



Honourable Minister Joellie Kaernerik
Minister Responsible for Qulliq Energy Corporation
Government of Nunavut
P O Box 2410
Iqaluit, Nunavut X0A 0H0

Re: Major Project Permit Applications – Generator Set (Genset) Replacements

Genset replacements are required for capacity increases to address growing community power needs and to replace old, obsolete, and unreliable units. The proposed upgrades align with QEC's mandate to provide a safe, reliable, and cost-effective power supply and support the continued growth of the communities.

Bill Nippard

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Interim President and CEO
Qulliq Energy Corporation

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Qulliq Energy Corporation
Société d'énergie Qulliq
Qulliq Alruyaktuqtunik Ikumatjutiit

Application for Major Project Permits

**GENSET REPLACEMENTS FOR
KUGAARUK, CORAL HARBOUR,
CHESTERFIELD INLET, WHALE COVE, AND POND INLET**

November 2023



Executive Summary

Qulliq Energy Corporation (QEC) hereby applies to the Minister Responsible for Qulliq Energy Corporation pursuant to section 18.1 of the *Qulliq Energy Corporation Act*, R.S.N.W.T. 1988, c.N-2 for project permits for genset replacements in Kugaaruk, Coral Harbour, Chesterfield Inlet, Whale Cove, and Pond Inlet.

The proposed genset replacements will address reliability and capacity issues in the communities related to the need to meet QEC's capacity planning criteria, address units that are at or beyond their useful life, and resolve reliability issues related to the unavailability of spare or replacement parts.

QEC's estimated cost to complete the five genset replacement projects is \$32.4 million. This would result in an estimated 1.47 cents/kWh increase in revenue requirement by the time the projects are fully in service. The projects will have no impact on rates until the time of QEC's first General Rate Application following the project in-service date. Project budgets have been prepared based on recent tendering experience with similar projects.

Genset replacement projects typically take two years to complete based on the need to order equipment and schedule construction. The projects are anticipated to be completed by the 2025/26 fiscal year.

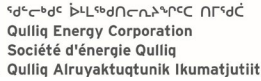


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Application for Major Project Permit | Genset Replacements

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1.0 Application

Qulliq Energy Corporation (QEC) hereby applies to the Minister Responsible for Qulliq Energy Corporation pursuant to Section 18.1 of the *Qulliq Energy Corporation Act*, R.S.N.W.T. 1988, cN-2 for major project permits for genset replacements in Kugaaruk, Coral Harbour, Chesterfield Inlet, Whale Cove, and Pond Inlet. QEC is requesting permission to proceed with these projects. Details in support of the requested project permits are set out below.

2.0 Background

QEC is committed to planning and developing cost effective and efficient ways to ensure that energy supply remains safe, reliable and stable. QEC uses a required firm capacity (RFC) planning formula for its diesel plants that 110% of the forecast peak load can be met with the largest single unit out of service, subject to engineering judgement. This planning criterion is consistent with that used by the Northwest Territories Power Corporation for its isolated single-generation communities.

Genset replacements can be required for a number of reasons, including:

1. The community does not have sufficient installed capacity to meet the RFC formula.
2. The genset has reached the end of its expected life either in age or hours of service.
3. Maintenance issues have arise that compromise the reliability of the unit.
4. Spare or replacement parts are no longer available.

QEC is applying for major project permits to replace gensets in six communities: Kugaaruk, Coral Harbour, Chesterfield Inlet, Whale Cove and Pond Inlet. The locations of these communities is shown in Figure 2.0.1



Figure 2.0-1 – Genset Replacement Community Locations



2.1 Kugaaruk

2.1.1 Project Background

Kugaaruk is located in the Kitikmeot Region of Nunavut. The population of the community was 1,033 in the 2021 census, an increase of 10.7% from the 2016 census.¹ Access to the community is primarily by air at the Kugaaruk airport or by sealift. Table 2.1-1 summarizes the current genset line-up installed in the community. There is also currently a Volvo D16 500kW emergency generator located in the community.

¹ Statistics Canada. 2021 Census of Canada. Available: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=9810000201#data> Accessed, September 11, 2023.



Table 2.1-1: Kugaaruk Genset Line-up

Unit Number	Brand and Model	Capacity (kW)	Year Installed	Operating Hours
G1	Detroit Diesel Series 60	320	2004	55,156
G2	Cat D 3508 B	550	2009	60,221
G3	Cat D 3508 B	550	2009	51,171

QEC received a major project permit to replace the plant in Kugaaruk in June 2022. Subsequent to receiving that major project permit QEC determined it would not replace the power plant in Kugaaruk at this time. As noted in the response to URRC-QEC-2 (b)² from the Kugaaruk and Chesterfield Inlet major project permit application proceeding, the Arctic Energy Fund (AEF) program had a hard cap on total funding for all projects. Power plant costs increased from the time the original budgets were prepared and QEC elected to prioritize completion of other projects with the available AEF funding. As a result, a new genset in Kugaaruk is required. QEC is proposing to replace Genset G1, a 320 kW unit with a new 550 kW unit.

The project involves the design, purchase and delivery of a 550 kW genset with radiator and hospital type silencer, reinforcement of the foundation and support structures of the ancillary equipment, installation of the new genset with all ancillary equipment, commissioning, testing and incorporation of the new equipment into the power plant system, training personnel and providing as-built drawings. As the capacity of the proposed genset is higher than the existing one the project scope includes reinforcement of the foundation and support structures, upgrading the fuel system and some programmable logic control (PLC) modifications.

2.1.2 Genset Condition and Operation

Kugaaruk genset G1 is a 320kW unit installed in 2004. Since April 2019 it has run for approximately 25% of the hours in the year (Figure 2.1-1).

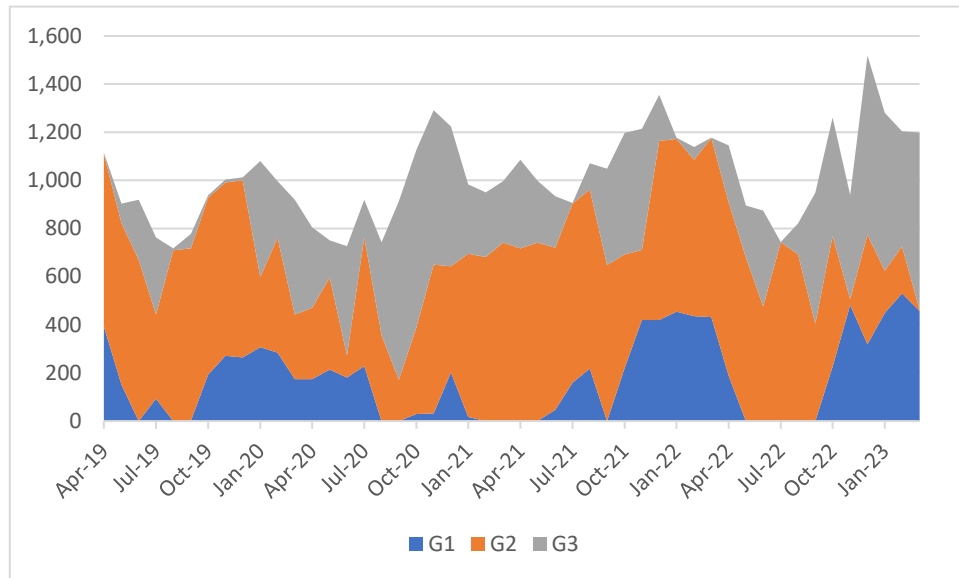
² URRC-QEC-2 (b). March 4, 2022.



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Figure 2.1-1 – Genset Run Hours – April 2019 through March 2023

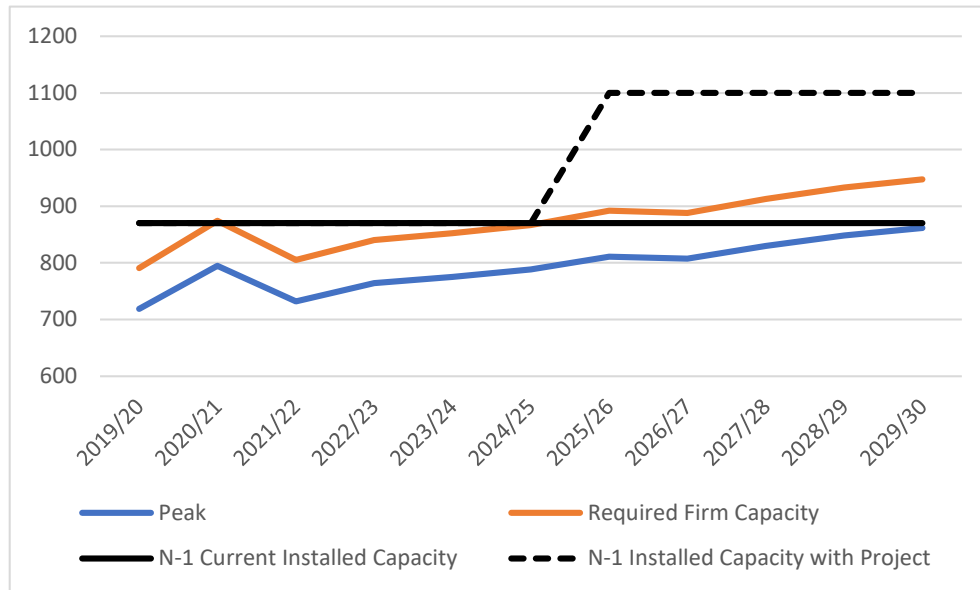


2.1.3 Required Firm Capacity

Kugaaruk's community peak has been increasing since 2021/22, driving the need for greater installed capacity. QEC's current load forecast projects the existing plant will not meet the required firm capacity criteria by approximately 2025, as shown in Figure 2.1-3. Replacing the existing 320 kW unit with a new 550 kW unit would increase the available firm capacity, enabling the plant to meet the community's peak load for the foreseeable future.



Figure 2.1-2 – Community Peak and Required Firm Capacity (kW)



2.2 Coral Harbour

2.2.1 Project Background

Coral Harbour is located on Southampton Island in the Kivalliq Region of Nunavut (Figure 2.0-1). The population of the community was 1,035 in the 2021 census, an increase of 16.2% from the 2016 census.³ Access to the community is primarily by air at the Coral Harbour airport or by sealift. Table 2.2-1 summarizes the current genset line-up installed in the community. There is also currently a Volvo D16 500kW emergency generator located in the community.

Table 2.2-1: Coral Harbour Genset Line-up

Unit Number	Brand and Model	Capacity (kW)	Year Installed	Operating Hours
G1	MTU 12V4000	720	2019	19,361
G2	Cat D 3508	420	2005	67,350
G3	Cat D 3508	420	2005	65,493

Coral Harbour Genset G2 is a 420 kW unit installed in 2005. QEC is proposing to replace the existing G2 unit with a higher capacity 720 kW unit. Capacity of the new Genset is higher than the existing one, therefore, reinforcement of the foundation and support

³ Statistics Canada. 2021 Census of Canada. Available: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=9810000201#data> Accessed, September 11, 2023.



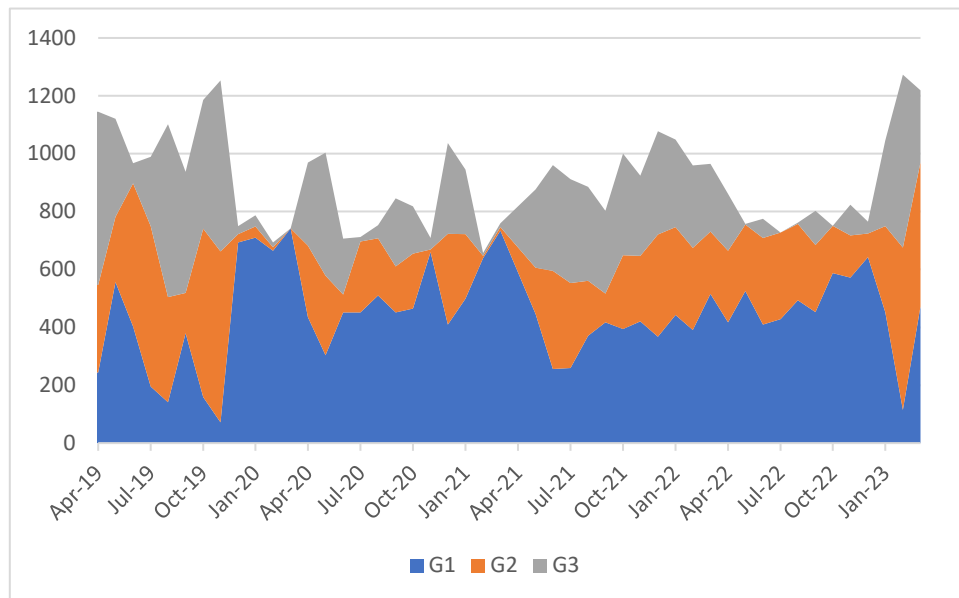
structures, upgrade the fuel system, cooling system, exhaust system and some modifications of PLC will be required.

The project involves the design, purchasing and delivery of a 720 kW genset, radiator and hospital type silencer, reinforcement of the foundation and support structures of the ancillary equipment, installation the new genset with all ancillary equipment, commissioning, testing and incorporation of the new equipment into the power plant system, training personnel and providing as built drawings.

2.2.2 Genset Condition and Operation

Coral Harbour Genset G2 is a 420 kW unit installed in 2005. Since April 2019 it has run for approximately 32% of the hours in the year (Figure 2.2-1).

Figure 2.2-1 – Genset Run Hours – April 2019 through March 2023

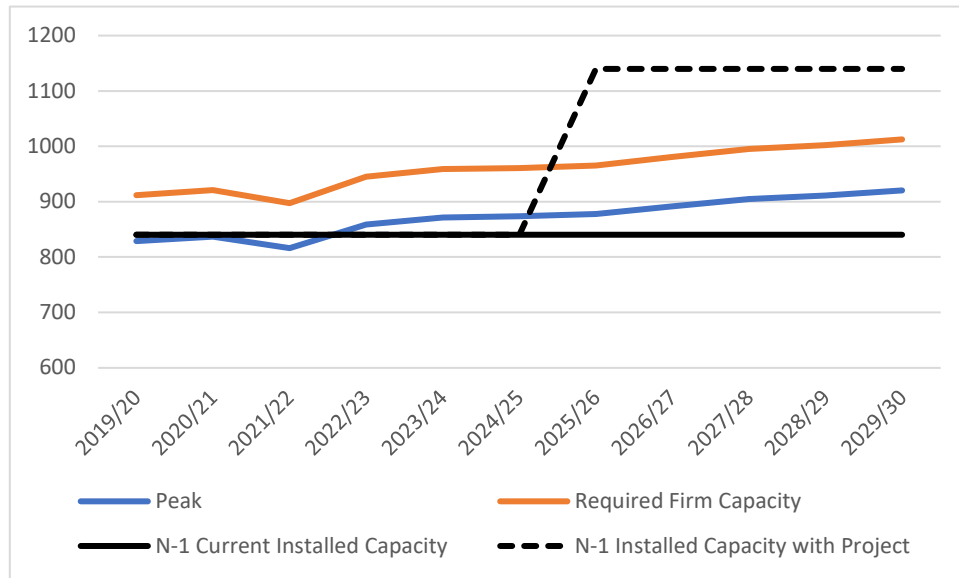


2.2.3 Required Firm Capacity

Coral Harbour's community peak has been increasing since 2021/22, driving the need for greater installed capacity. QEC's current plant does not meet the required firm capacity criteria, as shown in Figure 2.2-3. Replacing the existing 420 kW unit with a new 720 kW unit would increase the available firm capacity.



Figure 2.2-2 – Community Peak and Required Firm Capacity (kW)



2.3 Chesterfield Inlet

2.3.1 Project Background

Chesterfield Inlet is located on the shore of Hudson Bay in the Kivalliq Region of Nunavut (Figure 2.0-1). The population of the community was 397 in the 2021 census, a decrease of 9.2% from the 2016 census.⁴ Access to the community is primarily by air at the Chesterfield Inlet airport or by sealift. Table 2.3-1 summarizes the current genset line-up installed in the community. There is also currently a Volvo D16 500kW emergency generator located in the community.

Table 2.3-1: Chesterfield Inlet Genset Line-up

Unit Number	Brand and Model	Capacity (kW)	Year Installed	Operating Hours
G1	Detroit Diesel Series 60	320	2010	60,650
G2	Detroit Diesel Series 60	320	2013	46,007
G3	Volvo TWD1643GE	400	2019	14,532

QEC received a major project permit to replace the plant in Chesterfield Inlet in June 2022. Subsequent to receiving that major project permit – QEC determined it would not replace the power plant in Chesterfield Inlet and as a result an engine replacement is necessary. QEC is proposing to replace Genset G1, a 320 kW unit with a newer 320 kW unit.

⁴ Statistics Canada. 2021 Census of Canada. Available: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=9810000201#data> Accessed, September 11, 2023.

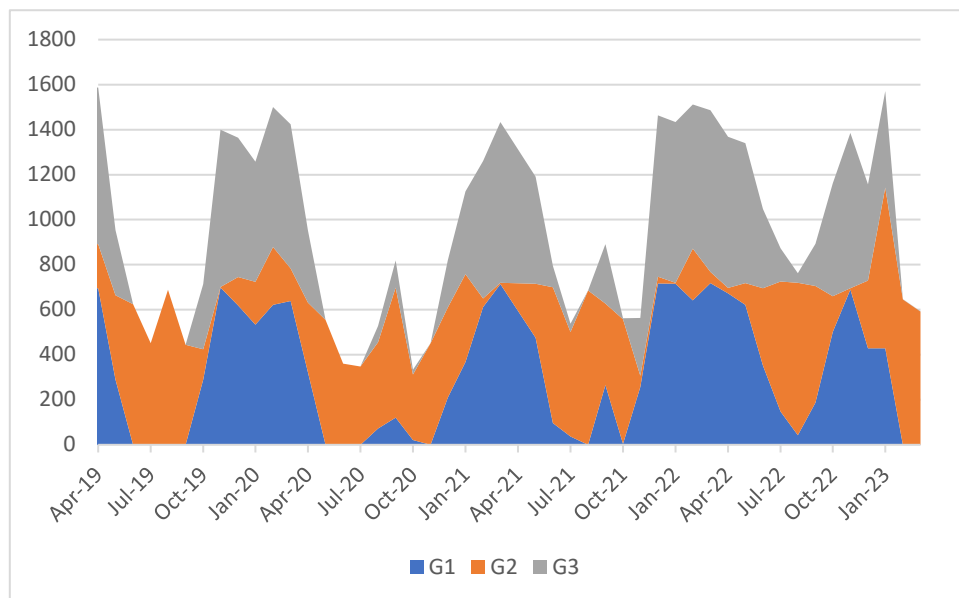


The project involves the design, purchasing and delivery of a 320 kW genset, radiator and hospital type silencer, reinforcement of the foundation and support structures of the ancillary equipment, installation the new genset with all ancillary equipment, commissioning, testing and incorporation of the new equipment into the power plant system, training personnel and providing as built drawings.

2.3.2 Genset Condition and Operation

Chesterfield Inlet genset G1 is a 320kW unit installed in 2010. It is approaching the end of its useful life based on the running time. Since April 2019 it has run for approximately 20% of the hours in the year (Figure 2.3-1).

Figure 2.3-1 – Genset Run Hours – April 2019 through March 2023

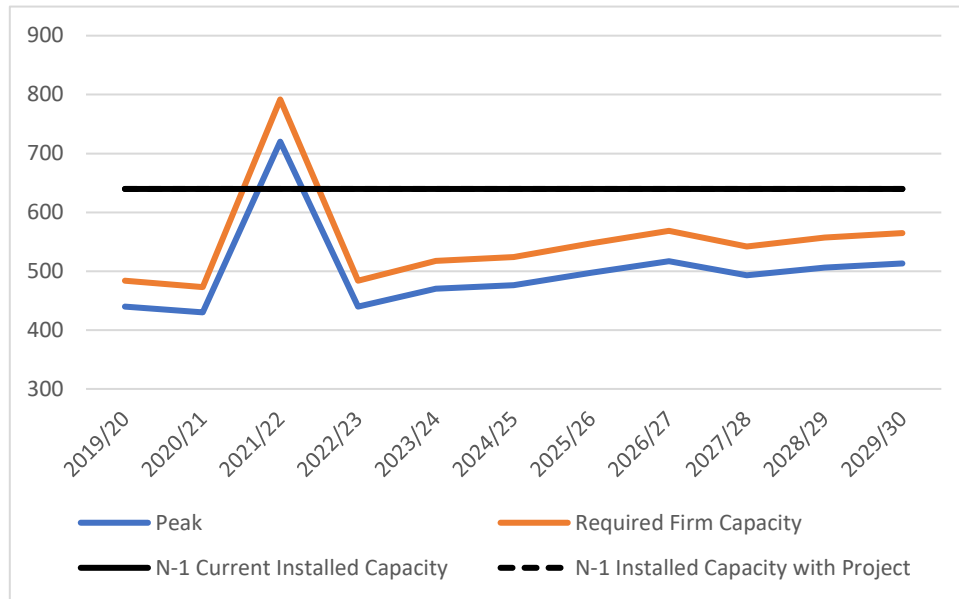


2.3.3 Required Firm Capacity

Chesterfield Inlet's community peak has been fairly stable as shown in Figure 2.3-2. Replacing the existing 320 kW unit with a new 320 kW unit would maintain the firm capacity in the community while providing a more reliable unit.



Figure 2.3-2 – Community Peak and Required Firm Capacity (kW)



2.4 Whale Cove

2.4.1 Project Background

Whale Cove is located on the shore of Hudson Bay in the Kivalliq Region of Nunavut (Figure 2.0-1). The population of the community was 470 in the 2021 census, an increase of 8.0% from the 2016 census.⁵ Access to the community is primarily by air at the Whale Cove airport or by sealift. Table 2.3-1 summarizes the current genset line-up installed in the community.

Table 2.4-1: Whale Cove Genset Line-up

Unit Number	Brand and Model	Capacity (kW)	Year Installed	Operating Hours
G1	Cat D3412	300	1991	121,331
G2	Cat C 3412	300	2022	3,793
G3	Cat D 3406	150	1991	69,338
G4	Detroit Diesel Series 60	320	2017	40,078

The project involves replacing the existing G1 300 kW genset with a new higher capacity 400 kW genset. The existing foundation & support structures will be reinforced. Fuel system and control system will need to be upgraded to accommodate these changes.

⁵ Statistics Canada. 2021 Census of Canada. Available: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=9810000201#data> Accessed, September 11, 2023.

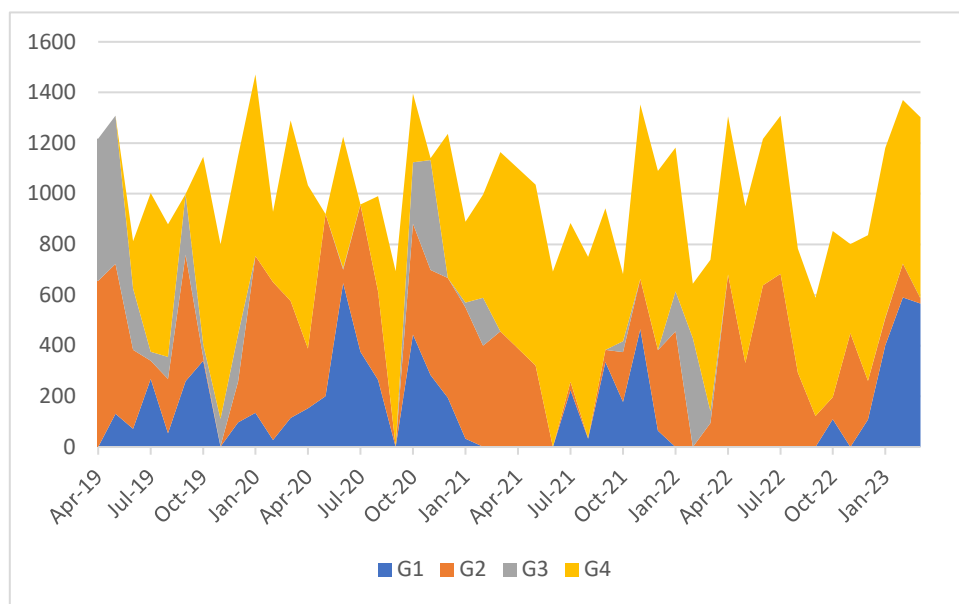


2.4.2 Genset Condition and Operation

The existing Whale Cove Power plant consists of four generator sets. One of the gensets have exceeded the manufacturer's recommended operating life. There is substantial risk of failure of this generator, which would pose a substantial risk of the plant not being able to meet the community load demand. The existing G1 genset was installed in 1991 and current operating hours are over 120,000. The engine has experienced its last major overhauling. Spare parts for the engine are no longer available. Failure of this generator will cause substantial shortage of power in the community.

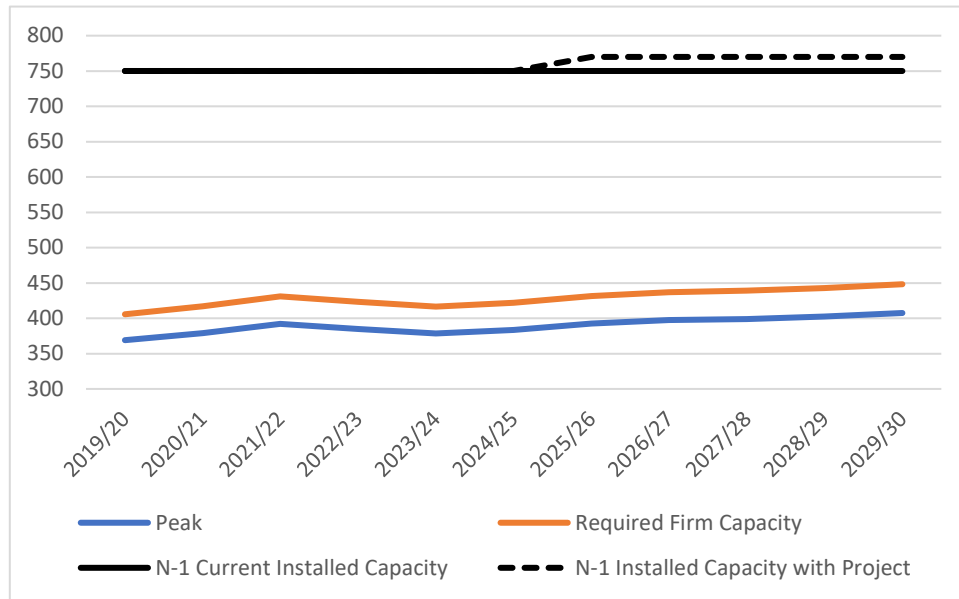
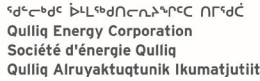
Since April 2019 unit G1 has run for approximately 44% of the hours in the year (Figure 2.4-1).

Figure 2.4-1 – Genset Run Hours – April 2019 through March 2023



2.4.3 Required Firm Capacity

Whale Cove's community peak has been fairly stable. Replacing the aging G1 will ensure the community continues to meet the required firm capacity criteria as shown in Figure 2.4-2.



2.5 Pond Inlet

2.5.1 Project Background

Pond Inlet is located on Baffin Island in the Qikiqtaaluk Region of Nunavut (Figure 2.0-1). The population of the community was 1,555 in the 2021 census, a decrease of 3.8% from the 2016 census.⁶ Access to the community is primarily by air at the Pond Inlet airport or by sealift. Table 2.5-1 summarizes the current genset line-up installed in the community.

Table 2.5-1: Pond Inlet Genset Line-up

Unit Number	Brand and Model	Capacity (kW)	Year Installed	Operating Hours
G1	MTU 12V4000	720	2020	6,445
G2	MTU 12V4000	850	2014	63,448
G3	Guascor SF360TA	550	2009	40,270
G4	Cat 3508	550	2021	7,268

The project involves replacing the existing G3 Guascor 550 kW generator set with a new higher capacity 750 kW genset.

⁶ Statistics Canada. 2021 Census of Canada. Available: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=9810000201#data> Accessed, September 11, 2023.

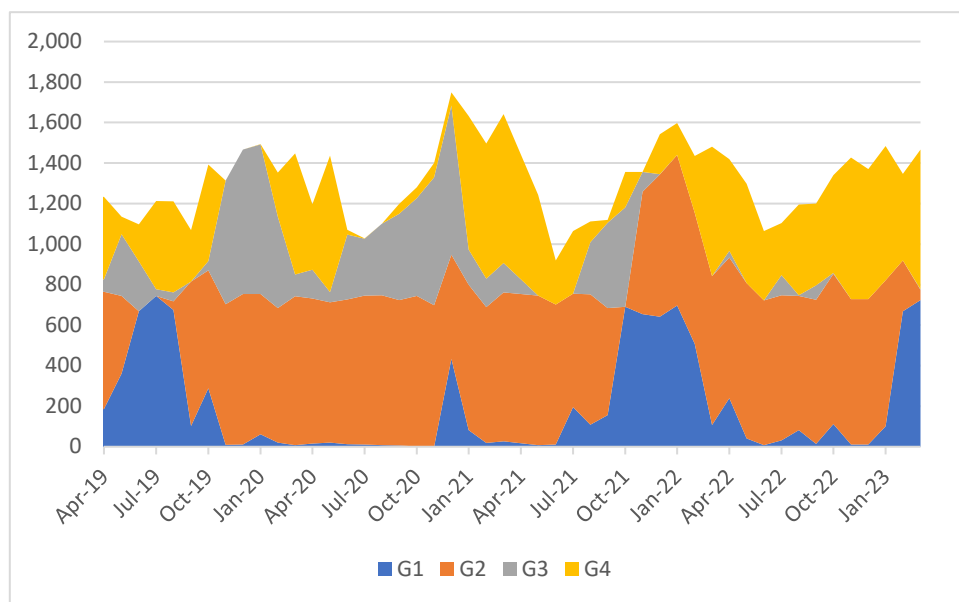


2.5.2 Genset Condition and Operation

The Pond Inlet Power plant consists of 4 generator sets. The existing Guascor G3 genset is a 550 kW generator installed in 2009. The genset is no longer reliable due to frequency of break down. Guascor units have proven to be unreliable and difficult to maintain.

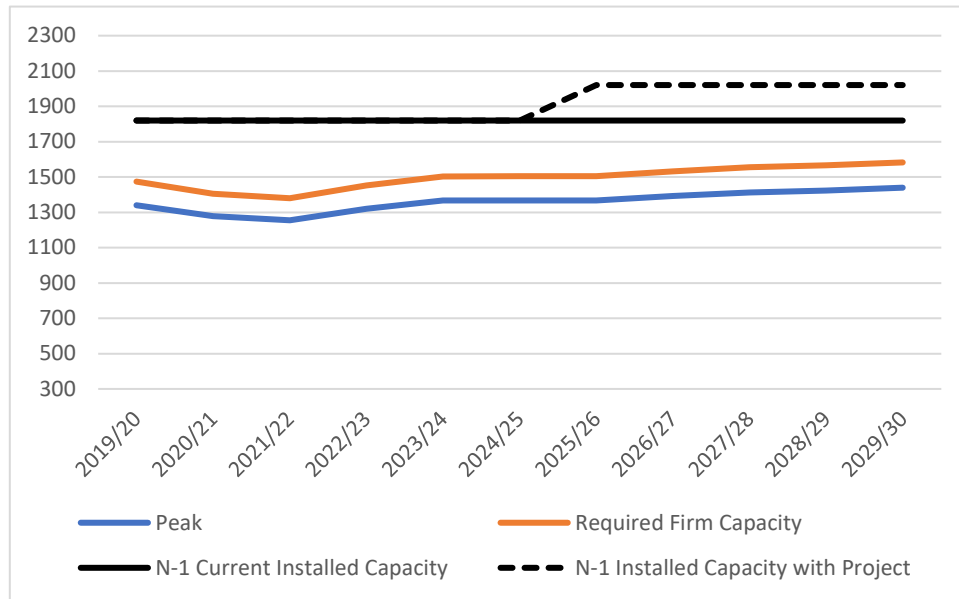
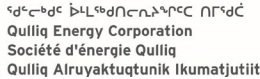
Since April 2019 unit G3 has run for approximately 25% of the hours in the year (Figure 2.5-1).

Figure 2.5-1 – Genset Run Hours – April 2019 through March 2023



2.5.3 Required Firm Capacity

Pond Inlet's community peak has been increasing since 2021/22, driving the need for greater installed capacity. Replacing the existing unit will improve reliability and ensure the plant meets the community's peak load for the foreseeable future.



3.0 Assessment of Project Options

QEC recognizes the need for a long-term approach to prioritize and maximize the benefit of capital expenditures while providing safe and reliable electricity service.

QEC considered the following options as potential solutions to address the deficiencies of the existing gensets.

Option 1 – Defer Genset Replacements

This option involves deferring the proposed genset replacements. This option is not recommended.

- Kugaaruk's community peak is forecast to exceed the existing installed firm capacity by 2025.
- Coral Harbour's community peak currently exceeds the existing installed firm capacity
- Chesterfield Inlet genset G1 is approaching the end of its life based on the running time.
- Whale Cove's genset G1's operating hours are over 120,000 and is at substantial risk of failure.
- Pond Inlet's genset G3 experiences frequent breakdowns and is unreliable.

Option 2 – Complete Genset Replacements



This option involves replacing the gensets in each community. Table 3.2-1 provides initial budget estimates for these projects. Budgets have been prepared based on recent experience with pricing for similar projects.

Table 3.2-1 - Project Budgets (\$000)

	Kugaaruk 550kW	Coral Harbour 720kW	Chesterfield Inlet 320kW	Whale Cove 400kW	Pond Inlet 750kW
QEC Payroll – Regular	278	165	184	165	220
QEC Payroll – OT	78	65	53	85	90
Materials & Land Rights	27	25	10	105	100
Freight	0	0	0		0
QEC Travel & Lodging	65	40	45	70	75
QEC Meals and Incidentals	23	20	21	34	32
Vehicle & Equipment Rentals	82	35	35	50	50
Equipment Purchase	0	0	0	0	0
Contractor Labour	1,089	1,970	1,325	1,635	1,775
Contractor Materials	2,204	3,145	2,125	2,265	3,690
Contractor Travel & Lodging	316	285	265	220	295
Contractor Meals & Incidentals	76	125	89	68	78
Sub-total	4,238	5,875	4,152	4,697	6,405
Contingency 15%	636	881	623	705	961
Overhead and IDC 11%	536	743	525	594	810
Total	5,409	7,499	5,300	5,996	8,176

4.0 Impact of the Project on Ratepayers

QEC conducted an analysis of the impact of the projects on ratepayers. It should be noted that the project will have no impact on rates until the time of QEC's General Rate Application following the project coming in-service. QEC conducted the rate impact analysis based on a territorial rate design assuming the projects are completed by the 2026/27 fiscal year.

The rate impact analysis is based on QEC's estimated cost for these projects of \$32.380 million.

Table 4.1-1 summarizes the estimated incremental revenue requirement increase due to the project of \$2.791 million. The estimated rate increase under territory-wide rates is 1.47 cents/kWh.



Table 4.1-1 New Genset Project Estimated Rate Impact

Project Characteristics	
Capital Cost (\$ 000)	32,380
Amortization Period (year)	25
GRA Approved Return on Ratebase	4.62%
Revenue Requirement Impacts	
Amortization Expense (\$ 000)	1,295
Return on Ratebase (\$ 000)	1,495
sub-total: Revenue Requirement Increase (\$ 000)	2,791
Total Revenue Requirement Impact (\$ 000)	2,791
2026/27 Forecast Sales (MWh)	190,023
Average Territorial Rate Increase (c/kWh)	1.47

It is important to note that this analysis has been provided for illustrative purposes only. Actual rate impacts will depend on the overall revenue requirements and rate designs approved in subsequent General Rate Applications.

5.0 Grounds in Support of the Application

The implementation of the proposed projects are very important to QEC's customers. The projects will address the need to maintain reliability and meet capacity planning requirements.

Power is an essential service in Nunavut and QEC must plan to be able to deliver reliable electricity. The projects will address current forecasted shortfalls in capacity, the need to replace units nearing or beyond their anticipated useful life, and address maintenance issues related to unreliable generators and unavailability of spare or replacement parts.

6.0 Project Timelines

Due to the long lead times currently being experienced for procurement and delivery of materials, these projects are anticipated to be completed by the 2025/26 fiscal year. Construction spending for genset replacements typically occurs over two years.