	63%
Tuktoyaktuk	15,809	15%
Ulukhaktok	5,637	5%
Aklavik	4,370	4%
Fort McPherson	4,193	4%
Paulatuk	3,744	4%
Sachs Harbour	2,605	3%
Tsiigehtchic	1,813	2%
Total	103,814	

Note: Totals may not add due to rounding.

Figure 5 and Table 9 summarize the share of GHG emissions by sector for Fort McPherson and for total Beaufort Delta communities.

Figure 5: GHG emissions by Sector: Fort McPherson and Beaufort Delta Communities (tonnes/yr)

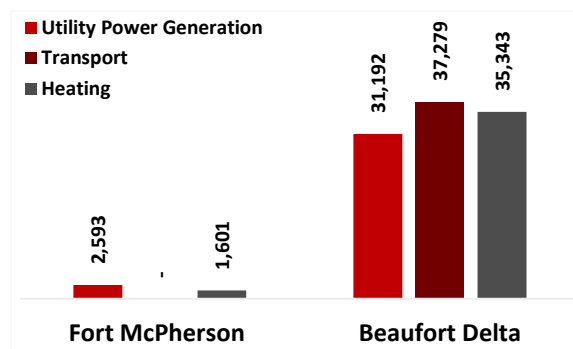


Table 9: GHGs by Sector (tonnes/year): Fort McPherson and Beaufort Delta Communities

	Fort McPherson	Beaufort Delta
Utility Power Generation	2,593	31,192
Transportation	N/A	37,279
Heating	1,601	35,343
Total	4,193	103,814

Note: Totals may not add due to rounding.

- Utility power generation fossil fuel emissions had a 30% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Fort McPherson had a 8.3% share of total utility power generation GHG emissions in the Beaufort Delta in 2016/17;
- Transportation fossil fuels had a 36% share of total Beaufort Delta GHG emissions in the 2016/17 period.
- Heating fossil fuels had a 34% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Fort McPherson had a 4.5% share of total heating GHG emissions in the Beaufort Delta in 2016/17. This does not include consideration of heating fuel for private use (see discussion at page 4).

TOWN OF INUVIK

Inuvik is located on the East Channel of the Mackenzie Delta, and accessible by road most of the year, with the exception of spring break-up and fall freeze-up in the Peel River and the Mackenzie River.

Fossil fuels from external sources (e.g., diesel, natural gas and other oil fuels) are relied on for electricity generation, heating and transportation.



Source: A Vision for the NWT Power System Plan (December 2013)

EXISTING GRID SYSTEM

With regard to electricity generation, Inuvik is one of 20 thermal rate zone communities served by NTPC.¹ Similar to other Beaufort Delta communities, there is no transmission connection between Inuvik and any other communities. Consequently, it has its own isolated thermal power plant. Four diesel generators and two natural gas generators with a 2-3 MW capacity provide roughly 29 GWh of energy annually to Inuvik, with natural gas providing 20-40%. The generators also provide heat for the power plant and community water intake through exhaust heat recovery on two of the units.

In order to ensure grid stability, the GNWT Net Metering Program limits the amount of intermittent renewable capacity that can be added to the isolated grid system. The current allowed intermittent renewable energy capacity for Inuvik is reviewed in Table 1. There is approximately 130 kW of solar currently installed under the net metering program; and 93 kW of other solar installed. With 447.9 kW of solar projects in the planning stage, the allowed intermittent renewable energy capacity for the community has been met.

Table 1: Allowed Intermittent Renewable Energy Capacity by Community (August 2019)

	Community Average Load	Intermittent Renewable Energy Capacity Allowed (kW)	Current Solar Capacity Installed (kW)		Planned Projects*	Currently Available Capacity (kW)**
			Net Metering Program	Other		
Inuvik	3,349	670	130	93	447.9	0

* Includes solar projects in the planning stage.

** Includes all solar capacity installed whether under the Net Metering Program or not.

NTPC is currently pursuing the development of the Inuvik High Point Wind Project (2-4 MW). This would be the largest renewable electricity generation development in the near term in the Beaufort Delta. Other recent renewable developments advanced by Nihtat Energ Ltd. include ground mount solar installations for the North Mart store (250 kW) and on the Mackenzie Hotel (150 kW). Over the summer of 2019, Nihtat Corporation also facilitated the installation of solar on the roofs of 29 homeowners in Inuvik (178 kW).

¹ The balance of thermal rate zone communities are served by ATCO's Northland Utilities [NUL].

2018 BEAUFORT DELTA OFF-GRID FOSSIL FUEL COSTS STUDY

In 2018, Gwich'in Council International (GCI) completed a study that reviewed fossil fuel uses, costs and GHG emissions by sector for each community in the Beaufort Delta region, and options to reduce fossil fuel uses (the “Beaufort Delta Off-Grid Fossil Fuel Costs Study” or “2018 Beaufort Delta Study”). While there were limitations with regard to transportation and heating fuel uses in certain communities, the study provides a basis for understanding fossil fuel uses in the electricity, heating and transportation sectors across the Beaufort Delta.

The Inuvik Community Energy Profile summarizes the information currently available from the 2018 Beaufort Delta Study. It is expected that this information will be updated and refined as part of the update work to be undertaken in winter 2020.

Overall fossil fuel use by sector for Beaufort Delta communities is summarized in Figure 1.

Figure 1: Total Fossil Fuel Use by Community and By Sector

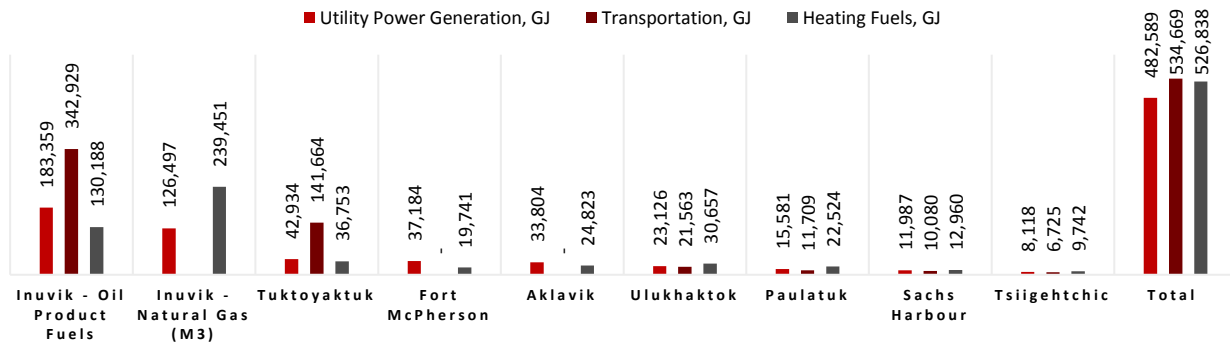


Figure 1 notes as follows regarding Inuvik fossil fuel use:

- Inuvik fossil fuel use related to utility power generation (183,359 GJ) is 38.0% of total utility power generation fossil fuel use in the Beaufort Delta. Natural gas use related to utility power generation (126,497 GJ) is 26.2% of total utility power generation fossil fuel use in the Beaufort Delta.
- Inuvik fossil fuel use related to the transportation sector (342,929 GJ) is about 64.1% of total heating fuel fossil use in the Beaufort Delta.²
- Fossil fuel use related to heating fuels (130,188 GJ) is about 24.7% of total heating fuel fossil use in the Beaufort Delta.³ Inuvik natural gas use related to heating fuels (239,451 GJ) is about 45.5% of total heating fuel fossil use in the Beaufort Delta.

The sections that follow summarize available information regarding Inuvik fossil fuel uses compared to overall Beaufort Delta fuel uses for each energy sector.

² Transportation fossil fuel volumes in the 2018 Beaufort Delta Study were based on GNWT fuel tax data. The GNWT provided fuel tax data for the “Inuvik Region” consisting of Inuvik, Fort McPherson and Aklavik. This data was only available for these communities at the Inuvik Region level, and separate information by community was not available. This data also did not include territory-wide suppliers that also supply the Beaufort Delta region (Petro-Can, Esso and Shell).

³ Total supply of heating oil for private use for the Inuvik Region in the 2018 Beaufort Delta Study was estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to the communities of Inuvik, Fort McPherson and Aklavik. No breakdown by community was available. More accurate heating fuel consumption information was only available for communities supplied by GNWT Fuel Services (Sachs Harbour, Tsiigehtchic, Paulatuk and Ulukaktok).

ELECTRICITY FOSSIL FUEL USE

NTPC 2016/17 GRA fossil fuel electricity volumes for Beaufort Delta Region Communities accounted for approximately:

- **57%** of forecast 2016/17 NTPC thermal zone diesel fuel use (16.1 million litres); and
- **60%** of forecast 2016/17 thermal zone fossil fuel generation (including natural gas generation).

Diesel generation for all eight Beaufort Delta communities is summarized in Figure 2 and Table 2 – Inuvik makes up about 63.7% of total thermal generation (MWh) in Beaufort Delta communities; 51.5% of litres of diesel fuel; and 100% of m³ of natural gas used.

Figure 2: Total Generation in Beaufort Delta Communities (MWh) (2016/17)

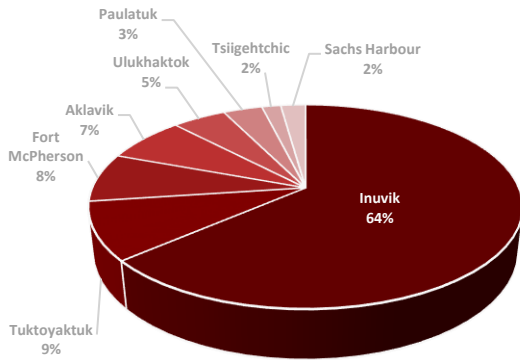


Table 2: Summary of Fossil Fuel Generation for Beaufort Delta Communities (2016/17)

	Fossil Fuel Generation (MWh)	Required Diesel Fuel (000 litres)	Required Natural Gas (m ³)
Inuvik	28,363	4,740	3,397
Tuktoyaktuk	4,096	1,110	
Fort McPherson	3,451	961	
Aklavik	3,216	874	
Ulukhaktok	2,134	598	
Paulatuk	1,547	403	
Sachs Harbour	986	310	
Tsiigehtchic	747	210	
Total	44,540	9,206	3,397

ELECTRICITY FOSSIL FUEL COSTS

Total utility fossil fuel generation costs are made up of fuel and non-fuel costs. Total forecast 2016/17 generation costs for all Beaufort Delta communities were about \$27.7 million. As summarized in Table 3:

- Inuvik made up 62.5% of total generation fuel costs, and 63.7% of total non-fuel costs.
- Inuvik made up about 63.1% of total utility costs.

Table 3: Comparison of Fossil Fuel Generation Costs (\$000) (2016/17)

	Inuvik	Beaufort Delta
Total Thermal Generation Fossil Fuel Cost	8,575	13,718
Total Non-Fuel Costs	8,885	13,953
Total Utility Costs	17,461	27,671

Note: Totals may not add due to rounding.

Total 2016/17 NTPC costs for fossil fuel generation in Beaufort Delta Communities is about \$0.64/kWh for diesel fuel use, and \$0.58/kWh for natural gas use.

Table 4 summarizes the total utility cost per kWh for Inuvik.

- Average Inuvik diesel and natural gas fuel use accounts for \$0.30/kWh.
- Non-fuel O&M and overhaul costs are about \$0.17/kWh.
- Capital costs are about \$0.15/kWh (includes depreciation and return on rate base for existing facilities).

Table 4: Total Utility Cost (\$/kWh) (2016/17): Inuvik and Beaufort Delta Communities

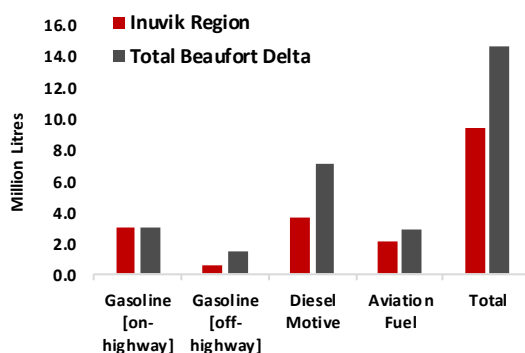
	Inuvik	Beaufort Delta Average Diesel Cost
Cost/Unit of Generation	\$0.30	\$0.31
Overhaul Cost	\$0.05	\$0.05
Non-Fuel O&M	\$0.12	\$0.12
Capital	\$0.15	\$0.15
Total Utility Cost	\$0.62	\$0.62

TRANSPORTATION FOSSIL FUEL USE

Fossil fuel volumes summarized from the 2018 Beaufort Delta Study are provided below.

Figure 3 summarizes total transportation fossil fuel use in the Inuvik Region (includes Inuvik, Aklavik and Fort McPherson) and in the Beaufort Delta. Total 2016 estimated transportation fossil fuel use in Beaufort Delta region communities included 14.6 million litres of diesel fuel, gasoline and aviation fuel.

Figure 3: Summary of Transportation Fossil Fuel Use for Inuvik Region and Beaufort Delta Region Communities - 2016



*Inuvik Region includes Inuvik, Aklavik and Fort McPherson.

** Fuel tax data for 2016 for the "Inuvik Region" was based on fuel tax data reported for units of fuel delivered to Inuvik, Fort McPherson and Aklavik by Inuvik-based suppliers; data was only available at the regional level, and did not include territory-wide suppliers.

Table 5 summarizes available information for total transportation fuel use (litres): and total costs for all Beaufort Delta communities. This shows Inuvik Region transportation fuel use as 65% of total Beaufort Delta litres.

Table 5: Transportation Fuel Use in Inuvik Region & Beaufort Delta Communities

	Inuvik Region, Litres	Beaufort Delta, Litres	Total Fuel Cost (\$000)
Gasoline [on highway]	3,060,129	3,060,129	3,730
Gasoline [off highway]	576,574	1,532,837	1,747
Diesel Motive	3,659,189	7,159,708	8,503
Aviation Fuel	2,171,290	2,839,760	3,220
Total	9,467,182	14,592,434	17,200

HEATING FOSSIL FUEL USE

Heating fuel use and costs summarized from the 2018 Beaufort Delta Study are provided in Tables 6 and 7. Inuvik Region uses a mix of heating oil, natural gas and propane.

- Inuvik Private Use is 80% of total Inuvik natural gas use; and 75% of heating oil use
- GNWT Properties is 100% of Inuvik propane use; 9% of natural gas use; and 25% of heating oil use
- Housing Corporation is 11% of Inuvik natural gas use.

Table 6: Heating Fuel Oil Use (litres): Inuvik & Beaufort Delta

	Inuvik	Beaufort Delta Communities
Housing Corporation (litres)	N/A	2,133,649
Estimated Private Use (litres)*	2,668,399	3,820,547
GNWT Properties (litres)	877,021	1,872,268
Other Heating Fuel [GJ]		
Propane	10,283	10,283
Natural Gas**	229,167	229,167
Pellets		318
Total Heating Fuel Oil (Litres)	3,545,420	7,826,464
<i>Total Other (GJ)</i>	<i>239,451</i>	<i>239,769</i>

* Supply of heating oil for private use for the Inuvik Region is estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to Inuvik, Fort McPherson, and Aklavik. No breakdown by community was available.

** Natural Gas includes 24,833 GJ for Housing Corporation, 21,347 for GNWT Properties Use, and 182, 987 for Estimated Private Use. Propane use relates entirely to GNWT Properties use.

Note: Totals may not add due to rounding.

Table 7: Heating Fuel Costs (\$): Inuvik & Beaufort Delta Communities

	Inuvik	Beaufort Delta Communities
Housing Corporation*	890,003	3,993,000
Estimated Private Use**	10,283,310	11,906,545
GNWT Properties		
Heating Oil	1,224,344	2,674,755
Propane	421,617	421,617
Natural Gas	875,240	875,240
Pellets		11,804
Total	13,694,513	19,882,960

* Housing Corporation and Estimated Private Use costs include Natural Gas.

** Supply of heating oil for private use for the Inuvik Region is estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to Inuvik, Fort McPherson, and Aklavik. No breakdown by community was available.

Note: Totals may not add due to rounding.

GREENHOUSE GAS (GHG) EMISSIONS

Total greenhouse gas (GHG) emissions for Inuvik and other Beaufort Delta Communities are summarized in Figure 4 and Table 8.

Based on data available from the Beaufort Delta Study, Inuvik produced about 65,642 tonnes/year of GHG emissions in the 2016/17 period. This was an approximate 63% share of total Beaufort Delta GHG emissions.

Figure 4: 2016 Total GHG Emissions by Community (tonnes/year)

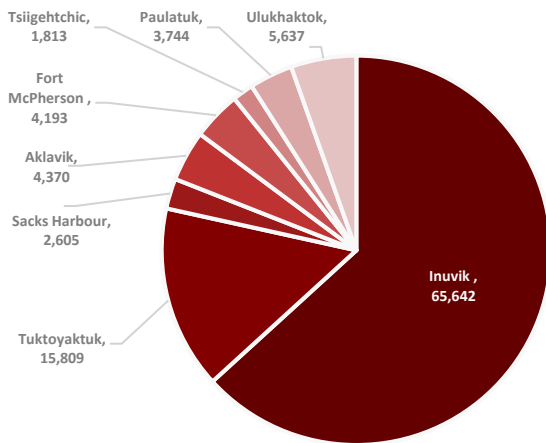


Table 8: Share of GHG Emissions by Community (2016/17)

Community	GHG Emissions (tonnes/yr)	Share of Total GHG Emissions
Inuvik	65,642	63%
Tuktoyaktuk	15,809	15%
Ulukhaktok	5,637	5%
Aklavik	4,370	4%
Fort McPherson	4,193	4%
Paulatuk	3,744	4%
Sachs Harbour	2,605	3%
Tsiigehtchic	1,813	2%
Total	103,814	

Note: Totals may not add due to rounding.

Figure 5 and Table 9 summarize the share of GHG emissions by sector for Inuvik and for total Beaufort Delta communities.

Figure 5: GHG emissions by Sector: Inuvik and Beaufort Delta Communities (tonnes/year)

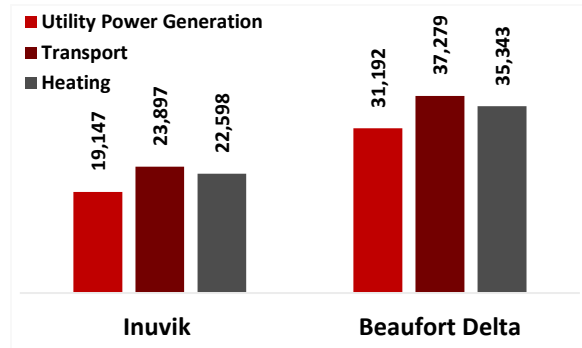


Table 9: GHGs by Sector (tonnes/year): Inuvik and Beaufort Delta Communities

	Inuvik	Beaufort Delta
Utility Power Generation	19,147	31,192
Transportation	23,897	37,279
Heating	22,598	35,343
Total	65,642	103,814

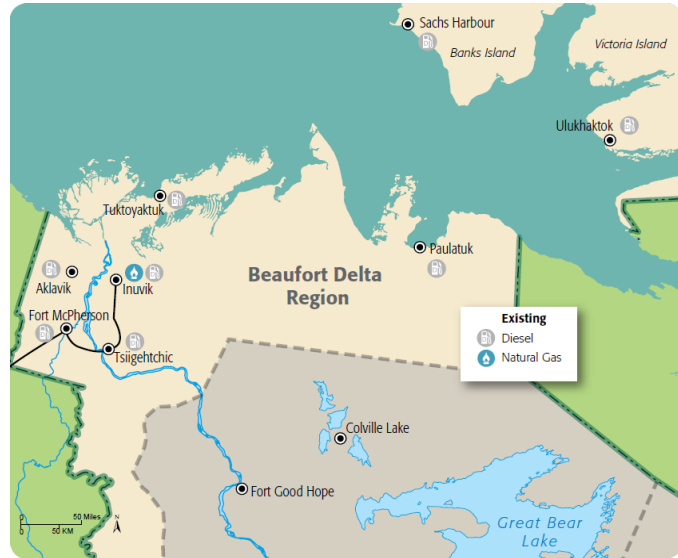
Note: Totals may not add due to rounding.

- Utility power generation fossil fuel emissions had a 30% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Inuvik had a 61.4% share of total utility power generation GHG emissions in the Beaufort Delta in 2016/17;
- Transportation fossil fuels had a 36% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Inuvik had a 64.1% share of total transport GHG emissions in the Beaufort Delta in 2016/17;
- Heating fossil fuels had a 34% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Inuvik had a 63.9% share of total heating GHG emissions in the Beaufort Delta in 2016/17.

HAMLET OF TUKTOYAKTUK

Tuktoyaktuk is located on the shores of the Arctic Ocean, at the uppermost edge of Canada. An all-season road opened on November 15, 2017. Previously Tuktoyaktuk was only accessible by air during warmer months and by ice road in the winter.

Fossil fuels from external sources (e.g., diesel and other oil fuels) are relied on for electricity generation, heating and transportation.



Source: A Vision for the NWT Power System Plan (December 2013)

EXISTING GRID SYSTEM

With regard to electricity generation, Tuktoyaktuk is one of 20 thermal rate zone communities served by NTPC.¹ Similar to other Beaufort Delta communities, there is no transmission connection between Tuktoyaktuk and any other communities. Consequently, it has its own isolated diesel power plant.

In order to ensure grid stability, the GNWT Net Metering Program limits the amount of intermittent renewable capacity that can be added to the isolated grid system. The current allowed intermittent renewable energy capacity for Tuktoyaktuk is reviewed in Table 1. There is currently approximately 15 kW of solar PV installed in Tuktoyaktuk under the net metering program, with 30 kW of solar projects also in the planning stage and 51 kW of currently available capacity.

Table 1: Allowed Intermittent Renewable Energy Capacity by Community (August 2019)

	Community Average Load	Intermittent Renewable Energy Capacity Allowed (kW)	Current Solar Capacity Installed (kW)		Planned Projects*	Currently Available Capacity (kW)**
			Net Metering Program	Other		
Tuktoyaktuk	481	96	15	0	30	51

* Includes solar projects in the planning stage.

** Includes all solar capacity installed whether under the Net Metering Program or not.

¹ The balance of thermal rate zone communities are served by ATCO's Northland Utilities [NUL].

2018 BEAUFORT DELTA OFF-GRID FOSSIL FUEL COSTS STUDY

In 2018, Gwich'in Council International (GCI) completed a study that reviewed fossil fuel uses, costs and GHG emissions by sector for each community in the Beaufort Delta region, and options to reduce fossil fuel uses (the "Beaufort Delta Off-Grid Fossil Fuel Costs Study" or "2018 Beaufort Delta Study"). While there were limitations with regard to transportation and heating fuel uses in certain communities, the study provides a basis for understanding fossil fuel uses in the electricity, heating and transportation sectors across the Beaufort Delta.

The Tuktoyaktuk Community Energy Profile summarizes the information currently available from the 2018 Beaufort Delta Study. It is expected that this information will be updated and refined as part of the update work to be undertaken in winter 2020.

Overall fossil fuel use by sector for Beaufort Delta communities is summarized in Figure 1.

Figure 1: Total Fossil Fuel Use by Community and By Sector

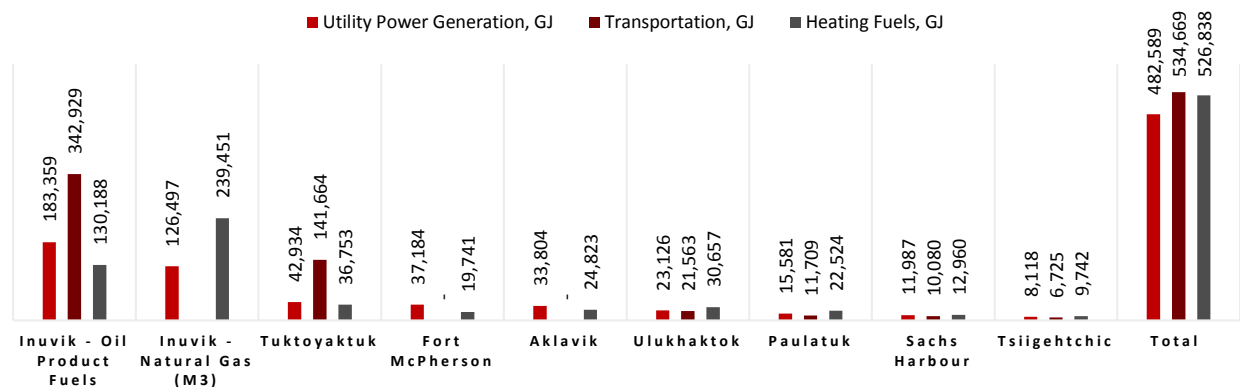


Figure 1 notes as follows regarding Tuktoyaktuk fossil fuel use:

- Fossil fuel use related to utility power generation (42,934 GJ) is 8.9% of total utility power generation fossil fuel use in the Beaufort Delta.
- Fossil fuel use related to the transportation sector (141,664 GJ) is about 26.5% of total heating fuel fossil use in the Beaufort Delta.²
- Fossil fuel use related to heating fuels (36,753 GJ) is about 7.0% of total heating fuel fossil use in the Beaufort Delta.³

The sections that follow summarize available information regarding Tuktoyaktuk fossil fuel uses compared to overall Beaufort Delta fuel uses for each energy sector.

² Transportation fossil fuel volumes in the 2018 Beaufort Delta Study were based on GNWT fuel tax data. The GNWT provided fuel tax data for the "Inuvik Region" consisting of Inuvik, Fort McPherson and Aklavik. This data was only available for these communities at the Inuvik Region level, and separate information by community was not available. This data also did not include territory-wide suppliers that also supply the Beaufort Delta region (Petro-Can, Esso and Shell).

³ Total supply of heating oil for private use for the Inuvik Region in the 2018 Beaufort Delta Study was estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to the communities of Inuvik, Fort McPherson and Aklavik. No breakdown by community was available. More accurate heating fuel consumption information was only available for communities supplied by GNWT Fuel Services (Sachs Harbour, Tsiigehtchic, Paulatuk and Ulukhaktok).

ELECTRICITY FOSSIL FUEL USE

NTPC 2016/17 GRA fossil fuel electricity volumes for Beaufort Delta Region Communities accounted for approximately:

- **57%** of forecast 2016/17 NTPC thermal zone diesel fuel use (16.1 million litres); and
- **60%** of forecast 2016/17 thermal zone fossil fuel generation (including natural gas generation).

Diesel generation for all eight Beaufort Delta communities is summarized in Figure 2 and Table 2 – Tuktoyaktuk makes up about 9.2% of total thermal generation (MWh) in Beaufort Delta communities; and 12.1% of litres of diesel fuel used.

Figure 2: Total Generation in Beaufort Delta Communities (MWh) (2016/17)

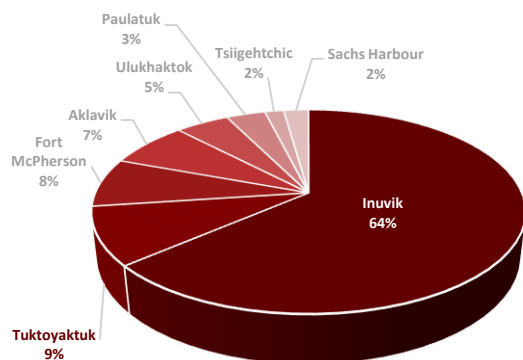


Table 2: Summary of Fossil Fuel Generation for Beaufort Delta Communities (2016/17)

	Fossil Fuel Generation (MWh)	Required Diesel Fuel (000 litres)	Required Natural Gas (m ³)
Inuvik	28,363	4,740	3,397
Tuktoyaktuk	4,096	1,110	
Fort McPherson	3,451	961	
Aklavik	3,216	874	
Ulukhaktok	2,134	598	
Paulatuk	1,547	403	
Sachs Harbour	986	310	
Tsiigehtchic	747	210	
Total	44,540	9,206	3,397

ELECTRICITY FOSSIL FUEL COSTS

Total utility fossil fuel generation costs are made up of fuel and non-fuel costs. Total forecast 2016/17 generation costs for all Beaufort Delta communities were about \$27.7 million. As summarized in Table 3:

- Tuktoyaktuk made up 8.7% of total generation fuel costs, and 9.2% of total non-fuel costs.
- Tuktoyaktuk made up about 9.0% of total utility costs.

Table 3: Comparison of Fossil Fuel Generation Costs (\$000) (2016/17)

	Tuktoyaktuk	Beaufort Delta
Total Thermal Generation Fossil Fuel Cost	1,198	13,718
Total Non-Fuel Costs	1,283	13,953
Total Utility Costs	2,481	27,671

Total 2016/17 NTPC costs for fossil fuel generation in Beaufort Delta Communities is about \$0.64/kWh for diesel fuel use, and \$0.58/kWh for natural gas use.

Table 4 summarizes the total utility cost per kWh for Tuktoyaktuk.

- Average Tuktoyaktuk diesel fuel use accounts for \$0.29/kWh.
- Non-fuel O&M and overhaul costs are about \$0.17/kWh.
- Capital costs are about \$0.15/kWh (includes depreciation and return on rate base for existing facilities).

Table 4: Total Utility Cost (\$/kWh) (2016/17): Tuktoyaktuk and Beaufort Delta Communities

	Tuktoyaktuk	Beaufort Delta Average Diesel Cost
Cost/Unit of Generation	\$0.29	\$0.31
Overhaul Cost	\$0.05	\$0.05
Non-Fuel O&M	\$0.12	\$0.12
Capital	\$0.15	\$0.15
Total Utility Cost	\$0.61	\$0.62

TRANSPORTATION FOSSIL FUEL USE

Fossil fuel volumes summarized from the 2018 Beaufort Delta Study are provided below.

Figure 3 summarizes total transportation fossil fuel use for Tuktoyaktuk and the Beaufort Delta. Total 2016 estimated transportation fossil fuel use in Beaufort Delta region communities included 14.6 million litres of diesel fuel, gasoline and aviation fuel.

Figure 3: Summary of Transportation Fossil Fuel Use for Tuktoyaktuk and Beaufort Delta Region Communities - 2016

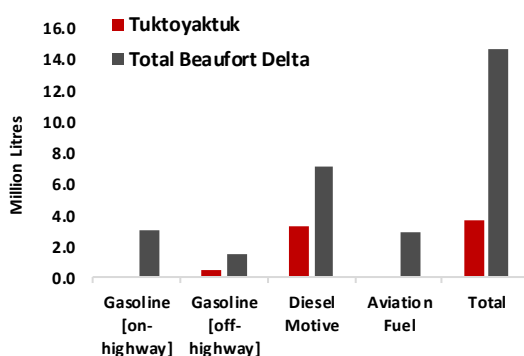


Table 5 summarizes available information for total transportation fuel use (litres); and total costs for all Beaufort Delta communities. This shows Tuktoyaktuk transportation fuel use as 25% of total Beaufort Delta litres. About 12% of Tuktoyaktuk transportation fuel use relates to off highway gasoline; and about 88% relates to diesel motive.

Table 5: Transportation Fuel Use in Tuktoyaktuk & Beaufort Delta Communities

	Tuktoyaktuk, Litres	Beaufort Delta, Litres	Total Fuel Cost (\$000)
Gasoline [on highway]	N/A	3,060,129	3,730
Gasoline [off highway]	437,353	1,532,837	1,747
Diesel Motive	3,270,564	7,159,708	8,503
Aviation Fuel	N/A	2,839,760	3,220
Total	3,707,917	14,592,434	17,200

HEATING FOSSIL FUEL USE

Heating fuel use and costs summarized from the 2018 Beaufort Delta Study are provided in Tables 6 and 7. Table 7 summarizes estimated 2018 Beaufort Delta Study heating fuel oil costs. This includes estimated private use as well as Housing Corporation and for GNWT properties use based on information made available for the Beaufort Delta Study.

- Tuktoyaktuk make up 13% of total Beaufort Delta heating fuel oil (litres) and 7% of related costs.
- Housing Corporation use makes up 56% of Tuktoyaktuk heating fuel oil use and related costs.
- Estimated Private use is 29% of Tuktoyaktuk heating fuel use and related costs; and
- GNWT Properties is 16% of Tuktoyaktuk heating fuel use and related costs.

Table 6: Heating Fuel Oil Use (litres): Tuktoyaktuk & Beaufort Delta

	Tuktoyaktuk	Beaufort Delta Communities
Housing Corporation (litres)	557,732	2,133,649
Estimated Private Use (litres)	286,300	3,820,547
GNWT Properties (litres)	156,870	1,872,268
<i>Other Heating Fuel [GJ]</i>		
Propane		10,283
Natural Gas		229,167
Pellets		318
Total Heating Fuel Oil (Litres)	1,000,903	7,826,464
<i>Total Other (GJ)</i>		239,769

Note: Totals may not add due to rounding.

Table 7: Heating Fuel Costs (\$): Tuktoyaktuk & Beaufort Delta Communities

	Tuktoyaktuk	Beaufort Delta Communities
Housing Corporation	810,913	3,993,000
Estimated Private Use	416,266	11,906,545
GNWT Properties		
Heating Oil	228,081	2,674,755
Propane		421,617
Natural Gas		875,240
Pellets		11,804
Total	1,455,261	19,882,960

Note: Totals may not add due to rounding.

GREENHOUSE GAS (GHG) EMISSIONS

Total greenhouse gas (GHG) emissions for Tuktoyaktuk and other Beaufort Delta Communities are summarized in Figure 4 and Table 8.

Based on data available from the Beaufort Delta Study, Tuktoyaktuk produced about 15,809 tonnes/year of GHG emissions in the 2016/17 period. This was an approximate 15% share of total Beaufort Delta GHG emissions.

Figure 4: 2016 Total GHG Emissions by Community (tonnes/year)

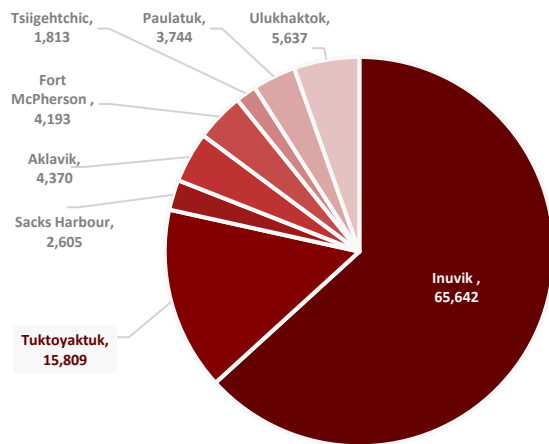


Table 8: Share of GHG Emissions by Community (2016/17)

Community	GHG Emissions (tonnes/yr)	Share of Total GHG Emissions
Inuvik	65,642	63%
Tuktoyaktuk	15,809	15%
Ulukhaktok	5,637	5%
Aklavik	4,370	4%
Fort McPherson	4,193	4%
Paulatuk	3,744	4%
Sachs Harbour	2,605	3%
Tsiigehtchic	1,813	2%
Total	103,814	

Note: Totals may not add due to rounding.

Figure 5 and Table 9 summarize the share of GHG emissions by sector for Tuktoyaktuk and for total Beaufort Delta communities.

Figure 5: GHG emissions by Sector: Tuktoyaktuk and Beaufort Delta Communities (tonnes/year)

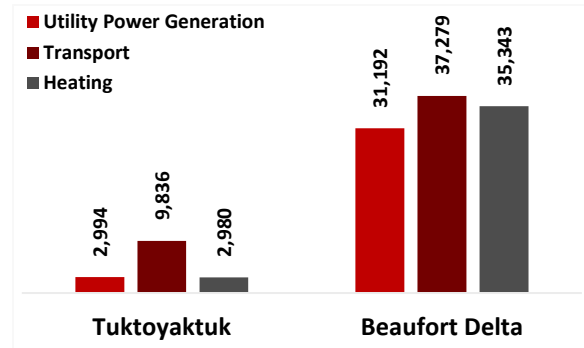


Table 9: GHGs by Sector (tonnes/year): Tuktoyaktuk and Beaufort Delta Communities

	Tuktoyaktuk	Beaufort Delta
Utility Power Generation	2,994	31,192
Transportation	9,836	37,279
Heating	2,980	35,343
Total	15,809	103,814

Note: Totals may not add due to rounding.

- Utility power generation fossil fuel emissions had a 30% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Tuktoyaktuk had a 9.6% share of total utility power generation GHG emissions in the Beaufort Delta in 2016/17;
- Transportation fossil fuels had a 36% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Tuktoyaktuk had a 26.4% share of total transport GHG emissions in the Beaufort Delta in 2016/17;
- Heating fossil fuels had a 34% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Tuktoyaktuk had a 8.4% share of total heating GHG emissions in the Beaufort Delta in 2016/17.

HAMLET OF PAULATUK

Paulatuk is located on the shores of the Beaufort Sea. It is not accessible by road, but is accessible by air year round. In the summer an annual sealift is provided.

Fossil fuels from external sources (e.g., diesel and other oil fuels) are relied on for electricity generation, heating and transportation.



Source: A Vision for the NWT Power System Plan (December 2013)

EXISTING GRID SYSTEM

With regard to electricity generation, Paulatuk is one of 20 thermal rate zone communities served by NTPC.¹ Similar to other Beaufort Delta communities, there is no transmission connection between Paulatuk and any other communities. Consequently, it has its own isolated diesel power plant.

In order to ensure grid stability, the GNWT Net Metering Program limits the amount of intermittent renewable capacity that can be added to the isolated grid system. The current allowed intermittent renewable energy capacity for Paulatuk is reviewed in Table 1. There is currently 15 kW of solar installed under the GNWT Net Metering Program and 7 kW of Solar PV capacity designated as “other”. With 16 kW of renewable energy is in the planning stage of development – the maximum allowable renewable energy capacity for the Paulatuk has been met.

Table 1: Allowed Intermittent Renewable Energy Capacity by Community (August 2019)

	Community Average Load	Intermittent Renewable Energy Capacity Allowed (kW)	Current Solar Capacity Installed (kW)		Planned Projects*	Currently Available Capacity (kW)**
			Net Metering Program	Other		
Paulatuk	166	33	15	7	16	0

* Includes solar projects in the planning stage.

** Includes all solar capacity installed whether under the Net Metering Program or not.

¹ The balance of thermal rate zone communities are served by ATCO’s Northland Utilities [NUL].

2018 BEAUFORT DELTA OFF-GRID FOSSIL FUEL COSTS STUDY

In 2018, Gwich'in Council International (GCI) completed a study that reviewed fossil fuel uses, costs and GHG emissions by sector for each community in the Beaufort Delta region, and options to reduce fossil fuel uses (the "Beaufort Delta Off-Grid Fossil Fuel Costs Study" or "2018 Beaufort Delta Study"). While there were limitations with regard to transportation and heating fuel uses in certain communities, the study provides a basis for understanding fossil fuel uses in the electricity, heating and transportation sectors across the Beaufort Delta.

The Paulatuk Community Energy Profile summarizes the information currently available from the 2018 Beaufort Delta Study. It is expected that this information will be updated and refined as part of the update work to be undertaken in winter 2020.

Overall fossil fuel use by sector for Beaufort Delta communities is summarized in Figure 1.

Figure 1: Total Fossil Fuel Use by Community and By Sector

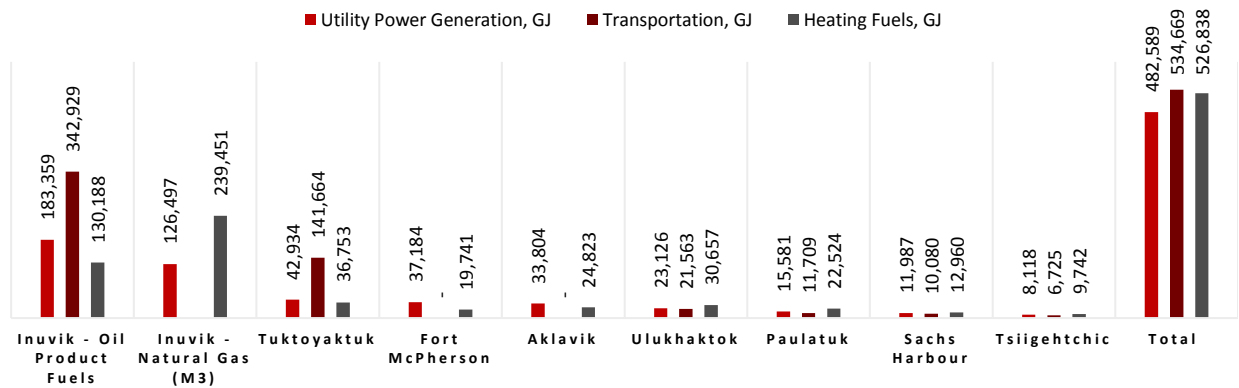


Figure 1 notes as follows regarding Paulatuk fossil fuel use:

- Fossil fuel use related to utility power generation (15,581 GJ) is 3.2% of total utility power generation fossil fuel use in the Beaufort Delta.
- Fossil fuel use related to the transportation sector (11,709 GJ) is about 2.2% of total heating fuel fossil use in the Beaufort Delta.²
- Fossil fuel use related to heating fuels (22,524 GJ) is about 4.3% of total heating fuel fossil use in the Beaufort Delta.³

The sections that follow summarize available information regarding Paulatuk fossil fuel uses compared to overall Beaufort Delta fuel uses for each energy sector.

² Transportation fossil fuel volumes in the 2018 Beaufort Delta Study were based on GNWT fuel tax data. The GNWT provided fuel tax data for the "Inuvik Region" consisting of Inuvik, Fort McPherson and Aklavik. This data was only available for these communities at the Inuvik Region level, and separate information by community was not available. This data also did not include territory-wide suppliers that also supply the Beaufort Delta region (Petro-Can, Esso and Shell).

³ Total supply of heating oil for private use for the Inuvik Region in the 2018 Beaufort Delta Study was estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to the communities of Inuvik, Fort McPherson and Aklavik. No breakdown by community was available. More accurate heating fuel consumption information was only available for communities supplied by GNWT Fuel Services (Sachs Harbour, Tsiigehtchic, Paulatuk and Ulukhaktok).

ELECTRICITY FOSSIL FUEL USE

NTPC 2016/17 GRA fossil fuel electricity volumes for Beaufort Delta Region Communities accounted for approximately:

- **57%** of forecast 2016/17 NTPC thermal zone diesel fuel use (16.1 million litres); and
- **60%** of forecast 2016/17 thermal zone fossil fuel generation (including natural gas generation).

Diesel generation for all eight Beaufort Delta communities is summarized in Figure 2 and Table 2 – Paulatuk makes up about 3.5% of total thermal generation (MWh) in Beaufort Delta communities; and 4.4% of litres of diesel fuel used.

Figure 2: Total Generation in Beaufort Delta Communities (MWh) (2016/17)

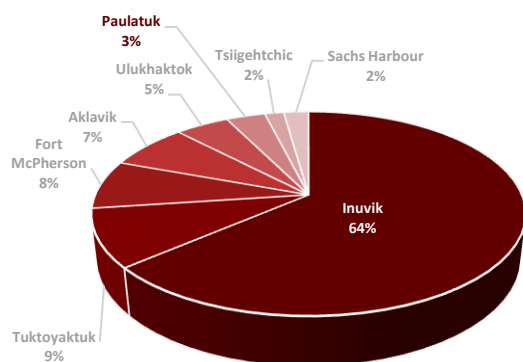


Table 2: Summary of Fossil Fuel Generation for Beaufort Delta Communities (2016/17)

	Fossil Fuel Generation (MWh)	Required Diesel Fuel (000 litres)	Required Natural Gas (m ³)
Inuvik	28,363	4,740	3,397
Tuktoyaktuk	4,096	1,110	
Fort McPherson	3,451	961	
Aklavik	3,216	874	
Ulukhaktok	2,134	598	
Paulatuk	1,547	403	
Sachs Harbour	986	310	
Tsiigehtchic	747	210	
Total	44,540	9,206	3,397

ELECTRICITY FOSSIL FUEL COSTS

Total utility fossil fuel generation costs are made up of fuel and non-fuel costs. Total forecast 2016/17 generation costs for all Beaufort Delta communities were about \$27.7 million. As summarized in Table 3:

- Paulatuk made up 3.5% of total generation fuel costs, and 3.5% of total non-fuel costs.
- Paulatuk made up about 3.5% of total utility costs.

Table 3: Comparison of Fossil Fuel Generation Costs (\$000) (2016/17)

	Paulatuk	Beaufort Delta
Total Thermal Generation Fossil Fuel Cost	477	13,718
Total Non-Fuel Costs	485	13,953
Total Utility Costs	961	27,671

Total 2016/17 NTPC costs for fossil fuel generation in Beaufort Delta Communities is about \$0.64/kWh for diesel fuel use, and \$0.58/kWh for natural gas use.

Table 4 summarizes the total utility cost per kWh for Paulatuk.

- Average Paulatuk diesel fuel use accounts for \$0.31/kWh.
- Non-fuel O&M and overhaul costs are about \$0.17/kWh.
- Capital costs are about \$0.15/kWh (includes depreciation and return on rate base for existing facilities).

Table 4: Total Utility Cost (\$/kWh) (2016/17): Paulatuk and Beaufort Delta Communities

	Paulatuk	Beaufort Delta Average Diesel Cost
Cost/Unit of Generation	\$0.31	\$0.31
Overhaul Cost	\$0.05	\$0.05
Non-Fuel O&M	\$0.12	\$0.12
Capital	\$0.15	\$0.15
Total Utility Cost	\$0.62	\$0.62

Note: Totals may not add due to rounding.

TRANSPORTATION FOSSIL FUEL USE

Fossil fuel volumes summarized from the 2018 Beaufort Delta Study are provided below.

Figure 3 summarizes total transportation fossil fuel use in Paulatuk. Total 2016 estimated transportation fossil fuel use in Paulatuk included 0.3 million litres of diesel fuel, gasoline and aviation fuel.

Figure 3: Summary of Transportation Fossil Fuel Use for Paulatuk - 2016

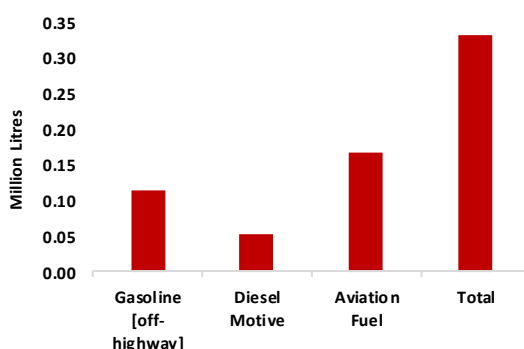


Table 5 summarizes available information for total transportation fuel use (litres); and total costs for all Beaufort Delta communities. This shows Paulatuk transportation fuel use as 2% of total Beaufort Delta litres. About 34% of total Paulatuk transportation fuel relates to off highway gasoline; about 16% relates to diesel motive; and about 50% to relates to aviation fuel.

Table 5: Transportation Fuel Use in Paulatuk & Beaufort Delta Communities

	Paulatuk, Litres	Beaufort Delta, Litres	Total Fuel Cost (\$000)
Gasoline [on highway]	N/A	3,060,129	3,730
Gasoline [off highway]	113,574	1,532,837	1,747
Diesel Motive	51,707	7,159,708	8,503
Aviation Fuel	166,346	2,839,760	3,220
Total	331,627	14,592,434	17,200

HEATING FOSSIL FUEL USE

Heating fuel use and costs summarized from the 2018 Beaufort Delta Study are provided in Tables 6 and 7. Table 7 summarizes estimated 2018 Beaufort Delta Study heating fuel oil costs. The following is noted regarding heating fuel oil use in Paulatuk:

- Paulatuk makes up 8% of total Beaufort Delta heating oil (litres); and 4% of related costs.
- Housing Corporation use makes up 45% of total Paulatuk fuel use litres; and related costs
- Estimated Private Use makes up 43% of total Paulatuk fuel use litres; and related costs
- GNWT Properties make up 11% of total Paulatuk fuel use liters; and related costs

Table 6: Heating Fuel Oil Use (litres): Paulatuk & Beaufort Delta

	Paulatuk	Beaufort Delta Communities
Housing Corporation (litres)	278,537	2,133,649
Estimated Private Use (litres)	265,325	3,820,547
GNWT Properties (litres)	69,526	1,872,268
<i>Other Heating Fuel [GJ]</i>		
Propane		10,283
Natural Gas		229,167
Pellets		318
Total Heating Fuel Oil (Litres)	613,389	7,826,464
<i>Total Other (GJ)</i>		239,769

Note: Totals may not add due to rounding.

Table 7: Heating Fuel Costs (\$): Paulatuk & Beaufort Delta Communities

	Paulatuk	Beaufort Delta Communities
Housing Corporation	378,641	3,993,000
Estimated Private Use	360,682	11,906,545
GNWT Properties		
Heating Oil	94,513	2,674,755
Propane		421,617
Natural Gas		875,240
Pellets		11,804
Total	833,836	19,882,960

Note: Totals may not add due to rounding.

GREENHOUSE GAS (GHG) EMISSIONS

Total greenhouse gas (GHG) emissions for Paulatuk and other Beaufort Delta Communities are summarized in Figure 4 and Table 8.

Based on data available from the Beaufort Delta Study, Paulatuk produced about 3,744 tonnes/year of GHG emissions in the 2016/17 period. This was an approximate 4% share of total Beaufort Delta GHG emissions.

Figure 4: 2016 Total GHG Emissions by Community (tonnes/year)

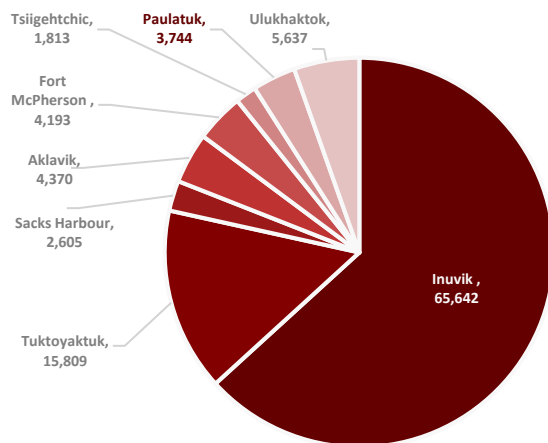


Table 8: Share of GHG Emissions by Community (2016/17)

Community	GHG Emissions (tonnes/yr)	Share of Total GHG Emissions
Inuvik	65,642	63%
Tuktoyaktuk	15,809	15%
Ulukhaktok	5,637	5%
Aklavik	4,370	4%
Fort McPherson	4,193	4%
Paulatuk	3,744	4%
Sachs Harbour	2,605	3%
Tsiigehtchic	1,813	2%
Total	103,814	

Note: Totals may not add due to rounding.

Figure 5 and Table 9 summarize the share of GHG emissions by sector for Paulatuk and for total Beaufort Delta communities.

Figure 5: GHG emissions by Sector: Paulatuk and Beaufort Delta Communities (tonnes/year)

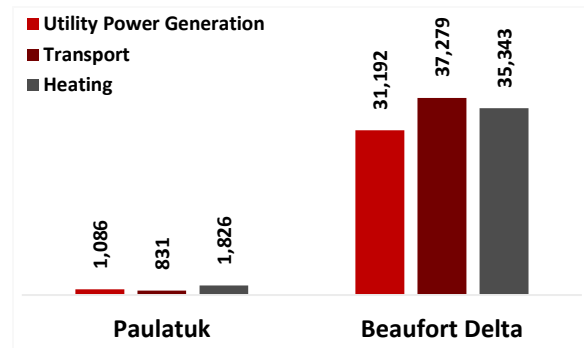


Table 9: GHGs by Sector (tonnes/year): Paulatuk and Beaufort Delta Communities

	Paulatuk	Beaufort Delta
Utility Power Generation	1,086	31,192
Transportation	831	37,279
Heating	1,826	35,343
Total	3,744	103,814

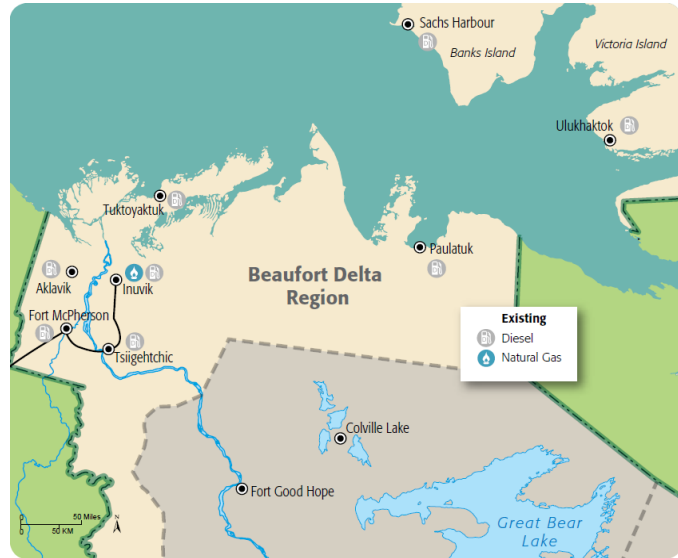
Note: Totals may not add due to rounding.

- Utility power generation fossil fuel emissions had a 30% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Paulatuk had a 3.5% share of total utility power generation GHG emissions in the Beaufort Delta in 2016/17;
- Transportation fossil fuels had a 36% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Paulatuk had a 2.2% share of total transport GHG emissions in the Beaufort Delta in 2016/17;
- Heating fossil fuels had a 34% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Paulatuk had a 5.2% share of total heating GHG emissions in the Beaufort Delta in 2016/17.

HAMLET OF SACHS HARBOUR

Sachs Harbour, located on Banks Island, is the most northern community in Northwest Territories (NWT). It is not accessible by road, but is accessible by air year round. In the summer an annual sealift is provided.

Fossil fuels from external sources (e.g., diesel and other oil fuels) are relied on for electricity generation, heating and transportation.



Source: A Vision for the NWT Power System Plan (December 2013)

EXISTING GRID SYSTEM

With regard to electricity generation, Sachs Harbour is one of 20 thermal rate zone communities served by NTPC.¹ Similar to other Beaufort Delta communities, there is no transmission connection between Sachs Harbour and any other communities. Consequently, it has its own isolated diesel power plant.

In order to ensure grid stability, the GNWT Net Metering Program limits the amount of intermittent renewable capacity that can be added to the isolated grid system. The current allowed intermittent renewable energy capacity for Sachs Harbour is reviewed in Table 1. There is 19 kW of solar currently installed in Sachs Harbour under the GNWT net metering program, and 3 kW of allowed intermittent renewable energy capacity remains available.

Table 1: Allowed Intermittent Renewable Energy Capacity by Community (August 2019)

	Community Average Load	Intermittent Renewable Energy Capacity Allowed (kW)	Current Solar Capacity Installed (kW)		Planned Projects*	Currently Available Capacity (kW)**
			Net Metering Program	Other		
Sachs Harbour	109	22	19	0	0	3

* Includes solar projects in the planning stage.

** Includes all solar capacity installed whether under the Net Metering Program or not.

¹ The balance of thermal rate zone communities are served by ATCO's Northland Utilities [NUL].

2018 BEAUFORT DELTA OFF-GRID FOSSIL FUEL COSTS STUDY

In 2018, Gwich'in Council International (GCI) completed a study that reviewed fossil fuel uses, costs and GHG emissions by sector for each community in the Beaufort Delta region, and options to reduce fossil fuel uses (the "Beaufort Delta Off-Grid Fossil Fuel Costs Study" or "2018 Beaufort Delta Study"). While there were limitations with regard to transportation and heating fuel uses in certain communities, the study provides a basis for understanding fossil fuel uses in the electricity, heating and transportation sectors across the Beaufort Delta.

The Sachs Harbour Community Energy Profile summarizes the information currently available from the 2018 Beaufort Delta Study. It is expected that this information will be updated and refined as part of the update work to be undertaken in winter 2020.

Overall fossil fuel use by sector for Beaufort Delta communities is summarized in Figure 1.

Figure 1: Total Fossil Fuel Use by Community and By Sector

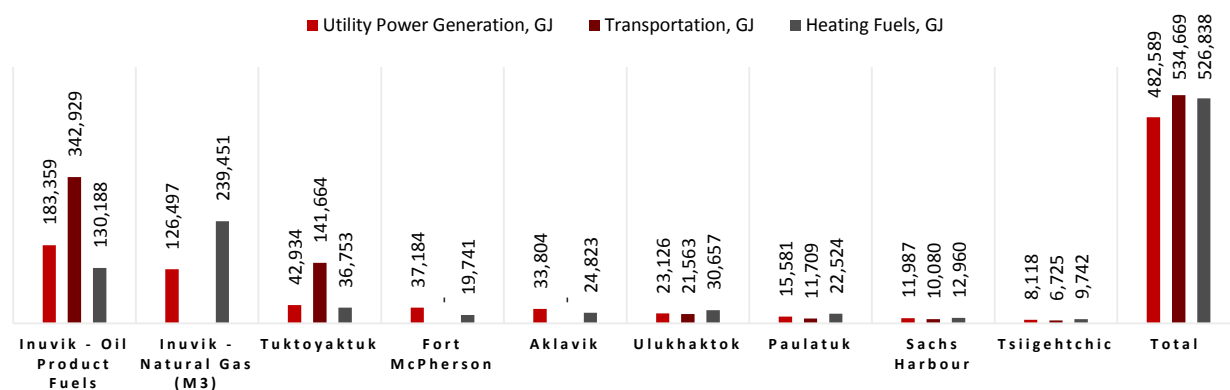


Figure 1 notes as follows regarding Sachs Harbour fossil fuel use:

- Fossil fuel use related to utility power generation (11,987 GJ) is 2.5% of total utility power generation fossil fuel use in the Beaufort Delta.
- Fossil fuel use related to the transportation sector (10,080 GJ) is about 1.9% of total heating fuel fossil use in the Beaufort Delta.²
- Fossil fuel use related to heating fuels (12,960 GJ) is about 2.5% of total heating fuel fossil use in the Beaufort Delta.³

The sections that follow summarize available information regarding Sachs Harbour fossil fuel uses compared to overall Beaufort Delta fuel uses for each energy sector.

² Transportation fossil fuel volumes in the 2018 Beaufort Delta Study were based on GNWT fuel tax data. The GNWT provided fuel tax data for the "Inuvik Region" consisting of Inuvik, Fort McPherson and Aklavik. This data was only available for these communities at the Inuvik Region level, and separate information by community was not available. This data also did not include territory-wide suppliers that also supply the Beaufort Delta region (Petro-Can, Esso and Shell).

³ Total supply of heating oil for private use for the Inuvik Region in the 2018 Beaufort Delta Study was estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to the communities of Inuvik, Fort McPherson and Aklavik. No breakdown by community was available. More accurate heating fuel consumption information was only available for communities supplied by GNWT Fuel Services (Sachs Harbour, Tsiigehtchic, Paulatuk and Ulukaktok).

ELECTRICITY FOSSIL FUEL USE

NTPC 2016/17 GRA fossil fuel electricity volumes for Beaufort Delta Region Communities accounted for approximately:

- **57%** of forecast 2016/17 NTPC thermal zone diesel fuel use (16.1 million litres); and
- **60%** of forecast 2016/17 thermal zone fossil fuel generation (including natural gas generation).

Diesel generation for all eight Beaufort Delta communities is summarized in Figure 2 and Table 2 – Sachs Harbour makes up about 2.2% of total thermal generation (MWh) in Beaufort Delta communities; and 3.4% of litres of diesel fuel used.

Figure 2: Total Generation in Beaufort Delta Communities (MWh) (2016/17)

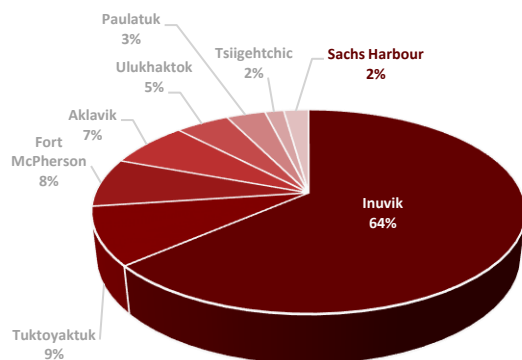


Table 2: Summary of Fossil Fuel Generation for Beaufort Delta Communities (2016/17)

	Fossil Fuel Generation (MWh)	Required Diesel Fuel (000 litres)	Required Natural Gas (m ³)
Inuvik	28,363	4,740	3,397
Tuktoyaktuk	4,096	1,110	
Fort McPherson	3,451	961	
Aklavik	3,216	874	
Ulukhaktok	2,134	598	
Paulatuk	1,547	403	
Sachs Harbour	986	310	
Tsiigehtchic	747	210	
Total	44,540	9,206	3,397

ELECTRICITY FOSSIL FUEL COSTS

Total utility fossil fuel generation costs are made up of fuel and non-fuel costs. Total forecast 2016/17 generation costs for all Beaufort Delta communities were about \$27.7 million. As summarized in Table 3:

- Sachs Harbour made up 2.5% of total generation fuel costs, and 2.2% of total non-fuel costs.
- Sachs Harbour made up about 2.3% of total utility costs.

Table 3: Comparison of Fossil Fuel Generation Costs (\$000) (2016/17)

	Sachs Harbour	Beaufort Delta
Total Thermal Generation Fossil Fuel Cost	337	13,718
Total Non-Fuel Costs	309	13,953
Total Utility Costs	646	27,671

Total 2016/17 NTPC costs for fossil fuel generation in Beaufort Delta Communities is about \$0.64/kWh for diesel fuel use, and \$0.58/kWh for natural gas use.

Table 4 summarizes the total utility cost per kWh for Sachs Harbour.

- Average Sachs Harbour diesel fuel use accounts for \$0.34/kWh.
- Non-fuel O&M and overhaul costs are about \$0.17/kWh.
- Capital costs are about \$0.15/kWh (includes depreciation and return on rate base for existing facilities).

Table 4: Total Utility Cost (\$/kWh) (2016/17): Sachs Harbour and Beaufort Delta Communities

	Sachs Harbour	Beaufort Delta Average Diesel Cost
Cost/Unit of Generation	\$0.34	\$0.31
Overhaul Cost	\$0.05	\$0.05
Non-Fuel O&M	\$0.12	\$0.12
Capital	\$0.15	\$0.15
Total Utility Cost	\$0.66	\$0.62

TRANSPORTATION FOSSIL FUEL USE

Fossil fuel volumes summarized from the 2018 Beaufort Delta Study are provided below.

Figure 3 summarizes total transportation fossil fuel use in Sachs Harbour. Total 2016 estimated transportation fossil fuel use in Sachs Harbour included 0.3 million litres of diesel fuel, gasoline and aviation fuel.

Figure 3: Summary of Transportation Fossil Fuel Use for Sachs Harbour - 2016

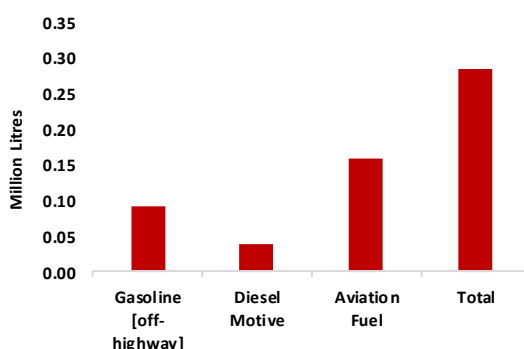


Table 5 summarizes available information for total transportation fuel use (litres); and total costs for all Beaufort Delta communities. This shows Sachs Harbour transportation fuel use as 2% of total Beaufort Delta litres. About 32% of Sachs Harbour transportation fuel use relates to gasoline [off highway]; 13% relates to diesel motive; and 55% relates to aviation fuel.

Table 5: Transportation Fuel Use in Sachs Harbour & Beaufort Delta Communities

	Sachs Harbour, Litres	Beaufort Delta, Litres	Beaufort Delta Fuel Cost (\$000)
Gasoline [on highway]	N/A	3,060,129	3,730
Gasoline [off highway]	90,504	1,532,837	1,747
Diesel Motive	37,745	7,159,708	8,503
Aviation Fuel	158,011	2,839,760	3,220
Total	286,260	14,592,434	17,200

HEATING FOSSIL FUEL USE

Heating fuel use and costs summarized from the 2018 Beaufort Delta Study are provided in Tables 6 and 7. Based on available information, the following is noted regarding Sachs Harbour heating fuel use:

- Sachs Harbour makes up 5% of total Beaufort Delta heating fuel oil (litres); and 3% of related costs.
- Housing Corporation makes up 27% of Sachs Harbour heating fuel oil use and related costs.
- Estimated Private use is 47% of Sachs Harbour heating fuel oil use and related costs.
- GNWT Properties is 26% of Sachs Harbour heating fuel oil use and related costs.

Table 6: Heating Fuel Oil Use (litres): Sachs Harbour & Beaufort Delta

	Sachs Harbour	Beaufort Delta Communities
Housing Corporation (litres)	93,880	2,133,649
Estimated Private Use (litres)	167,094	3,820,547
GNWT Properties (litres)	91,961	1,872,268
<i>Other Heating Fuel [GJ]</i>		
Propane		10,283
Natural Gas		229,167
Pellets		318
Total Heating Fuel Oil (Litres)	352,935	7,826,464
<i>Total Other (GJ)</i>		239,769

Note: Totals may not add due to rounding.

Table 7: Heating Fuel Costs (\$): Sachs Harbour & Beaufort Delta Communities

	Sachs Harbour	Beaufort Delta Communities
Housing Corporation	141,327	3,993,000
Estimated Private Use	251,544	11,906,545
GNWT Properties		
Heating Oil	138,439	2,674,755
Propane		421,617
Natural Gas		875,240
Pellets		11,804
Total	531,309	19,882,960

Note: Totals may not add due to rounding.

GREENHOUSE GAS (GHG) EMISSIONS

Total greenhouse gas (GHG) emissions for Sachs Harbour and other Beaufort Delta Communities are summarized in Figure 4 and Table 8.

Based on data available from the Beaufort Delta Study, Sachs Harbour produced about 2,605 tonnes/year of GHG emissions in the 2016/17 period. This was an approximate 3% share of total Beaufort Delta GHG emissions.

Figure 4: 2016 Total GHG Emissions by Community (tonnes/year)

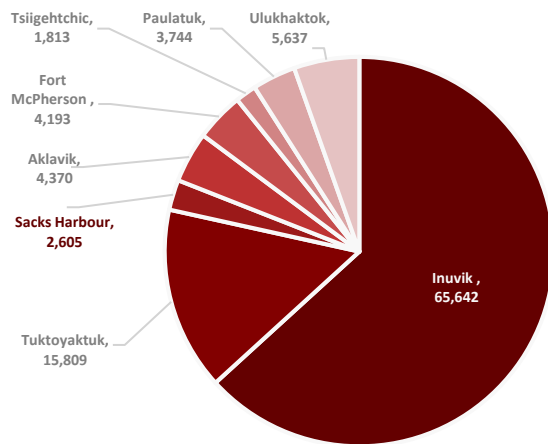


Table 8: Share of GHG Emissions by Community (2016/17)

Community	GHG Emissions (tonnes/yr)	Share of Total GHG Emissions
Inuvik	65,642	63%
Tuktoyaktuk	15,809	15%
Uluhaktok	5,637	5%
Aklavik	4,370	4%
Fort McPherson	4,193	4%
Paulatuk	3,744	4%
Sachs Harbour	2,605	3%
Tsiigehtchic	1,813	2%
Total	103,814	

Note: Totals may not add due to rounding.

Figure 5 and Table 9 summarize the share of GHG emissions by sector for Sachs Harbour and for total Beaufort Delta communities.

Figure 5: GHG emissions by Sector: Sachs Harbour and Beaufort Delta Communities (tonnes/year)

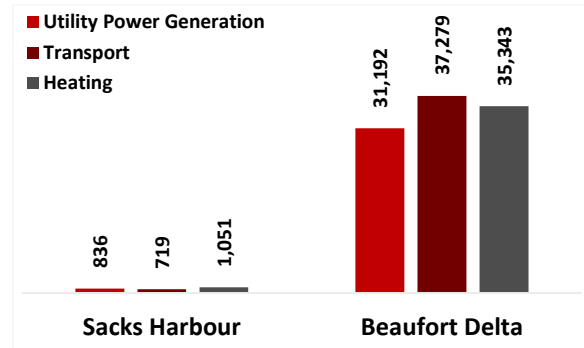


Table 9: GHGs by Sector (tonnes/year): Sachs Harbour and Beaufort Delta Communities

	Sachs Harbour	Beaufort Delta
Utility Power Generation	836	31,192
Transportation	719	37,279
Heating	1,051	35,343
Total	2,605	103,814

Note: Totals may not add due to rounding.

- Utility power generation fossil fuel emissions had a 30% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Sachs Harbour had a 2.7% share of total utility power generation GHG emissions in the Beaufort Delta in 2016/17;
- Transportation fossil fuels had a 36% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Sachs Harbour had a 1.9% share of total transport GHG emissions in the Beaufort Delta in 2016/17;
- Heating fossil fuels had a 34% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Sachs Harbour had a 3.0% share of total heating GHG emissions in the Beaufort Delta in 2016/17.

COMMUNITY OF TSIIGEHTCHIC

Tsiigehtchic is located at the confluence of the Mackenzie and the Arctic Red Rivers. It is accessible by road most of the year, with the exception of spring break-up and fall freeze-up in the Peel River and the Mackenzie River.

Fossil fuels from external sources (e.g., diesel and other oil fuels) are relied on for electricity generation, heating and transportation.



Source: A Vision for the NWT Power System Plan (December 2013)

EXISTING GRID SYSTEM

With regard to electricity generation, Tsiigehtchic is one of 20 thermal rate zone communities served by NTPC.¹ Similar to other Beaufort Delta communities, there is no transmission connection between Tsiigehtchic and any other communities. Consequently, it has its own isolated diesel power plant.

In order to ensure grid stability, the GNWT Net Metering Program limits the amount of intermittent renewable capacity that can be added to the isolated grid system. The current allowed intermittent renewable energy capacity for Tsiigehtchic is reviewed in Table 1. Tsiigehtchic does not appear to have solar PV or other renewable energy capacity sources planned or installed at this time and has 18 kW of intermittent renewable energy capacity available.

Table 1: Allowed Intermittent Renewable Energy Capacity by Community (August 2019)

	Community Average Load	Intermittent Renewable Energy Capacity Allowed (kW)	Current Solar Capacity Installed (kW)		Planned Projects*	Currently Available Capacity (kW)**
			Net Metering Program	Other		
Tsiigehtchic	89	18	0	0	0	18

* Includes solar projects in the planning stage.

** Includes all solar capacity installed whether under the Net Metering Program or not.

¹ The balance of thermal rate zone communities are served by ATCO's Northland Utilities [NUL].

2018 BEAUFORT DELTA OFF-GRID FOSSIL FUEL COSTS STUDY

In 2018, Gwich'in Council International (GCI) completed a study that reviewed fossil fuel uses, costs and GHG emissions by sector for each community in the Beaufort Delta region, and options to reduce fossil fuel uses (the "Beaufort Delta Off-Grid Fossil Fuel Costs Study" or "2018 Beaufort Delta Study"). While there were limitations with regard to transportation and heating fuel uses in certain communities, the study provides a basis for understanding fossil fuel uses in the electricity, heating and transportation sectors across the Beaufort Delta.

The Tsiigehtchic Community Energy Profile summarizes the information currently available from the 2018 Beaufort Delta Study. It is expected that this information will be updated and refined as part of the update work to be undertaken in winter 2020.

Overall fossil fuel use by sector for Beaufort Delta communities is summarized in Figure 1.

Figure 1: Total Fossil Fuel Use by Community and By Sector

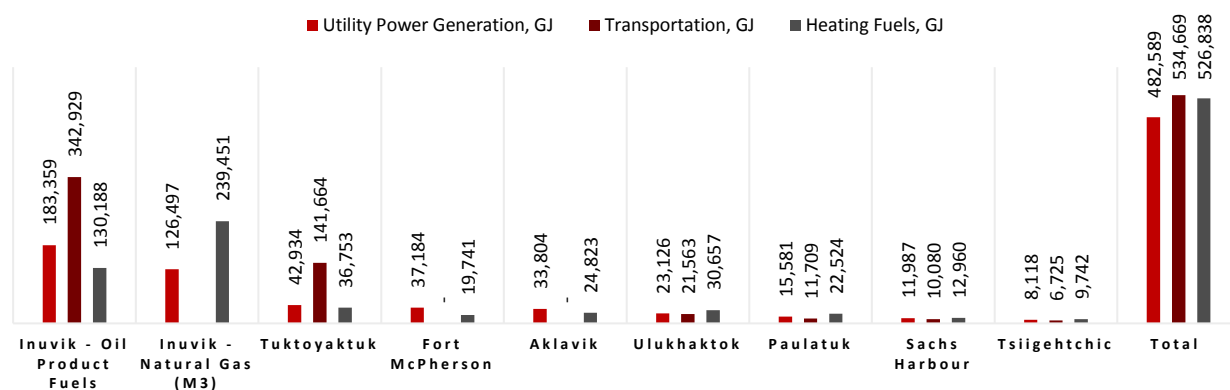


Figure 1 notes as follows regarding Tsiigehtchic fossil fuel use:

- Fossil fuel use related to utility power generation (8,118 GJ) is 1.7% of total utility power generation fossil fuel use in the Beaufort Delta.
- Fossil fuel use related to the transportation sector (6,725 GJ) is 1.3% of total utility power generation fossil fuel use in the Beaufort Delta.²
- Fossil fuel use related to heating fuels (9,742 GJ) is about 1.8% of total heating fuel fossil use in the Beaufort Delta.³

The sections that follow summarize available information regarding Tsiigehtchic fossil fuel uses compared to overall Beaufort Delta fuel uses for each energy sector.

² Transportation fossil fuel volumes in the 2018 Beaufort Delta Study were based on GNWT fuel tax data. The GNWT provided fuel tax data for the "Inuvik Region" consisting of Inuvik, Fort McPherson and Aklavik. This data was only available for these communities at the Inuvik Region level, and separate information by community was not available. This data also did not include territory-wide suppliers that also supply the Beaufort Delta region (Petro-Can, Esso and Shell).

³ Total supply of heating oil for private use for the Inuvik Region in the 2018 Beaufort Delta Study was estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to the communities of Inuvik, Fort McPherson and Aklavik. No breakdown by community was available. More accurate heating fuel consumption information was only available for communities supplied by GNWT Fuel Services (Sachs Harbour, Tsiigehtchic, Paulatuk and Ulukhaktok).

ELECTRICITY FOSSIL FUEL USE

NTPC 2016/17 GRA fossil fuel electricity volumes for Beaufort Delta Region Communities accounted for approximately:

- **57%** of forecast 2016/17 NTPC thermal zone diesel fuel use (16.1 million litres); and
- **60%** of forecast 2016/17 thermal zone fossil fuel generation (including natural gas generation).

Diesel generation for all eight Beaufort Delta communities is summarized in Figure 2 and Table 2 – Tsiigehtchic makes up about 1.7% of total thermal generation (MWh) in Beaufort Delta communities; and 2.3% of litres of diesel fuel used.

Figure 2: Total Generation in Beaufort Delta Communities (MWh) (2016/17)

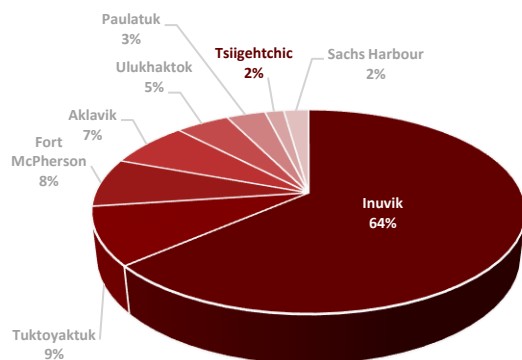


Table 2: Summary of Fossil Fuel Generation for Beaufort Delta Communities (2016/17)

	Fossil Fuel Generation (MWh)	Required Diesel Fuel (000 litres)	Required Natural Gas (m ³)
Inuvik	28,363	4,740	3,397
Tuktoyaktuk	4,096	1,110	
Fort McPherson	3,451	961	
Aklavik	3,216	874	
Ulukhaktok	2,134	598	
Paulatuk	1,547	403	
Sachs Harbour	986	310	
Tsiigehtchic	747	210	
Total	44,540	9,206	3,397

ELECTRICITY FOSSIL FUEL COSTS

Total utility fossil fuel generation costs are made up of fuel and non-fuel costs. Total forecast 2016/17 generation costs for all Beaufort Delta communities were about \$27.7 million. As summarized in Table 3:

- Tsiigehtchic made up 1.9% of total generation fuel costs, and 1.7% of total non-fuel costs.
- Tsiigehtchic made up about 1.8% of total utility costs.

Table 3: Comparison of Fossil Fuel Generation Costs (\$000) (2016/17)

	Tsiigehtchic	Beaufort Delta
Total Thermal Generation Fossil Fuel Cost	256	13,718
Total Non-Fuel Costs	234	13,953
Total Utility Costs	490	27,671

Total 2016/17 NTPC costs for fossil fuel generation in Beaufort Delta Communities is about \$0.64/kWh for diesel fuel use, and \$0.58/kWh for natural gas use.

Table 4 summarizes the total utility cost per kWh for Tsiigehtchic.

- Average Tsiigehtchic diesel fuel use accounts for \$0.34/kWh.
- Non-fuel O&M and overhaul costs are about \$0.17/kWh.
- Capital costs are about \$0.15/kWh (includes depreciation and return on rate base for existing facilities).

Table 4: Total Utility Cost (\$/kWh) (2016/17): Tsiigehtchic and Beaufort Delta Communities

	Tsiigehtchic	Beaufort Delta Average Diesel Cost
Cost/Unit of Generation	\$0.34	\$0.31
Overhaul Cost	\$0.05	\$0.05
Non-Fuel O&M	\$0.12	\$0.12
Capital	\$0.15	\$0.15
Total Utility Cost	\$0.66	\$0.62

TRANSPORTATION FOSSIL FUEL USE

Fossil fuel volumes summarized from the 2018 Beaufort Delta Study are provided below.

Figure 3 summarizes total transportation fossil fuel use in Tsiigehtchic. Total 2016 estimated transportation fossil fuel use in Tsiigehtchic included 0.2 million litres of diesel fuel and gasoline.

Figure 3: Summary of Transportation Fossil Fuel Use for Tsiigehtchic - 2016

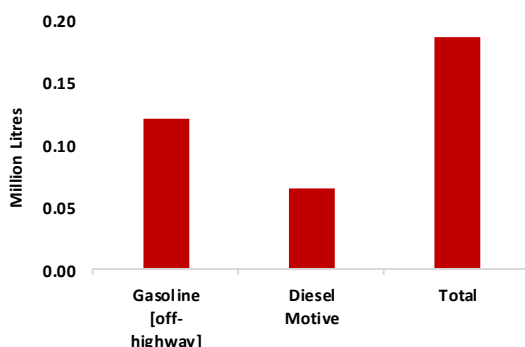


Table 5 summarizes available information for total transportation fuel use (litres); and total costs for all Beaufort Delta communities.

Table 5 shows Tsiigehtchic transportation fuel use as 1% of total Beaufort Delta litres. About 65% of this transportation use relates to gasoline (off highway); and 35% relates to diesel motive.

Table 5: Transportation Fuel Use in Tsiigehtchic & Beaufort Delta Communities

	Tsiigehtchic, Litres	Beaufort Delta, Litres	Total Fuel Cost (\$000)
Gasoline [on highway]	N/A	3,060,129	3,730
Gasoline [off highway]	122,023	1,532,837	1,747
Diesel Motive	64,511	7,159,708	8,503
Aviation Fuel	N/A	2,839,760	3,220
Total	186,534	14,592,434	17,200

HEATING FOSSIL FUEL USE

Heating fuel use and costs summarized from the 2018 Beaufort Delta Study are provided in Tables 6 and 7. Table 7 summarizes estimated 2018 Beaufort Delta Study heating fuel oil costs.

Based on available information, the following is noted regarding Tsiigehtchic heating fuel use:

- Tsiigehtchic makes up 3% of total Beaufort Delta heating fuel oil (litres); and 2% of related costs.
- Housing Corporation makes up 28% of total Tsiigehtchic heating fuel oil; and related costs.
- Estimated Private Use makes up 35% of total Tsiigehtchic heating fuel oil and related costs;
- GNWT Properties use makes up 37% of Tsiigehtchic heating fuel oil and related costs.

Table 6: Heating Fuel Oil Use (litres): Tsiigehtchic & Beaufort Delta

	Tsiigehtchic	Beaufort Delta Communities
Housing Corporation (litres)	73,837	2,133,649
Estimated Private Use (litres)	92,815	3,820,547
GNWT Properties (litres)	98,642	1,872,268
<i>Other Heating Fuel [GJ]</i>		
Propane		10,283
Natural Gas		229,167
Pellets		318
Total Heating Fuel Oil (Litres)	265,293	7,826,464
<i>Total Other (GJ)</i>		239,769

Note: Totals may not add due to rounding.

Table 7: Heating Fuel Costs (\$): Tsiigehtchic & Beaufort Delta Communities

	Tsiigehtchic	Beaufort Delta Communities
Housing Corporation	104,303	3,993,000
Estimated Private Use	131,112	11,906,545
GNWT Properties		
Heating Oil	139,343	2,674,755
Propane		421,617
Natural Gas		875,240
Pellets		11,804
Total	374,758	19,882,960

Note: Totals may not add due to rounding.

GREENHOUSE GAS (GHG) EMISSIONS

Total greenhouse gas (GHG) emissions for Tsiigehtchic and other Beaufort Delta Communities are summarized in Figure 4 and Table 8.

Based on data available from the Beaufort Delta Study, Tsiigehtchic produced about 1,813 tonnes/year of GHG emissions in the 2016/17 period. This was an approximate 2% share of total Beaufort Delta GHG emissions.

Figure 4: 2016 Total GHG Emissions by Community (tonnes/year)

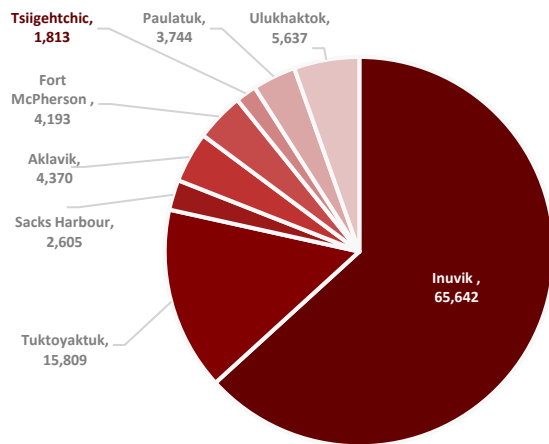


Table 8: Share of GHG Emissions by Community (2016/17)

Community	GHG Emissions (tonnes/yr)	Share of Total GHG Emissions
Inuvik	65,642	63%
Tuktoyaktuk	15,809	15%
Uluhaktok	5,637	5%
Aklavik	4,370	4%
Fort McPherson	4,193	4%
Paulatuk	3,744	4%
Sachs Harbour	2,605	3%
Tsiigehtchic	1,813	2%
Total	103,814	

Note: Totals may not add due to rounding.

Figure 5 and Table 9 summarize the share of GHG emissions by sector for Tsiigehtchic and for total Beaufort Delta communities.

Figure 5: GHG emissions by Sector: Tsiigehtchic and Beaufort Delta Communities (tonnes/year)

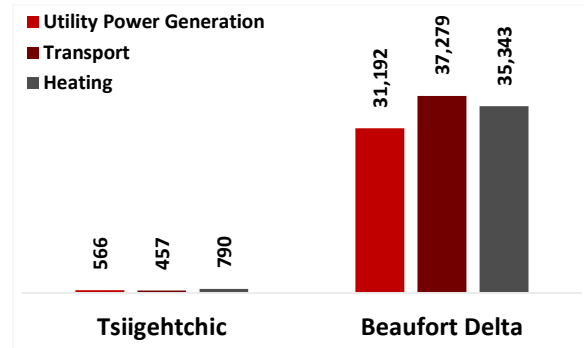


Table 9: GHGs by Sector (tonnes/year): Tsiigehtchic and Beaufort Delta Communities

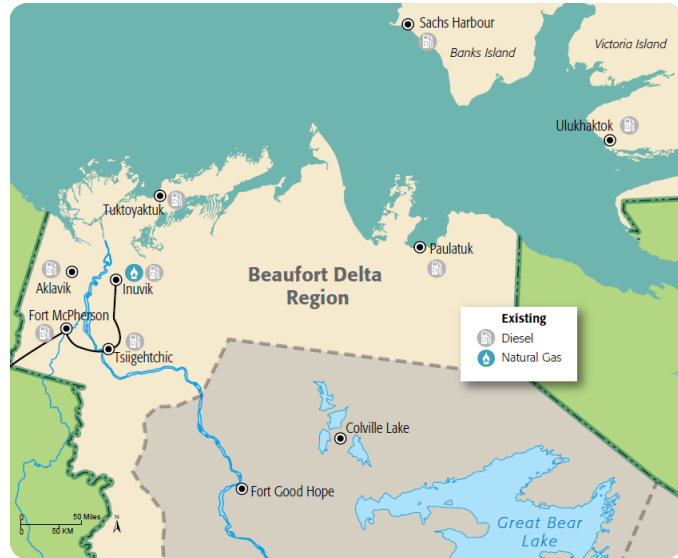
	Tsiigehtchic	Beaufort Delta
Utility Power Generation	566	31,192
Transportation	457	37,279
Heating	790	35,343
Total	1,813	103,814

- Utility power generation fossil fuel emissions had a 30% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Tsiigehtchic had a 1.8% share of total utility power generation GHG emissions in the Beaufort Delta in 2016/17;
- Transportation fossil fuels had a 36% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Tsiigehtchic had a 1.2% share of total transport GHG emissions in the Beaufort Delta in 2016/17;
- Heating fossil fuels had a 34% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Tsiigehtchic had a 2.2% share of total heating GHG emissions in the Beaufort Delta in 2016/17.

HAMLET OF ULUKHAKTOK

Ulukhaktok is located on Victoria Island and is the most eastern Inuvialuit community. It is not accessible by road, but is accessible by air year round. In the summer an annual sealift is provided.

Fossil fuels from external sources (e.g., diesel and other oil fuels) are relied on for electricity generation, heating and transportation.



Source: A Vision for the NWT Power System Plan (December 2013)

EXISTING GRID SYSTEM

With regard to electricity generation, Ulukhaktok is one of 20 thermal rate zone communities served by NTPC.¹ Similar to other Beaufort Delta communities, there is no transmission connection between Ulukhaktok and any other communities. Consequently, it has its own isolated diesel power plant.

In order to ensure grid stability, the GNWT Net Metering Program limits the amount of intermittent renewable capacity that can be added to the isolated grid system. The current allowed intermittent renewable energy capacity for Ulukhaktok is reviewed in Table 1. Ulukhaktok does not appear to have solar PV or other renewable energy capacity sources planned or installed at this time and has 47 kW of intermittent renewable energy capacity available.

Table 1: Allowed Intermittent Renewable Energy Capacity by Community (August 2019)

	Community Average Load	Intermittent Renewable Energy Capacity Allowed (kW)	Current Solar Capacity Installed (kW)		Planned Projects*	Currently Available Capacity (kW)**
			Net Metering Program	Other		
Ulukhaktok	235	47	0	0	0	47

* Includes solar projects in the planning stage.

** Includes all solar capacity installed whether under the Net Metering Program or not.

¹ The balance of thermal rate zone communities are served by ATCO's Northland Utilities [NUL].

2018 BEAUFORT DELTA OFF-GRID FOSSIL FUEL COSTS STUDY

In 2018, Gwich'in Council International (GCI) completed a study that reviewed fossil fuel uses, costs and GHG emissions by sector for each community in the Beaufort Delta region, and options to reduce fossil fuel uses (the “Beaufort Delta Off-Grid Fossil Fuel Costs Study” or “2018 Beaufort Delta Study”). While there were limitations with regard to transportation and heating fuel uses in certain communities, the study provides a basis for understanding fossil fuel uses in the electricity, heating and transportation sectors across the Beaufort Delta.

The Ulukhaktok Community Energy Profile summarizes the information currently available from the 2018 Beaufort Delta Study. It is expected that this information will be updated and refined as part of the update work to be undertaken in winter 2020.

Overall fossil fuel use by sector for Beaufort Delta communities is summarized in Figure 1.

Figure 1: Total Fossil Fuel Use by Community and By Sector

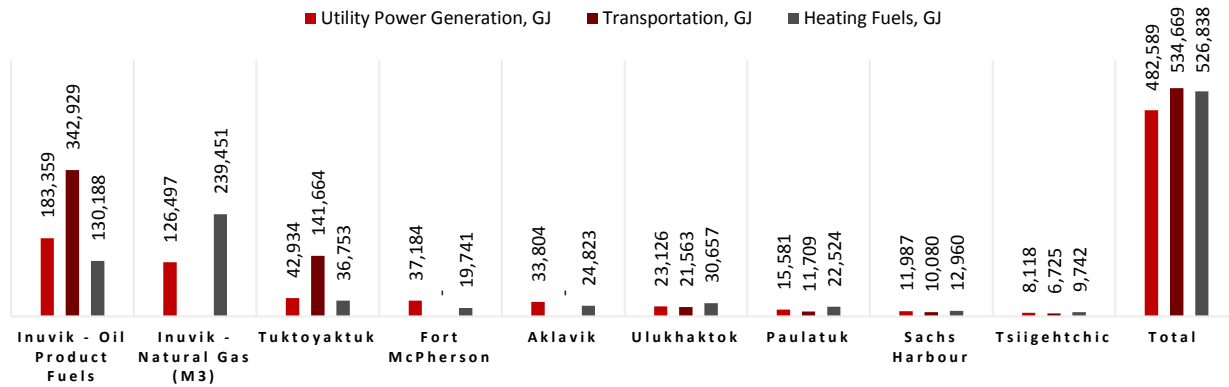


Figure 1 notes as follows regarding Ulukhaktok fossil fuel use:

- Fossil fuel use related to utility power generation (23,126 GJ) is 4.8% of total utility power generation fossil fuel use in the Beaufort Delta.
- Fossil fuel use related to the transportation sector (21,563 GJ) is about 4.0% of total heating fuel fossil use in the Beaufort Delta.²
- Fossil fuel use related to heating fuels (30,657 GJ) is about 5.8% of total heating fuel fossil use in the Beaufort Delta.³

The sections that follow summarize available information regarding Ulukhaktok fossil fuel uses compared to overall Beaufort Delta fuel uses for each energy sector.

² Transportation fossil fuel volumes in the 2018 Beaufort Delta Study were based on GNWT fuel tax data. The GNWT provided fuel tax data for the “Inuvik Region” consisting of Inuvik, Fort McPherson and Aklavik. This data was only available for these communities at the Inuvik Region level, and separate information by community was not available. This data also did not include territory-wide suppliers that also supply the Beaufort Delta region (Petro-Can, Esso and Shell).

³ Total supply of heating oil for private use for the Inuvik Region in the 2018 Beaufort Delta Study was estimated based on tax data for fuel supplied by Inuvik-based companies in 2016 to the communities of Inuvik, Fort McPherson and Aklavik. No breakdown by community was available. More accurate heating fuel consumption information was only available for communities supplied by GNWT Fuel Services (Sachs Harbour, Tsiigehtchic, Paulatuk and Ulukaktok).

ELECTRICITY FOSSIL FUEL USE

NTPC 2016/17 GRA fossil fuel electricity volumes for Beaufort Delta Region Communities accounted for approximately:

- **57%** of forecast 2016/17 NTPC thermal zone diesel fuel use (16.1 million litres); and
- **60%** of forecast 2016/17 thermal zone fossil fuel generation (including natural gas generation).

Diesel generation for all eight Beaufort Delta communities is summarized in Figure 2 and Table 2 – Ulukhaktok makes up about 4.8% of total thermal generation (MWh) in Beaufort Delta communities; and 6.5% of litres of diesel fuel used.

Figure 2: Total Generation in Beaufort Delta Communities (MWh) (2016/17)

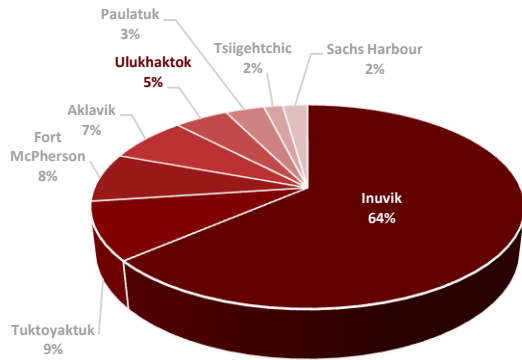


Table 2: Summary of Fossil Fuel Generation for Beaufort Delta Communities (2016/17)

	Fossil Fuel Generation (MWh)	Required Diesel Fuel (000 litres)	Required Natural Gas (m ³)
Inuvik	28,363	4,740	3,397
Tuktoyaktuk	4,096	1,110	
Fort McPherson	3,451	961	
Aklavik	3,216	874	
Ulukhaktok	2,134	598	
Paulatuk	1,547	403	
Sachs Harbour	986	310	
Tsiigehtchic	747	210	
Total	44,540	9,206	3,397

ELECTRICITY FOSSIL FUEL COSTS

Total utility fossil fuel generation costs are made up of fuel and non-fuel costs. Total forecast 2016/17 generation costs for all Beaufort Delta communities were about \$27.7 million. As summarized in Table 3:

- Ulukhaktok made up 4.7% of total generation fuel costs, and 4.8% of total non-fuel costs.
- Ulukhaktok made up about 4.8% of total utility costs.

Table 3: Comparison of Fossil Fuel Generation Costs (\$000) (2016/17)

	Ulukhaktok	Beaufort Delta
Total Thermal Generation Fossil Fuel Cost	646	13,718
Total Non-Fuel Costs	669	13,953
Total Utility Costs	1,315	27,671

Total 2016/17 NTPC costs for fossil fuel generation in Beaufort Delta Communities is about \$0.64/kWh for diesel fuel use, and \$0.58/kWh for natural gas use.

Table 4 summarizes the total utility cost per kWh for Ulukhaktok.

- Average Ulukhaktok diesel fuel use accounts for \$0.30/kWh.
- Non-fuel O&M and overhaul costs are about \$0.17/kWh.
- Capital costs are about \$0.15/kWh (includes depreciation and return on rate base for existing facilities).

Table 4: Total Utility Cost (\$/kWh) (2016/17): Ulukhaktok and Beaufort Delta Communities

	Ulukhaktok	Beaufort Delta Average Diesel Cost
Cost/Unit of Generation	\$0.30	\$0.31
Overhaul Cost	\$0.05	\$0.05
Non-Fuel O&M	\$0.12	\$0.12
Capital	\$0.15	\$0.15
Total Utility Cost	\$0.62	\$0.62

TRANSPORTATION FOSSIL FUEL USE

Fossil fuel volumes summarized from the 2018 Beaufort Delta Study are provided below.

Figure 3 summarizes total transportation fossil fuel use in Ulukhaktok. Total 2016 estimated transportation fossil fuel use in Ulukhaktok included 0.6 million litres of diesel fuel, gasoline and aviation fuel.

Figure 3: Summary of Transportation Fossil Fuel Use for Ulukhaktok - 2016

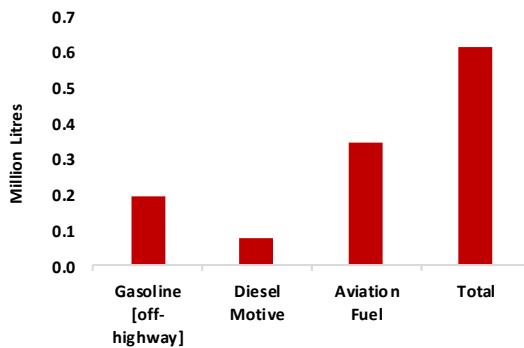


Table 5 summarizes available information for total transportation fuel use (litres); and total costs for all Beaufort Delta communities. This shows Ulukhaktok transportation fuel use as 4% of total Beaufort Delta litres. About 31% of Ulukhaktok transportation fuel use relate to gasoline (off highway); about 12% relates to diesel motive; and about 56% relates to aviation fuel.

Table 5: Transportation Fuel Use in Ulukhaktok & Beaufort Delta Communities

	Ulukhaktok, Litres	Beaufort Delta, Litres	Total Fuel Cost (\$000)
Gasoline [on highway]	N/A	3,060,129	3,730
Gasoline [off highway]	192,810	1,532,837	1,747
Diesel Motive	75,991	7,159,708	8,503
Aviation Fuel	344,113	2,839,760	3,220
Total	612,914	14,592,434	17,200

HEATING FOSSIL FUEL USE

Heating fuel use and costs summarized from the 2018 Beaufort Delta Study are provided in Tables 6 and 7. Based on available information, the following is noted regarding Ulukhaktok heating fuel use:

- Ulukhaktok makes up 11% of total Beaufort Delta heating fuel oil (litres); and 6% of related costs.
- Housing Corporation makes up 40% of total Ulukhaktok heating fuel oil; and related costs.
- Estimated Private Use makes up 41% of total Ulukhaktok heating fuel oil and related costs;
- GNWT Properties use makes up 20% of Ulukhaktok heating fuel oil and related costs.

Table 6: Heating Fuel Oil Use (litres): Ulukhaktok & Beaufort Delta

	Ulukhaktok	Beaufort Delta Communities
Housing Corporation (litres)	330,370	2,133,649
Estimated Private Use (litres)	340,613	3,820,547
GNWT Properties (litres)	163,908	1,872,268
<i>Other Heating Fuel [GJ]</i>		
Propane		10,283
Natural Gas		229,167
Pellets		318
Total Heating Fuel Oil (Litres)	834,891	7,826,464
<i>Total Other (GJ)</i>		239,769

Note: Totals may not add due to rounding.

Table 7: Heating Fuel Costs (\$): Ulukhaktok & Beaufort Delta Communities

	Ulukhaktok	Beaufort Delta Communities
Housing Corporation	449,689	3,993,000
Estimated Private Use	463,632	11,906,545
GNWT Properties		
Heating Oil	223,107	2,674,755
Propane		421,617
Natural Gas		875,240
Pellets		11,804
Total	1,136,428	19,882,960

Note: Totals may not add due to rounding.

GREENHOUSE GAS (GHG) EMISSIONS

Total greenhouse gas (GHG) emissions for Ulukhaktok and other Beaufort Delta Communities are summarized in Figure 4 and Table 8.

Based on data available from the Beaufort Delta Study, Ulukhaktok produced about 5,637 tonnes/year of GHG emissions in the 2016/17 period. This was an approximate 5% share of total Beaufort Delta GHG emissions.

Figure 4: 2016 Total GHG Emissions by Community (tonnes/year)

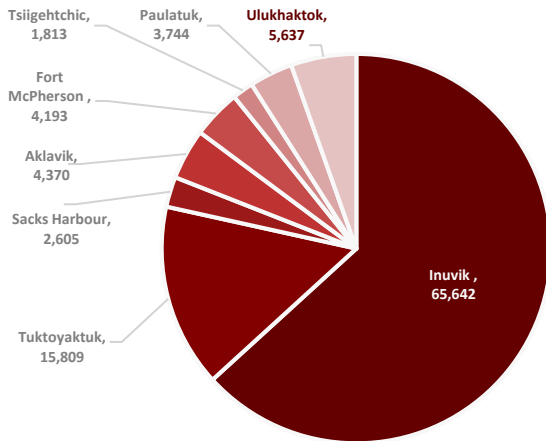


Table 8: Share of GHG Emissions by Community (2016/17)

Community	GHG Emissions (tonnes/yr)	Share of Total GHG Emissions
Inuvik	65,642	63%
Tuktoyaktuk	15,809	15%
Ulukhaktok	5,637	5%
Aklavik	4,370	4%
Fort McPherson	4,193	4%
Paulatuk	3,744	4%
Sachs Harbour	2,605	3%
Tsiigehtchic	1,813	2%
Total	103,814	

Note: Totals may not add due to rounding.

Figure 5 and Table 9 summarize the share of GHG emissions by sector for Ulukhaktok and for total Beaufort Delta communities.

Figure 5: GHG emissions by Sector: Ulukhaktok and Beaufort Delta Communities (tonnes/year)

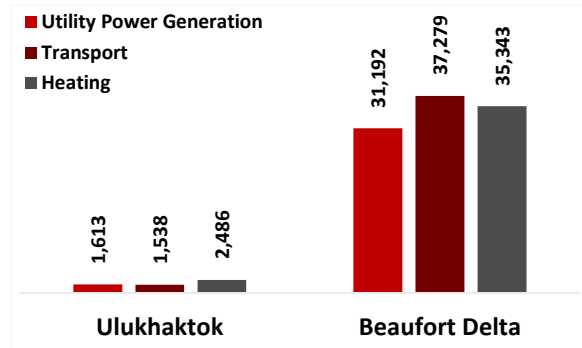


Table 9: GHGs by Sector (tonnes/year): Ulukhaktok and Beaufort Delta Communities

	Ulukhaktok	Beaufort Delta
Utility Power Generation	1,613	31,192
Transportation	1,538	37,279
Heating	2,486	35,343
Total	5,637	103,814

- Utility power generation fossil fuel emissions had a 30% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Ulukhaktok had a 5.2% share of total utility power generation GHG emissions in the Beaufort Delta in 2016/17;
- Transportation fossil fuels had a 36% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Ulukhaktok had a 4.1% share of total transport GHG emissions in the Beaufort Delta in 2016/17;
- Heating fossil fuels had a 34% share of total Beaufort Delta GHG emissions in the 2016/17 period.
 - Ulukhaktok had a 7.0% share of total heating GHG emissions in the Beaufort Delta in 2016/17.