CI C0051815 –
RTU Replacements Program – Phase 6
Filed Estimate: $5,959,915
Revised Estimate (Post-Refinement): $5,058,726
NSEB Matter M12550
Midgard Evidence Report

SUBMITTED BY
Midgard Consulting Inc.

DATE
February 17, 2026

Midgard, established in 2009, provides consulting services across the electrical power and utility sector. Midgard's principals and staff have direct experience in project development, design, contract procurement, finance, construction, and operations. This combined experience has translated into mandates in project due diligence, lender's technical advisor, loan guarantee assessments, and Independent Engineer roles in Canada, the United States, and internationally. Midgard has worked for developers, utilities, government agencies, and both project lenders and equity providers.

Midgard's team has extensive experience modelling fuel sources, creating energy yield estimates, reviewing contracts, reviewing pro-formas, and assessing project risks from a construction, operations, and financial perspective.

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REPORT SIGN-OFF

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NOTE: ORIGINAL HARD COPY IS SIGNED AND RETAINED ON FILE BY MIDGARD

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LIST OF ACRONYMS

AACE	Association for the Advancement of Cost Engineering
ACE	Annual Capital Expenditure
AFUDC	Allowance for Funds Used During Construction
AO	Administrative Overhead
CEJC	Capital Expenditure Justification Criteria
ECS	External Connection Sheets
I/O	Input/Output
IED	Intelligent Electronic Device

IFC	Issued for Construction
IR	Information Request(s)
NPV	Net Present Value
NSEB	Nova Scotia Energy Board
NSPI	Nova Scotia Power Incorporated
RFP	Request for Proposal
RFW	Request For Work
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SOD	System Operating Diagram

1 INTRODUCTION

Midgard Consulting Incorporated ("**Midgard**") has been retained by Counsel for the Nova Scotia Energy Board ("**NSEB**") to carry out a review of the Nova Scotia Power Incorporated's ("**NSPI**") "RTU Replacements Program Phase 6" Application (referred to in this report as "**the Application**"), NSEB Matter M12550. This Application constitutes the sixth Phase of a long-term capital sustainment initiative, referred to throughout this report as "the **Program**".

NSPI is a regulated electric utility that generates, transmits, and distributes electricity in Nova Scotia. It develops and manages generation assets, including its Remote Terminal Units ("**RTUs**") at various substations and generating stations, and the associated replacement project ("the **Project**") in order to maintain system reliability and meet capacity requirements.

NSPI is seeking approval from the NSEB for the capital costs of the Project. In its application, NSPI requests acceptance for the capital costs for the Project, identified as approximately $5.96M (CI C0051815).[1]

The findings stated within this report are the professional opinion of Midgard and are based on a review of the information described in Section 1.3.

1.1 Application Context[2]

NSPI included CI C0051815 in its 2025 Annual Capital Expenditure ("**ACE**") Plan for the replacement of 14 RTUs, based on risk assessments identifying the equipment as obsolete. During the review of the 2025 ACE Plan, the NSEB identified a significant increase in the estimated labour hours compared to Phase 1 of the RTU replacements. As a result, the NSEB withheld approval for this specific project in its Decision. While NSPI attributed the increase to evolving infrastructure complexity and compliance requirements, the NSEB determined that the four-fold increase in average labour hours required further justification. Consequently, the NSEB initiated a separate process to verify the reasonableness of the budget estimate prior to approval.

1.2 Report Structure

Midgard evaluates NSPI's rationale for proceeding with the Project, focusing on whether the justifications are adequately supported by evidence from the application and NSPI's responses to subsequent Information Requests ("**IRs**"). Midgard's report structure includes asking relevant questions regarding the prudency of NSPI decision making and actions for the Project. Accordingly, Midgard has organized this report as follows:

[1] Exhibit N-1, p. 1.

[2] NSEB Matter No. M12012, Decision, Section 2.2.1, pp. 8-11.

1. Section 2: Reviews NSPI's application context, project description, and rationale for depreciation life.
2. Section 3: Evaluates NSPI's execution strategy, including installation sequencing and assertions regarding standardization and cost reduction.
3. Section 4: Assesses project controls and governance, including delivery model justification, estimate basis, and contingency approach.
4. Section 5: Evaluates cost reasonableness across labour, material procurement, and indirect cost allocation.
5. Section 6: Summarizes conclusions and provides recommendations for NSEB consideration.
6. Appendix A: Presents the comparative analysis of labour allocations.
7. Appendix B: Includes the resumes of the report contributors.

1.3 Overview of Information Reviewed

Table 1 contains a summary of documentation in this proceeding reviewed by Midgard during the preparation of this report.

Table 1: Relevant Proceeding Documentation Reviewed by Midgard

Exhibit #	Document
N-1	RTU Work Order - Redacted
N-2	NSPI (Midgard) RIR 1 to 14 - Redacted
N-2(C)	NSPI (Midgard) RIR 1 to 14 - Confidential
N-2-(i)	NSPI (Midgard) RIR 14 – Att 1-2 - Excels
NSEB Matter No. M12012 – 2025 ACE Plan	
N-1	Application
N-7	NSPI (CA) RIR-1 to RIR-32 – Redacted
N-8	NSPI (IG) RIR-1 to RIR-18 – Redacted
N-9	NSPI (NSUARB) RIR-1 to RIR-177 – Redacted
N-10	NSPI (SBA) RIR-1 to RIR-9
N-21	NSPI – Response to Undertakings 1-11 - Redacted

1.4 Project Overview

The Project involves the systematic replacement of obsolete technology, specifically RTUs, within NSPI's power grid infrastructure at various substations and generating stations in Nova Scotia. The Project scope includes the removal of existing units, installation of new RTUs, connection of Intelligent Electronic Devices ("**IED**s") such as recloser controllers and relays, and the harvesting of removed components to maintain a sustainable spare parts inventory for the remaining fleet.

Following an asset management assessment that deemed approximately 74% of the current RTU fleet obsolete due to evolving industry standards, 14 units were identified for replacement in this Phase based on condition and criticality. The Project scope includes the replacement of these 14 units, which have surpassed their manufacturer end-of-service dates by 10 years or more, and the integration of standardized hardware to support Grid Modernization initiatives. The installed units will undergo commissioning and testing by internal and external resources at each respective site, with the first unit in-service targeted for July 2025.

1.5 Report Contributors

This report was contributed to by the following individuals, whose curriculum vitae are attached as Appendix B:.

1. Ali Saffar, P.Eng. – Technical analysis, RTU design evaluation and IFC package assessment, technical specifications review, cost variance technical validation.
2. Alireza Esmaeili, P.Eng. – Technical analysis, RTU design evaluation and IFC package assessment.
3. Behrouz Jarrahi, P.Eng. – Cost variance technical validation.
4. Michael Walsh, MIR – Report quality assurance.
5. Matthew Matusiak, P.Eng. – Report quality assurance, coordinator and compiler.
6. Tazrin Priyanka, EIT – Report coordinator and compiler.

2 REVIEW OF CI C0051815 – RTU REPLACEMENTS PROGRAM – PHASE 6

2.1 Project Description

The Project involves the replacement of RTUs at various substations and generating stations across Nova Scotia. According to the Application, Project activities were scheduled to commence in April 2024, with the first unit targeted for in-service in July 2025 and final close-out anticipated in November 2027, as summarized in Table 2.

Table 2: Project Key Milestones[3]

Key Milestone	Target Date
Start Date	April 2024
In-Service Date	July 2025[4]
Final Cost Date	November 2027

The total forecasted capital cost of the Replacement Project, as filed, is $5,959,915. NSPI subsequently refined the Phase 6 estimate based on execution experience from the first two completed sites, reducing the forecast to $5,058,964 (a reduction of approximately $0.90M).[5] Project costs include internal and external labour for engineering, design, and field installation, materials for 14 new units, and associated overheads. The Project comprises two primary components:

1. The acquisition of 14 standardized RTUs to replace obsolete equipment, detailed engineering design to integrate the new units with existing field devices (e.g., IEDs), and the development of telecommunications and data architecture specifications; and
2. The physical removal of existing RTUs, installation of new hardware, extensive wiring and connection of relays and controllers, and rigorous testing by technicians to ensure effective communication with the Supervisory Control and Data Acquisition ("**SCADA**") system before the units are placed in service.

NSPI's position on the Project is that it aligns with its asset management practices to support system reliability. The primary objectives are to:

1. Replace 14 units that have surpassed their expected 20-year life span and manufacturer support dates;

[3] Exhibit N-1, p. 1 of 6.

[4] Exhibit N-2, NSPI Response to I-13(a)(i), p. 3 of 4, l. 1-6. The application states an in-service date of July 2025. In response to I-13, NSPI clarified that individual RTU in-service dates range from February 2025 (91V Fourth Lake, actual) through December 2027 (1V-Avon 1, forecast).

[5] Document 100246, NSPI Letter, dated December 9, 2025, Attachment 1.

2. Harvest components from removed units to sustain the spare parts inventory for the remaining fleet;
3. Standardize equipment to support grid modernization initiatives, including advanced protection and automation; and
4. Mitigate the increasing risk of equipment failure due to sparse inventory and lack of vendor support.

NSPI requests approval of this capital expenditure, submitting that replacement is the only viable alternative for these obsolete units. The proposed approach is intended to ensure the orderly modernization of the fleet and mitigate the risk of extended outages associated with the failure of critical telemetry and control equipment.

Midgard reviewed these submissions to assess whether the Project, as proposed, is justified, reasonable, and aligned with regulatory expectations for prudent utility investment.

2.2 Asset Life – Depreciation

Within NSPI's Application, the RTU investment is identified under "General Plant Communication Equipment – SCADA Eq" with an estimated life of 20 years. NSPI states the RTUs in scope have reached or surpassed their expected 20-year life and have exceeded manufacturer end-of-service dates, which is consistent with the practical obsolescence drivers typically observed for RTU/SCADA field assets.[6] Table 3 compares the depreciation life of NSPI's RTUs against peer utilities.

Table 3: Depreciation Lives Comparison (Years)

Asset	NSPI	BC Hydro[7]	Manitoba Hydro[8]	Alectra Utilities[9]	Peer Average
RTU	20	20	25	20	21.7

The peer comparison table for RTU depreciation life indicates NSPI at 20 years, with BC Hydro and Alectra Utilities also at 20 years and Manitoba Hydro at 25 years. NSPI's 20-year life aligns with the majority of peers shown, and the 1.7-year difference from the peer average is attributable to Manitoba Hydro's longer 25-year life. The peer utility set does not indicate a material outlier position for NSPI. Rather, NSPI's selection falls within a commonly observed range.

[6] Exhibit N-1, p. 1 of 6.

[7] BC Hydro, *F2023-F2025 Revenue Requirement Application*, Appendix T, p. 31 of 734. Link. "C68202 - Terminal Unit, Remote (Slave)"

[8] Manitoba Hydro, *2026-2028 General Rate Application*, Tab 9, MFR 82 – Attachment 1, p. 61. Link. "1105Q - INSTRUMENTATION, CONTROL & D/C SYSTEMS"

[9] Kinetrics, *Asset Depreciation Study for the Ontario Energy Board*, Section 43.3, Table 43-1, p. 156. Link. "Remote SCADA". Cited by Alectra Utilities Corporation in its *2027-2031 Electricity Distribution Rates, Cost of Service* application before the Ontario Energy Board (EB-2025-0252).

3 PROJECT EXECUTION STRATEGY

This section examines NSPI's execution approach for the Project to assess the efficiency and effectiveness of the Project's planning, sequencing, and incorporation of prior process improvements. This section will scrutinize the following questions:

1. Has NSPI optimized the Project's execution by prioritizing installations based on criticality, complexity, or opportunities for learning-curve benefits?
2. Did NSPI leverage pre-Phase 6 experience to standardize the Project's designs, streamline its processes, and hence reduce costs?

3.1 Installation Prioritization and Sequencing

NSPI confirms that the selection of the 14 RTUs for Phase 6 relied on an *"overall risk matrix of condition and criticality."* [10] Prioritization was driven by asset age, manufacturer life-cycle status and obsolescence timelines, maintenance history, and each unit's system criticality. The selected RTUs are characterized as obsolete, having exceeded their 20-year service life and manufacturer support window by more than a decade, thereby necessitating prompt replacement to reduce failure risk.[11]

While this risk matrix identified which units required prompt intervention based on failure probability, it does not capture the technical heterogeneity of the sites themselves (a factor that emerged as the primary determinant of project cost). Although the specific condition assessments of the 14 RTU sites were not shared by NSPI in its ACE filing or evidence, NSPI identifies this technical complexity, rather than schedule pressure, as the principal cost driver. NSPI states:

> *"The increase in estimated labour hours for Phase 6 in comparison to Phase 1 is a direct result of evolving infrastructure complexity, changes in compliance requirements, accessibility challenges, enhanced technological scope and testing procedures, and workforce constraints. These factors collectively contribute to the higher labour effort required compared to Phase 1."* [12]

This assertion is substantiated by the Input/Output ("**I/O**") point density analysis of the Phase 6 sites, which serves as a quantitative proxy for system complexity and labour resource needs. As illustrated in Table 4, with 91V – Fourth Lake Hydro serving as the baseline medium-complexity benchmark, the sites are not uniform replacement candidates but rather exhibit substantial diversity in technical scope.

[10] Exhibit N-1, p. 2 of 6.

[11] Exhibit N-1, pp. 1-2 of 6.

[12] NSEB Matter No. M12012, Exhibit N-9, NSPI Response to IR-140, p. 2 of 2, l. 10-14.

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Table 4: Site Distribution by Complexity Tier[13]

Complexity Tier	Definition (I/O Points)	Number of Sites	Description
Low	[redacted]	[redacted]	Standard replacement sites with lower signal density.
Medium	[redacted]	[redacted]	Sites with moderate integration requirements, including the benchmark site.
High	[redacted]	[redacted]	Complex hubs with high signal density, significant control automation, and extensive testing scope.

50% of the Phase 6 RTU portfolio falls into the Medium or High complexity categories, with three sites exceeding 200 I/O points. This data confirms that labour estimates based on simple "like-for-like" replacements would understate the effort required for these complex, control-heavy hubs. Given this portfolio complexity, the execution approach materially influences overall labour needs and resource allocation.

NSPI's execution strategy utilizes parallel processing for office-based tasks while maintaining sequential execution for field work. NSPI notes that labour categories such as *"Engineering & Design, Drafting, and Project Management are executed in parallel across multiple sites rather than sequentially on a per-site basis."*[14] Conversely, field installations follow a specific sequence of civil, electrical, and commissioning steps per site:

> *"The Electrical Installation work is preceded by Civil Construction, where required, by external contractors with one RTU Technician providing site supervision. The typical days on site for an RTU installation is approximately 25 - 32 days depending on actual crew complement. The normal shift length for the Technicians is 8 hours per day. These work steps i.e. civil installation, electrical installation and testing/commissioning are normally done sequentially."* [15]

When questioned about productivity trends, NSPI admits it *"did not maintain a formal, program-level hours-per-RTU productivity metric across previous projects."* [16] NSPI attributes this lack of tracking to the variability of site conditions and a cyber incident that limited access to historical data.

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[13] See *P0822-D008-MDL-R00-EXT - Comparative Analysis.xlsx* for supporting calculations. Signal counts shown for Phase 6 sites were derived from manual review of available project documentation and, given the volume of signals, may contain inadvertent enumeration errors. Accordingly, the figures should be interpreted as indicative of relative I/O density and complexity bands rather than audit-grade counts.

[14] Exhibit N-2, NSPI Response to I-13(c), p. 4 of 4, l. 8-10.

[15] Exhibit N-2, NSPI Response to I-6(c), p. 7 of 7, l. 11-16.

[16] Exhibit N-2, NSPI Response to I-2(e), p. 5 of 7, l. 8-9.

NSPI's claim of efficiency gains via standardization is anecdotal and difficult to validate.[17] NSPI does not present any metrics tailored to Phase 6 activities. The cyber incident did not prevent NSPI from incorporating measures and metrics directly into the Project during its planning which NSPI would use to demonstrate management of its performance during Project execution.

3.1.1 Conclusions – Installation Prioritization and Sequencing

The installation sequence does not appear optimized to maximize work crew efficiency through progressive skill development. While NSPI employs process optimizations such as parallel design work and equipment standardization, the physical installation schedule is primarily dictated by risk mitigation (asset condition and criticality) rather than managing sequencing to compound learning and productivity in the service of managing Program costs and execution risk.

An execution strategy structured for learning-curve efficiency would sequence installations from low-complexity to high-complexity sites, enabling work crews to refine techniques, standardize procedures, and achieve productivity gains on simpler installations before confronting the labour-intensive testing and commissioning requirements of control-heavy hubs. Such an approach would front-load productivity improvements, reducing unit costs for later installations while compressing overall project duration.

The absence of Program-level productivity metrics obfuscates whether Phase 6 estimates incorporate efficiency gains from prior Program Phases and whether the installation sequence has been structured to achieve such gains. Without empirical tracking of hours-per-task across RTU projects, NSPI cannot demonstrate that repetitive work (e.g., project management, standard design elements) benefits from compounding learning, nor can it substantiate claims that process improvements have been systematically captured and applied in the estimation of Phase 6 costs.

Table 5: Summary of Findings – Installation Prioritization and Sequencing

Report Section	Question	Midgard Commentary
3.1	Has NSPI optimized the Project's execution by prioritizing installations based on criticality, complexity, or opportunities for learning-curve benefits?	Prioritization is driven by asset criticality and risk mitigation, rather than complexity or learning-curve opportunities. The schedule lacks the low-to-high complexity sequencing required to facilitate crew efficiency, and the absence of historical productivity metrics prevents verification of claimed process improvements.

[17] Exhibit N-2, NSPI Response to I-2(e), p. 5 of 7, l. 13-18.

3.2 Process Standardization & Cost Reduction

NSPI asserts that its execution strategy for the Project builds upon a foundation of historical experience, stating that:

> *"The methodology used is consistent with prior phases and has been progressively refined based on experience and lessons learned from those prior phases."* [18]

Specifically, NSPI confirmed that:

> *"Historical actuals from the most recent RTU Replacement project (CI 52308, Phase 5) were used in developing the original Phase 6 estimate. Recent experience and actuals from the completed RTU replacements under this project were used in developing the revised Phase 6 estimate."* [19]

And:

> *"Across previous projects, NS Power implemented incremental standardization and Quality Assurance (QA) enhancements, incorporating field feedback and aligning to more current and widely adopted technologies and materials. While program‑level hours‑per‑RTU metrics were not maintained, productivity improved in several ways, including greater predictability, reduced clarification questions, and supply‑chain efficiencies."* [20]

NSPI has implemented *"incremental standardization and Quality Assurance (QA) enhancements, incorporating field feedback and aligning to more current and widely adopted technologies and materials."* [21] These efforts have allegedly yielded tangible standardization achievements in three specific areas:

1. Technology selection via a competitive RFP process, resulting in vendor standardization;[22]
2. Role specialization and clearer labour category definitions;[23] and
3. Quality assurance processes for documentation and IFC packages.

NSPI maintains that these refinements have improved predictability and supply-chain efficiencies. Specifically, NSPI notes that:

[18] Exhibit N-2, NSPI Response to I-2(b), p. 4 of 7, l. 7-8.

[19] Exhibit N-2, NSPI Response to I-2(f)(i), p. 6 of 7, l. 1-4.

[20] Exhibit N-2, NSPI Response to I-2(e), p. 5 of 7, l. 13-18.

[21] Exhibit N-2, NSPI Response to I-2(e), p. 5 of 7, l. 13-15.

[22] Exhibit N-2, NSPI Response to I-5(b), p. 4 of 5, l. 29.

[23] Exhibit N-2, NSPI Response to I-2(e), p. 5 of 7, l. 22-23.

> *"Over time, there has been increased alignment of work activities with the appropriate specialized roles required for RTU replacement projects. This is reflected in the more clearly defined labour categories identified in Phase 6. Assigning tasks to resources with the appropriate expertise has improved task execution efficiency and supported a more optimized use of labour."* [24]

However, a tension exists between these process improvements and scope expansion. While NSPI achieved standardization gains, Phase 6 involves functional requirements that far exceed Phase 1. NSPI explains that:

> *"…there are now over 4 times the number of I/O points to the RTU in Phase 6 as compared to Phase 1. There is also the addition of J-Box cabinets at the Phase 6 sites for marshalling the wiring from the field devices to the RTUs. These advancements reasonably require more engineering, configuration, testing, and validation efforts than would have been required during earlier phases of the program."* [25]

NSPI also argues that:

> *"The greater emphasis on pre-work, detailed planning and QA (Quality Assurance) enhancements have resulted in more efficient installation and commissioning work with greater predictability of time required and reduced clarification questions from the field crews."* [26]

Notwithstanding these assertions, NSPI offers no empirical data to quantify efficiency gains or benchmark prior performance. Without the historical baseline data (lost during the cyber incident), NSPI cannot empirically demonstrate that Phase 6 estimates incorporate efficiency gains derived from Phases 1 through 5, or that process improvements were tracked or memorialized for any of the prior Phases of RTU work. This absence of verifiable metrics undermines claims of process maturity and challenges the reliability of the Phase 6 cost estimates.

3.2.1 Lack of Evidence Supporting NSPI Assertions

3.2.1.1 Labour Planning & Institutional Knowledge

Despite operational standardization, NSPI's ability to demonstrate cost efficiency is materially limited by the absence of formal knowledge management. Knowledge transfer appears to be informal. NSPI states:

[24] Exhibit N-2, NSPI Response to I-2(e), p. 5 of 7, l. 21-25.

[25] Exhibit N-2, NSPI Response to I-3(b)(ii), p. 4 of 5, l. 24-29.

[26] Exhibit N-2, NSPI Response to I-3(b)(ii), p. 5 of 5, l. 18-22.

> *"No internal post-project reviews, close-out reports or formal lessons learned assessments for the earlier RTU Replacement projects were completed."* [27]

This gap between operational experience and documented knowledge creates a risk of institutional memory decay, particularly considering that *"key personnel involved in earlier phases are no longer with the Company"*.[28]

Furthermore, NSPI explicitly states that it:

> *"…did not maintain a formal, program-level hours-per-RTU productivity metric across previous projects. Site conditions and implementation variability (e.g. replacement strategy, condition of documentation, wiring situation) also limit direct comparability on a per-RTU basis."* [29]

Absent reliable productivity benchmarks, cost reasonableness is best assessed through a normalized comparison. The following analysis converts historical data to 2025 dollars to isolate real cost growth attributable to scope and execution rather than inflation. Table 6 presents a side-by-side comparison of Phase 5 and Phase 6 unit costs, converted into 2025 dollars using Statistics Canada's Consumer Price Index. Note that Phase 5 was for replacement of 4 RTUs and was approved in NSPI's 2018 ACE filing.

Table 6: Comparative Analysis of Phase 5 vs. Phase 6 RTU Unit Costs (2025$)[30]

Estimate Element	Cost (Phase 5)	Cost (Phase 6)	Cost per RTU (Phase 5)	Cost per RTU (Phase 6)	Variance ($)	Variance (%)
Regular Labour	$175,896	$1,016,722	$53,093	$72,623	**$19,530**	**36.8%**
Term Labour/ Consulting	$57,880	$273,420	$17,471	$19,530	**$2,059**	**11.8%**
Overtime Labour	$8,775	$121,660	$2,649	$8,690	**$6,041**	**228.1%**
Contracts	$85,000	$459,800	$25,657	$32,843	**$7,186**	**28.0%**

[27] Exhibit N-2, NSPI Response to I-2(h), p. 6 of 7, l. 17-18.

[28] Exhibit N-2, NSPI Response to I-1(a)(i), p. 2 of 4, l. 9-10.

[29] Exhibit N-2, NSPI Response to I-2(e), p. 5 of 7, l. 8-11.

[30] *See P0822-D008-MDL-R00-EXT - Comparative Analysis.xlsx* for supporting calculations. Cost data for Phase 5 is derived from the 2018 RTU Replacements Program (CI 52308). To permit a valid comparison with Phase 6, Phase 5 unit costs have been: (1) normalized using an equivalent completed-RTU factor (4 RTUs); and (2) escalated from the project's 2019 in-service date to 2025 dollars using a cumulative Consumer Price Index adjustment factor (2019–2025 Annual Average variance).

Estimate Element	Cost (Phase 5)	Cost (Phase 6)	Cost per RTU (Phase 5)	Cost per RTU (Phase 6)	Variance ($)	Variance (%)
Travel Expense	$15,300	$119,042	$4,618	$8,503	**$3,885**	**84.1%**
Meals & Entertainment	$5,975	$25,200	$1,804	$1,800	**-$4**	**-0.2%**
Materials (including Equipment) - Misc Listing	$321,960	$1,499,614	$97,182	$107,115	**$9,933**	**10.2%**
Vehicle Overhead	$73,675	$391,564	$22,238	$27,969	**$5,730**	**25.8%**
Contingency (10%)	$60,693	$351,546	$18,320	$25,110	**$6,791**	**37.1%**
Interest Capitalized	$6,678	$7,889	$2,016	$563	**-$1,452**	**-72.0%**
Administrative Overhead	$176,225	$792,507	$53,193	$56,608	**$3,415**	**6.4%**

Regular Labour costs per RTU increased by 36.8%, suggesting either greater technical scope or reduced workforce efficiency. Overtime Labour rose by approximately 228%, indicating a materially higher reliance on premium hours relative to historical norms. Travel expenses increased by 84.1% in real terms, likely driven by the separation of vehicle rental costs and the inclusion of remote sites. In contrast, Materials costs per RTU increased by only 10.2%, indicating relative hardware cost stability, thereby concentrating real cost growth in direct labour and logistical support categories sensitive to execution practices.

3.2.1.2 Quantification & Measurement

Project management frameworks emphasize quantitative performance metrics as essential for validating process improvements. NSPI's reliance on qualitative assessments (e.g., *"greater predictability, reduced clarification questions"*)[31] limits the ability to empirically demonstrate that standardization efforts translated into measurable productivity gains and cost efficiencies.

[31] Exhibit N-2, NSPI Response to I-2(e), p. 5 of 7, l. 17.

Financial data from prior Program Phases offers mixed evidence of estimation accuracy. While five of the six prior Phases were completed under budget, variances were significant, ranging from an overspend of $169,254 or 24.6% (Phase 4) to an underspend of $335,928 or 34.0% (Phase 5). Phase 5 underspend is presumably due in large part to the lack of completion of the 106W Pubnico Point Windfarm RTU.[32]

Contingency was reportedly unused for most Phases. NSPI could not provide specific details on contingency drivers due to the cyber incident.[33] Contingency allowances have trended upward in recent Phases, despite NSPI acknowledging that such funds were required in only one of the five previous Phases (Phase 3).[34] For Phase 6, the contingency is set at 10%,[35] a rate that aligns with the maximum percentage allocated to any prior Phase in the history of the Program. This escalation is not consistent with NSPI's assertion that its estimating methodology relies on "lessons learned" and "progressively refined" experience from prior Phases.[36]

3.2.1.3 Adaptive Learning in Phase 6

Despite these historical gaps, NSPI has demonstrated adaptive learning and improved cost control mechanisms within Phase 6 itself. The most significant evidence of this is the approximate $900,000 cost reduction applied after the completion of the first two Phase 6 sites. This adjustment suggests that the Project team is actively incorporating real-time data to refine the remaining estimate:

> *"…execution experience gained from the two completed sites has allowed for refinement of the Project Manager's labour allocation. Specifically, the Project Manager supports multiple concurrent projects, and labour hours are now distributed across those projects rather than being fully attributed to the RTU Replacement Project as was initially estimated."* [37]

Table 7 illustrates examples of these refinements, where generic assumptions were replaced with site-specific realities.

Table 7: Phase 6 Cost Estimate Refinements (Adaptive Learning)[38]

Cost Estimate Element	Fiscal Change ($)	NSPI Variance Explanation
Project Management	-$111,800	The project manager was determined not to be needed on a full-time basis for this specific project and has the capability

[32] Exhibit N-2, NSPI Response to I-2(i), p. 7 of 7, l. 1-3.

[33] Exhibit N-2, NSPI Response to I-2(c)(ii-iii), p. 4 of 7, l. 17-19.

[34] Exhibit N-2, NSPI Response to I-2(c), p. 4 of 7, l. 17-18.

[35] Exhibit N-1, p. 2 of 6.

[36] Exhibit N-2, NSPI Response to I-2(b), p. 4 of 7, l. 7-8.

[37] Exhibit N-2, NSPI Response to I-11, p. 2 of 2, l. 8-12.

[38] Exhibit N-2, NSPI Response to I-14, Attachment 1.

Cost Estimate Element	Fiscal Change ($)	NSPI Variance Explanation
		to manage additional work outside this scope, resulting in a reduction of estimated days.
Civil Construction	-$80,080	The estimate was reduced because it was determined that only half of the sites require civil construction. This reduction is partially offset by one specific site (4S-Townsend St.) requiring more civil effort than initially anticipated.

The reduction in Project Management hours indicates an optimization of overhead resources, shifting from a dedicated resource model to a shared resource model. Similarly, the adjustment in Civil Construction costs reflects a transition from generic assumptions to site-specific realities. These adjustments indicate that initial Project cost estimates were higher than required. The necessity of such a substantial adjustment early in the Project execution suggests that cost estimates have erred on the side of caution, rather than stemming directly from compounded learning of prior phases.

3.2.2 Conclusions – Process Standardization & Cost Reduction

NSPI asserts it leveraged prior experience to implement tangible standardization in vendor selection, technology platforms, labour role definition, and quality assurance processes. Operational refinements, such as improved predictability and reduced field clarifications, substantiate NSPI's claim that methodologies were *"progressively refined based on experience."* [39] However, the efficacy of these measures in driving cost reduction is obscured by three details:

1. Learning occurred through ad-hoc channels rather than formal post-project reviews or lessons-learned assessments, creating organizational risk given recent personnel turnover.
2. The absence of quantitative productivity metrics (e.g., hours-per-RTU) prevents empirical validation of claimed efficiency gains.
3. An approximate $900,000 budget reduction following just two completed Phase 6 sites suggests that initial estimates either did not rely on available historical efficiency data, or the historical data was not relevant, or the initial estimates were augmented or escalated excessively.

Consequently, while early-Phase experience may have improved execution consistency, it did not yield demonstrable absolute unit cost reductions for RTU replacement activities or tasks.

[39] Exhibit N-2, NSPI Response to I-2(b), p. 4 of 7, l. 7-8.

Table 8: Summary of Findings – Process Standardization & Cost Reduction

Report Section	Question	Midgard Commentary
3.2	Did NSPI leverage pre-Phase 6 experience to standardize the Project's designs, streamline its processes, and hence reduce costs?	Inconclusive. NSPI states it applied prior experience to standardize vendors, technology, labour roles, and quality processes, improving execution consistency and predictability. However, the absence of materials demonstrating formal lessons-learned reviews, limited quantitative productivity metrics, and the post-filing material budget reduction indicate that efficiency gains were not empirically validated and have not translated into unit cost reductions where appropriate.

3.3 Overall Project Prudence & Ratepayer Interest

The following summarizes Midgard's conclusions from the review of the Project:

1. <u>Installation Prioritization and Sequencing:</u> NSPI's decision to sequence installations based on asset condition and criticality was necessary to mitigate immediate failure risks associated with obsolete equipment. However, this approach bypassed opportunities to improve execution efficiency through learning-curve benefits. By not sequencing sites from low-to-high complexity, NSPI misses the opportunity to refine standard procedures on simpler units before addressing complex, control-heavy hubs. The absence of Program-level productivity metrics further prevents empirical verification that repetitive tasks are benefiting from compounding learning.
2. <u>Process Standardization and Cost Reduction:</u> NSPI leverages prior experience to implement standardization in vendor selection, technology platforms, and quality assurance processes, which improves execution consistency. Despite these operational refinements, the absence of formal post-project reviews and quantitative productivity metrics limits the ability to validate claimed efficiency gains. Furthermore, the budget reduction applied after two completed sites implies that initial Project cost estimates were high, in spite of available historical data. Using materials cost as the proxy for the complexity of the equipment, Phase 6 materials costs are comparable with those in Phase 5. The material differences in the Phase 6 cost estimates are tied to labour and overtime.

Table 9 summarizes NSPI's supporting justifications by report section, along with Midgard's independent evaluation and commentary.

Table 9: Project Execution Strategy Conclusions

Report Section	Question	Midgard Commentary
3.1	Has NSPI optimized the Project's execution by prioritizing installations based on criticality, complexity, or opportunities for learning-curve benefits?	Prioritization is driven by asset criticality and risk mitigation, rather than complexity or learning-curve opportunities. The schedule lacks the low-to-high complexity sequencing required to facilitate crew efficiency, and the absence of historical productivity metrics prevents verification of claimed process improvements.
3.2	Did NSPI leverage pre-Phase 6 experience to standardize the Project's designs, streamline its processes, and hence reduce costs?	Inconclusive. NSPI states it applied prior experience to standardize vendors, technology, labour roles, and quality processes, improving execution consistency and predictability. However, the absence of materials demonstrating formal lessons-learned reviews, limited quantitative productivity metrics, and the post-filing material budget reduction indicate that efficiency gains were not empirically validated and have not translated into unit cost reductions where appropriate.

4 PROJECT CONTROLS & GOVERNANCE

This section evaluates NSPI's use of historical data from Phases 1-5 to inform Phase 6 planning and execution, examining whether the utility maintained adequate productivity tracking, applied lessons learned, and incorporated past performance into current estimates. This section will scrutinize the following questions:

1. Did NSPI demonstrate that its reliance on internal resources was more cost-effective than external alternatives?
2. Is the Phase 6 Capital Cost Estimate classification and contingency allowance supported by a data-driven methodology?

4.1 Delivery Model Justification

NSPI's Capital Expenditure Justification Criteria ("**CEJC**") mandates the *"Evaluation of alternative means of acquiring technologies including design and build (NSPI owned)... or contract to others,"* and requires that such alternatives be ranked using financial metrics like Net Present Value ("**NPV**").[40] Despite this requirement, NSPI confirmed that no analysis was performed for the current or previous Phases of the Program. NSPI stated:

> *"No formal comparative cost analysis was undertaken for Phase 6 to evaluate alternative delivery models for allocating work between internal resources and external contractors."* [41]

NSPI further noted that *"[t]his type of analysis was not undertaken for Phases 1 to 5,"* relying instead on a *"similar approach"* of defaulting to internal teams for the core technical scope.[42]

In the absence of a quantitative analysis, NSPI defense relies on qualitative assertions regarding specialized skills and familiarity with the existing system:

> *"The allocation of work was based on the nature of the tasks required, the specialized skills associated with each labour category, and the availability of internal resources to perform the work."* [43]

However, the evidence suggests that the decision to utilize external contractors was driven by capacity constraints rather than cost efficiency. NSPI states it *"did not have the capability of using only internal resources due to the amount of work required"*.[44] While NSPI applies competitive procurement for materials through a

[40] NSPI, Capital Expenditure Justification Criteria, Section 17.1,

[41] Exhibit N-2, NSPI Response to I-5(c), p. 5 of 5, l. 10-11.

[42] Exhibit N-2, NSPI Response to I-5(c)(ii), p. 5 of 5, l. 24-26.

[43] Exhibit N-2, NSPI Response to I-5(c), p. 5 of 5, l. 12-14.

[44] Exhibit N-2, NSPI Response to I-5(c), p. 5 of 5, l. 14-15.

Request for Proposal ("**RFP**") process[45] and for civil works through site-specific quotations based on availability and pricing,[46] no comparable market test was conducted for the high-value system integration and testing scope, representing a procurement governance gap.

4.1.1 Conclusions – Delivery Model Justification

NSPI fails to demonstrate that its internal resource model is more cost-effective than external alternatives. NSPI's indication that no formal comparative cost analysis was undertaken constitutes a direct failure to validate the efficiency of its chosen delivery model as required by the CEJC. While NSPI offers qualitative justifications regarding specialized skills, these claims are unsubstantiated by financial data or market benchmarking. Consequently, NSEB cannot verify whether the significant overhead premium paid for internal labour is prudent.

Table 10: Summary of Findings – Delivery Model Justification

Report Section	Question	Midgard Commentary
4.1	Did NSPI demonstrate that its reliance on internal resources was more cost-effective than external alternatives?	NSPI acknowledges that no formal make-versus-buy analysis was conducted for Phase 6. Although materials and civil works were competitively tendered, core technical work was assigned internally without market testing, and no quantitative evidence was provided to demonstrate that higher internal overhead rates were offset by productivity gains.

4.2 Estimate Basis and Risk Quantification

NSPI's methodology supporting the Phase 6 estimate relies on qualitative expert judgment rather than quantitative historical baselines, deviating from a strictly data-driven approach. In its Application, NSPI asserts the classification of the Phase 6 estimate as an Association for the Advancement of Cost Engineering ("**AACE**") Class 3 Estimate:

> *"The critical scope of this work is well understood based on previous program replacements and the estimate is considered to have AACE Class 3 accuracy."* [47]

[45] Exhibit N-2, NSPI Response to I-5(b), p. 4 of 5, l. 29.

[46] Exhibit N-2, NSPI Response to I-5(a)(i), p. 3 of 5, l. 18-20.

[47] Exhibit N-1, p. 5 of 6.

AACE Class 3 estimates typically require 10-40% project definition and carry an accuracy range of -20% to +30%.[48] NSPI's claim of Class 3 status is technically supported by the level of engineering definition, evidenced by the completion of representative IFC packages for sites like Fourth Lake Hydro and Springhill, alongside detailed scoping documents for others.[49]

However, the accuracy normally associated with a Class 3 classification is undermined by the lack of historical calibration. A Class 3 estimate typically relies on a cost database built from verified actuals to benchmark unit rates.[50] In this case, without granular data from Phases 1-5 to validate assumptions (e.g., hours per RTU), the base estimate carries higher inherent uncertainty than a typical Class 3 estimate derived from a mature dataset.

This lack of granular data extends to the contingency determination. NSPI describes its approach as follows:

> *"Contingency is determined using a combination of internal subject matter expert judgment (professional engineers and project managers) and the non-binding contingency guidelines. Consistent with the maturity checklist this project is being filed as a Class 3 Estimate with a contingency value appropriate to that range. Risks intended to be covered by the contingency are overtime work that may be required, unexpected significant increase in currency exchange rate, or material cost. Risks are well understood based on past program experience, and similar past projects have included a 10% contingency, which has generally been required to complete the intended scope."* [51]

While NSPI has prepared a risk register that catalogues key operational, schedule, and supply-chain risks, the link between these risks and the 10% contingency is qualitative rather than quantitative. The register identifies specific threats (e.g., site accessibility and outage availability) and assigns them qualitative ratings (e.g., "Medium" Impact, "High" Likelihood).[52]

This reliance on qualitative judgment over quantitative modeling is further evidenced by the historical data in Table 11, which illustrates a distinct shift in contingency application from negligible amounts in early Phases to a fixed percentage in recent projects.

[48] AACE Recommended Practice No. 69R-12, Section 3, p. 3 of 21.

[49] Exhibit N-2(C), Attachments 1 & 2.

[50] AACE Recommended Practice No. 69R-12, Section 3, p. 3 of 21.

[51] Exhibit N-1, p. 2 of 6.

[52] Exhibit N-2, NSPI Response to IR-2(g), Attachment 1.

Table 11: Historical RTU Program Costs and Contingency Allocations (Phases 1-6)[53]

CI Number	Phase	Approved Amount ($)	Actual Cost ($)	Variance ($)	Contingency ($)	Contingency (%)
38142	-	$512,974	$410,229	-$102,745	$6,000	1%
40245	1	$459,517	$398,506	-$61,011	$7,500	2%
41428	2	$149,751	$119,268	-$30,483	-	-
43227	3	$687,839	$857,093	-$169,254	$10,933	2%
46572	4	$693,354	$585,319	-$108,035	$47,984	10%
52308	5	$988,056	$652,129	-$335,927	$60,693	10%
51815[54]	6	$5,058,726	-	-	$351,546	10%

The data reveals that while early Phases operated with 0-2% contingency, this sequence of capital projects has standardized to a flat 10% for the most recent Phases (4, 5, and 6) regardless of the specific risk differences between them. Crucially, there is no cost translation of these risks in the Phase 6 estimate. NSPI does not assign a monetary value to the identified threats, nor does it calculate an expected cost exposure (i.e., probability × consequence). There is no evidence of probabilistic modeling (e.g., Monte Carlo analysis) to aggregate these exposures into a calculated risk reserve. As a result, NSPI's 10% contingency operates as a static, policy-based allowance associated with the "Class 3" label, rather than a risk-modeled reserve calibrated to the specific risk profile documented in the register.

4.2.1 Conclusions – Estimate Basis and Risk Quantification

While NSPI's estimate classification (Class 3) aligns with the level of engineering definition (via its representative IFC packages), the valuation of that estimate and its contingency are derived primarily from heuristic (expert) judgment rather than empirical data.

The absence of historical productivity metrics (Phases 1-5) and the inability to verify past costs due to cyber incidents means the estimate lacks the historical data pillar required for a truly data-driven Class 3 estimate. The 10% contingency is a standard allowance but is not mathematically derived from a quantitative risk assessment of the specific Phase 6 uncertainties. Consequently, the estimate is methodologically defensible as judgment-based but fails the test of being data-driven.

[53] Exhibit N-2, NSPI Response to I-2(c)(i) & (h)(i), pp. 4 & 7 of 7. Variance is calculated as Actual Cost minus Approved/Filed Amount, where a positive value indicates an overspend and a negative value indicates an underspend. Based on NSPI's Phase 6 cost build-up, the 10% contingency is applied to direct costs but excludes internal administrative overhead, vehicle overhead, and capitalized interest.

[54] Exhibit N-2, NSPI Response to I-14, Attachment 1.

Table 12: Summary of Findings – Estimate Basis and Risk Quantification

Report Section	Question	Midgard Commentary
4.2	Is the Phase 6 Capital Cost Estimate classification and contingency allowance supported by a data-driven methodology?	NSPI's Phase 6 estimate is classification-compliant but not empirically calibrated. The base unit rates and the 10% contingency are primarily judgment-based, with no quantitative linkage from the risk register to expected risk cost or to the contingency level.

4.3 Overall Project Prudence & Ratepayer Interest

The following summarizes Midgard's conclusions from the review of the Project:

1. Delivery Model Justification: NSPI defaults to an internal resource model for core execution without conducting the comparative financial analysis required by the CEJC. While materials and civil works were competitively procured, the high-value system integration scope was assigned internally based on qualitative assertions of specialized skills rather than demonstrated cost efficiency. The absence of a quantitative make-versus-buy analysis prevents verification that the chosen level of internal labour is the prudent delivery model.
2. Estimate Basis and Risk Quantification: The Phase 6 estimate classification (Class 3) is technically supported by the level of engineering definition but lacks the historical data calibration typically required for such precision. Due to the unavailability of granular data from Phases 1-5, both the base estimate and the 10% contingency allowance rely on judgment rather probabilistic risk modeling or actual realized contingency needs of prior Phases. Consequently, while the estimate methodology is compliant with classification standards, the resulting contingency amount is not data-driven.

Table 15 summarizes NSPI's supporting justifications by report section, along with Midgard's independent evaluation and commentary.

Table 13: Project Controls & Governance Conclusions

Report Section	Question	Midgard Commentary
4.1	Did NSPI demonstrate that its reliance on internal resources was more cost-effective than external alternatives?	NSPI acknowledges that no formal make-versus-buy analysis was conducted for Phase 6. Although materials and civil works were competitively tendered, core technical work was assigned internally without market testing, and no quantitative evidence was provided to

Report Section	Question	Midgard Commentary
		demonstrate that higher internal overhead rates were offset by productivity gains.
4.2	Is the Phase 6 Capital Cost Estimate classification and contingency allowance supported by a data-driven methodology?	NSPI's Phase 6 estimate is classification-compliant but not empirically calibrated. The base unit rates and the 10% contingency are primarily judgment-based, with no quantitative linkage from the risk register to expected risk cost or to the contingency level.

5 ASSESSMENT OF COST REASONABLENESS

This section evaluates the reasonableness of NSPI's cost estimate for the Project to determine whether the proposed expenditure represents a prudent allocation of ratepayer funds, considering the Project's scope, historical performance, procurement approach, and cost allocation methodologies. This section will scrutinize the following questions:

1. Are the substantial increases in labour requirements, per RTU, substantiated by objective evidence of expanded scope, infrastructure complexity, or material changes in site conditions and compliance obligations?
2. Has NSPI demonstrated that equipment and material costs reflect competitive procurement practices and represent reasonable value relative to market conditions and functional requirements?
3. Are indirect cost components (including administrative overhead allocations, vehicle and travel loadings, and capitalized financing costs) calculated using transparent methodologies that ensure appropriate cost recovery without undue burden on ratepayers?

5.1 Labour Hour Escalation & Scope Justification

The assessment of the Project's labour requirements was developed from a constrained but representative evidence base. For three of fourteen sites (91V – Fourth Lake Hydro,[55] 74N – Springhill,[56] and 2V – Avon #2 Hydro[57]), complete Issued for Construction ("**IFC**") packages were available, including schematics, wiring diagrams, terminal layouts, and Request for Work ("**RFW**") forms. For the remaining eleven sites, External Connection Sheets ("**ECS**")[58] and System Operating Diagrams ("**SOD**")[59] provided signal scope and connectivity information.

Regarding Phase 1 data availability, NSPI states:

> *"Phase 1 IFC drawings/packages, scope documents and detailed estimated costs and tasks breakdowns are not available. The records associated with Phase 1 date back approximately 15 years, and the key personnel involved in earlier phases are no longer with the Company… the data required to fully respond to the foregoing question is not expected to be recovered."* [60]

[55] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 1, .pdf p. 1-73.

[56] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 1, .pdf p. 74-240.

[57] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 1, .pdf p. 241-339.

[58] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 2.

[59] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 3.

[60] Exhibit N-2, NSPI Response to I-1(a)(i), p. 2 of 4, l. 7-10 & 13-14.

Consequently, a technical comparison between Phase 1 and Phase 6 scope, complexity, or execution methods cannot be supported by primary documentation.

NSPI's filed estimate allocates 1,939 hours per RTU across nine labour categories, as detailed in Appendix A:. NSPI attributes labour increases relative to Phase 1 to several drivers:[61]

1. A 4.3-fold increase in average I/O points per RTU (from approximately 53 points in Phase 1 to 228 points in Phase 6);
2. Expanded integration with SCADA and IEDs;
3. Addition of junction box cabinets for marshalling field device wiring;
4. Site accessibility constraints (e.g., 91V Fourth Lake); and
5. Maturation of installation practices emphasizing pre-work planning, quality assurance, and controlled cutover execution.

A material driver of variance in field labour categories (SM Electrician, RTU Technician, PLT Field Resources) is the planned installation and commissioning duration per site. NSPI states that:

> *"The typical days on site for an RTU installation is approximately 25 - 32 days depending on actual crew complement. The normal shift length for the Technicians is 8 hours per day."* [62]

However, review of site-specific RFW forms indicates that the total duration allocated for installation and commissioning activities is [redacted]. The RFW specifies [redacted].[63] For a two-person crew (e.g., SM Electrician + RTU Technician) working 8-hour days, this equates to [redacted]. The difference between [redacted] and 25-32 days represents [redacted]. The RFW forms reflect the actual scope of field activities required, [redacted][64] Based on this documented technical scope, a [redacted] installation and commissioning period is considered realistic and technically reasonable. The basis for NSPI's 25-32 day estimate and its reconciliation to RFW-documented durations was not provided.

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[61] Exhibit N-2, NSPI Response to I-3(b)(ii), pp. 4-5 of 5.

[62] Exhibit N-2, NSPI Response to I-6(c), p. 7 of 7, l. 13-15.

[63] Exhibit N-2(C), NSPI Response to I-1, Attachment 1, pp. 1-2 of 339.

[64] Exhibit N-2(C), NSPI Response to I-1, Attachment 1, pp. 1-2 of 339.

Table 14 presents the variances between NSPI's filed labour estimate and Midgard's allocation by resource category. Midgard's allocations are based upon professional opinion and experience. Detailed Phase-by-Phase allocations and role definitions are provided in Appendix A:.

Table 14: Labour Hour Variance Analysis[65]

Resource Category	Total Hours/RTU - NSPI	Total Hours/RTU – Midgard	Variance (Hours)	Variance (%)
SM Electrician	272	150	-122	-44.9%
Engineering	431	255	-176	-40.8%
Telecontrol Technologist	182	135	-47	-25.8%
PLT – Field Resources	176	150	-26	-14.8%
RTU Technician	392	190	-202	-51.5%
Electrical Engineering Technologist	176	102	-74	-42.0%
Drafting SME – CADD	35	35	0	0.0%
Civil Construction	100	100	0	0.0%
Project Manager	175	174	-1	-0.6%
Total	**1939**	**1291**	**-648**	**-33.4%**

The allocation totals 1,291 hours per RTU, representing a 33% reduction relative to NSPI's filed estimate. The largest percentage variances are observed in RTU Technician (52% reduction), SM Electrician (45% reduction), Electrical Engineering Technologist (42% reduction), and Engineering (41% reduction). Smaller variances are observed in Telecontrol Technologist (26% reduction) and PLT Field Resources (15% reduction). Drafting and Civil Construction allocations show no variance. The Project Manager allocation shows minimal variance (1% reduction).

The Project Manager allocation reflects the assessment that project management functions (e.g., Program planning, procurement coordination, schedule oversight, and reporting) include both Program-level activities and site-specific coordination. Day-to-day site coordination and field troubleshooting are assumed to be

[65] See *P0822-D008-MDL-R00-EXT - Comparative Analysis.xlsx* for supporting calculations. NSPI's estimates include both regular and overtime hours. Midgard's estimates reflect regular hours only, with overtime expected to be minimal under normal execution conditions.

embedded within lead technical roles. Notably, NSPI's variance explanation for its updated estimate states that *"the PM was determined not to be needed on a full time basis and has the capability to manage additional work outside this project",* [66] and that Project Management hours have been *"distributed across those projects rather than being fully attributed"* [67] to this Project. This suggests that NSPI's filed 175 hours/RTU may reflect an allocation methodology rather than project-specific effort traceable to discrete deliverables.

5.1.1 Conclusions

The 33% variance between NSPI's filed labour estimate (1,939 hours/RTU) and the allocation derived from Phase 6 technical documentation (1,291 hours/RTU) demonstrates that filed labour requirements lack sufficient evidentiary support, despite qualitatively reasonable drivers such as increased I/O points and IED integration. The filed estimate lacks the work breakdown structures, task-duration standards, and deliverable mapping necessary to verify that labour hours scale proportionally to these scope drivers.

To resolve the specific discrepancies driving this variance, NSPI should have:

1. Reconciled assumed installation and commissioning durations to the site-specific RFW documentation;
2. Documented the attribution methodology for Program-level project management hours to ensure they reflect direct project effort; and
3. Provided a task-level labour basis of estimate that explicitly maps hours to discrete deliverables.

Considering the lack of comparative data provided in evidence and the material variances identified, Midgard recommends a reduction of 30% in labour hours to align the estimate with a technically supportable baseline that reflects reasonable productivity.

Table 15: Summary of Findings – Labour Hour Escalation & Scope Justification

Report Section	Question	Midgard Commentary
5.1	Are the substantial increases in labour requirements, per RTU, substantiated by objective evidence of expanded scope, infrastructure complexity, or material changes in site conditions and compliance obligations?	While NSPI identifies valid complexity drivers, the specific magnitude of labour increases remains unsubstantiated. A 33% variance exists between NSPI's filed estimate and an independent allocation derived from Phase 6 technical documents. This variance is driven by unresolved disputes regarding installation duration and the absence of task-level traceability. Midgard recommends a 30% reduction in labour hours to reflect reasonable

[66] Exhibit N-2, NSPI Response to I-14, Attachment 1.

[67] Exhibit N-2, NSPI Response to I-11(a), p. 2 of 2, l. 10-11.

Report Section	Question	Midgard Commentary
		productivity levels supported by technical documentation.

5.2 Material Procurement & Cost Competitiveness

NSPI has employed a structured procurement strategy that balances competitive tension with the operational benefits of standardization. NSPI confirmed that the procurement of major equipment, specifically the RTUs was conducted through a competitive RFP process. This process utilized a "Supplier of Choice" evaluation model that weighed pricing, technical compliance, and delivery capability, ultimately resulting in the selection of NovaTech Automation.[68]

The use of a competitive RFP for the primary hardware cost driver demonstrates that market forces were leveraged to establish a fair price baseline. Furthermore, the selection of a single vendor via this process aligns with long-term operational efficiency goals by minimizing inventory diversity and reducing training burdens. Complementing this equipment strategy, NSPI applies similar rigour to service procurement. NSPI states:

> *"For civil engineering services, NS Power routinely engages contractors from its approved EMSA list, including Black & McDonald Ltd. and Harbour Construction. Both firms are familiar with NS Power's standards and the civil work typically associated with RTU installations. Requests for quotations are issued based on site-specific civil packages, and the contractor with availability and competitive pricing is selected."* [69]

NSPI also provided a detailed breakdown of material cost variances between the current Phase 6 and the previous Phase 1. NSPI attributed cost increases to two distinct categories, noting first that:

> *"Material pricing in Phase 6 reflects cumulative inflation and market-driven cost increases over the 15 years since Phase 1. Global supply chain disruptions, price increases during and after the COVID pandemic and currency fluctuations (i.e. lower Canadian dollar) have contributed to higher vendor pricing relative to Phase 1."* [70]

To substantiate the second category (functional requirements) NSPI presented specific technical metrics:

[68] Exhibit N-2, NSPI Response to I-5, Attachment 12.

[69] Exhibit N-2, NSPI Response to I-5(a)(i), p. 3 of 5, l. 15-20.

[70] Exhibit N-2, NSPI Response to I-3(b)(i), p. 4 of 5, l. 4-8.

> *"…there are now over 4 times the number of I/O points to the RTU in Phase 6 as compared to Phase 1. There is also the addition of J-Box cabinets at the Phase 6 sites for marshalling the wiring from the field devices to the RTUs."* [71]

By quantifying this technical complexity, NSPI effectively distinguishes necessary scope evolution from unjustified "scope creep." The material costs, therefore, reflect not merely a replacement of like-for-like assets, but the acquisition of more capable infrastructure required for modern grid integration. Furthermore, an internal technical review of the confidential vendor quotes and material lists has revealed no anomalies regarding unit pricing or specifications.[72]

5.2.1 Conclusions – Material Procurement & Cost Competitiveness

NSPI utilized appropriate competitive tendering processes for major equipment and leveraged established service agreements for labour and civil works, ensuring pricing reflects current market conditions. The substantial cost variances relative to early Phases are adequately justified by the quantifiable increase in functional requirements and verifiable macroeconomic factors, including inflation and currency devaluation. The material costs presented in the application represent reasonable value for the enhanced functionality delivered.

Table 16: Summary of Findings – Material Procurement and Cost Competitiveness

Report Section	Question	Midgard Commentary
5.2	Has NSPI demonstrated that equipment and material costs reflect competitive procurement practices and represent reasonable value relative to market conditions and functional requirements?	Yes. Competitive tendering for major equipment and master service agreements for civil works confirmed market rates. Material cost variances relative to early Phases are justified by quantified functional increases and verifiable macroeconomic inflation.

5.3 Indirect Cost Allocation & Transparency

NSPI applies Labour Administrative Overhead ("**AO**") rates of 57.79% (2024), 56.63% (2025), and 53.98% (2026 onwards). Contractor AO rates are significantly lower, trending downward from 15.27% in 2024 to 10.45% by 2026, as shown in Table 17.

[71] Exhibit N-2, NSPI Response to I-3(b)(ii), p. 4 of 5, l. 24-26.

[72] Exhibit N-2, NSPI Response to I-3, Confidential Attachments 1-3.

Table 17: Comparative Overhead Rates (Internal vs. Contractor)[73]

Year	Internal Labour AO Rate	Contractor AO Rate
2024	57.79%	15.27%
2025	56.63%	14.46%
2026+	53.98%	10.45%

To mitigate ratepayer burden during periods of high resource utilization, the methodology incorporates a specific adjustment for overtime. Notably, NSPI adjusts total Overtime Labour by 50% before applying the capital labour driver, ensuring that only half of overtime costs attract administrative overhead.[74] This mechanism prevents excessive overhead recovery and combined with the downward trend in AO rates through 2026, indicates that the project is not subject to escalating indirect cost burdens over its lifecycle.

Regarding logistics, recent cost variance reports indicate a modification in cost categorization where rental vehicle costs, previously bundled with general travel expenses, are now separated. This reclassification enhances the granularity and visibility of logistics expenditures.[75]

Finally, the Allowance for Funds Used During Construction ("**AFUDC**") is calculated at a standard rate of 6.72%. The total calculated AFUDC for the project is approximately $7,889, accrued on eligible project spend prior to the in-service date.[76] This amount represents a negligible fraction of the total capital cost, confirming that financing costs are being recovered at approved levels without disproportionately inflating the Project's asset value.

5.3.1 Conclusions – Indirect Cost Allocation & Transparency

NSPI adheres to NSEB-approved accounting policies for Administrative Overhead and AFUDC. The specific exclusion of 50% of overtime labour from overhead application and the granular separation of travel expenses demonstrate a prudent approach to cost allocation. Consequently, the indirect cost mechanisms appear reasonable, and scrutiny should remain focused on direct labour management rather than overhead methodologies.

[73] Exhibit N-2, NSPI Response to I-4(a-b), p. 2 of 4, l. 11 to p. 3, l. 1.

[74] Exhibit N-2, NSPI Response to I-4(a-b), p. 3 of 4, l. 12-14.

[75] Exhibit N-2, NSPI Response to I-14, Attachment 1. Previously, all travel-related costs (hotels, meals, and vehicle rentals) were lumped into a single line item. In the new estimate, rental vehicles have been broken out into their own specific line item.

[76] Exhibit N-2, NSPI Response to I-14, Attachment 2.

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Table 18: Summary of Findings – Indirect Cost Allocation & Transparency

Report Section	Question	Midgard Commentary
5.3	Are indirect cost components (including administrative overhead allocations, vehicle and travel loadings, and capitalized financing costs) calculated using transparent methodologies that ensure appropriate cost recovery without undue burden on ratepayers?	Yes. Indirect cost components utilize transparent methodologies consistent with approved accounting policies. The 50% reduction in overhead application on overtime labour and the separation of vehicle loadings minimize undue burden.

5.4 Overall Project Prudence & Ratepayer Interest

The following summarizes Midgard's conclusions from the review of the Project:

1. Labour Hour Escalation and Scope Justification: The filed labour estimate of 1,939 hours per RTU lacks sufficient evidentiary support. While qualitative drivers (e.g. increased I/O points and IED integration) justify some level of effort increase, the magnitude of the variance relative to industry norms and technical documentation is unsubstantiated. Furthermore, the absence of task-level traceability and historical productivity data prevents verification of efficiency gains expected from standardization. Consequently, Midgard recommends a 30% reduction in labour hours to align the estimate with reasonable productivity levels supported by technical documentation.
2. Material Procurement and Cost Competitiveness: NSPI utilizes appropriate competitive tendering processes for major equipment (RTUs) and leverages established master service agreements for civil works, ensuring pricing reflects current market conditions. The material cost variances relative to early Phases are adequately justified by quantifiable increases in functional requirements and verifiable macroeconomic factors, including inflation and currency devaluation. The material costs presented in the application represent reasonable value for the enhanced functionality delivered.
3. Indirect Cost Allocation and Transparency: Indirect cost components utilize transparent methodologies consistent with NSEB-approved accounting policies. The specific exclusion of 50% of overtime labour from overhead application and the granular separation of travel expenses demonstrate a prudent approach to cost allocation that minimizes undue burden on ratepayers. Accordingly, the indirect cost mechanisms appear reasonable, and scrutiny should remain focused on direct labour management rather than overhead methodologies.

Based on the findings above, Midgard recommends the following for NSEB consideration:

1. Adjustment to Labour Estimate: Reduce the approved labour hours for the Project by 30% to reflect a technically supportable baseline consistent with RFW documentation.

2. Enhanced Reporting Requirements: Direct NSPI to (i) reconcile assumed installation durations to site-specific technical documents, (ii) document the attribution methodology for Program-level project management, and (iii) provide a task-level labour basis of estimate that explicitly maps hours to discrete deliverables for future Phases.

Table 19 summarizes NSPI's supporting justifications by report section, along with Midgard's independent evaluation and commentary.

Table 19: Assessment of Cost Reasonableness Conclusions

Report Section	Question	Midgard Commentary
5.1	Are the substantial increases in labour requirements per RTU substantiated by objective evidence of expanded scope, infrastructure complexity, or material changes in site conditions and compliance obligations?	While NSPI identifies valid complexity drivers, the specific magnitude of labour increases remains unsubstantiated. A 33% variance exists between NSPI's filed estimate and an independent allocation derived from Phase 6 technical documents. This variance is driven by unresolved disputes regarding installation duration and the absence of task-level traceability. Midgard recommends a 30% reduction in labour hours to reflect reasonable productivity levels supported by technical documentation.
5.2	Has NSPI demonstrated that equipment and material costs reflect competitive procurement practices and represent reasonable value relative to market conditions and functional requirements?	Yes. Competitive tendering for major equipment and master service agreements for civil works confirmed market rates. Material cost variances relative to early Phases are justified by quantified functional increases and verifiable macroeconomic inflation.
5.3	Are indirect cost components (including administrative overhead allocations, vehicle and travel loadings, and capitalized financing costs) calculated using transparent methodologies that ensure appropriate cost recovery without undue burden on ratepayers?	Yes. Indirect cost components utilize transparent methodologies consistent with approved accounting policies. The 50% reduction in overhead application on overtime labour and the separation of vehicle loadings minimize undue burden.

6 CONCLUSIONS & RECOMMENDATIONS

6.1 Conclusions

Table 20 summarizes Midgard's findings regarding NSPI's Project execution strategy, controls and governance, and cost estimating decisions for the Project.

Table 20: Summary of Conclusions

Report Section	Question	Midgard Commentary
3.1	Has NSPI optimized the Project's execution by prioritizing installations based on criticality, complexity, or opportunities for learning-curve benefits?	Prioritization is driven by asset criticality and risk mitigation, rather than complexity or learning-curve opportunities. The schedule lacks the low-to-high complexity sequencing required to facilitate crew efficiency, and the absence of historical productivity metrics prevents verification of claimed process improvements.
3.2	Did NSPI leverage pre-Phase 6 experience to standardize the Project's designs, streamline its processes, and hence reduce costs?	Inconclusive. NSPI states it applied prior experience to standardize vendors, technology, labour roles, and quality processes, improving execution consistency and predictability. However, the absence of materials demonstrating formal lessons-learned reviews, limited quantitative productivity metrics, and the post-filing material budget reduction indicate that efficiency gains were not empirically validated and have not translated into unit cost reductions where appropriate.
4.1	Did NSPI demonstrate that its reliance on internal resources was more cost-effective than external alternatives?	NSPI acknowledges that no formal make-versus-buy analysis was conducted for Phase 6. Although materials and civil works were competitively tendered, core technical work was assigned internally without market testing, and no quantitative evidence was provided to demonstrate that higher internal overhead rates were offset by productivity gains.
4.2	Is the Phase 6 Capital Cost Estimate classification and contingency allowance supported by a data-driven methodology?	NSPI's Phase 6 estimate is classification-compliant but not empirically calibrated. The base unit rates and the 10% contingency are primarily judgment-based, with no quantitative linkage from the risk register to expected risk cost or to the contingency level.

Report Section	Question	Midgard Commentary
5.1	Are the substantial increases in labour requirements per RTU substantiated by objective evidence of expanded scope, infrastructure complexity, or material changes in site conditions and compliance obligations?	While NSPI identifies valid complexity drivers, the specific magnitude of labour increases remains unsubstantiated. A 33% variance exists between NSPI's filed estimate and an independent allocation derived from Phase 6 technical documents. This variance is driven by unresolved disputes regarding installation duration and the absence of task-level traceability. Midgard recommends a 30% reduction in labour hours to reflect reasonable productivity levels supported by technical documentation.
5.2	Has NSPI demonstrated that equipment and material costs reflect competitive procurement practices and represent reasonable value relative to market conditions and functional requirements?	Yes. Competitive tendering for major equipment and master service agreements for civil works confirmed market rates. Material cost variances relative to early Phases are justified by quantified functional increases and verifiable macroeconomic inflation.
5.3	Are indirect cost components (including administrative overhead allocations, vehicle and travel loadings, and capitalized financing costs) calculated using transparent methodologies that ensure appropriate cost recovery without undue burden on ratepayers?	Yes. Indirect cost components utilize transparent methodologies consistent with approved accounting policies. The 50% reduction in overhead application on overtime labour and the separation of vehicle loadings minimize undue burden.

6.2 Recommendations

This section outlines Midgard's recommended actions for the Project:

1. Adjustment to Labour Estimate: Reduce the approved labour hours for the Project by 30% to reflect a technically supportable baseline consistent with RFW documentation.
2. Enhanced Reporting Requirements: Direct NSPI to (i) reconcile assumed installation durations to site-specific technical documents, (ii) document the attribution methodology for Program-level project management, and (iii) provide a task-level labour basis of estimate that explicitly maps hours to discrete deliverables for future Phases.

APPENDIX A: LABOUR ALLOCATION COMPARATIVE ANALYSIS

A.1 Methodology

The allocation methodology applies a conservative benchmarking approach. Following review of ECS and SOD documentation for all fourteen sites, the three sites with complete IFC packages (91V – Fourth Lake Hydro,[77] 74N – Springhill,[78] and 2V – Avon #2 Hydro[79]) were identified as having some of the highest RTU point counts and signal density within Phase 6. The workload derived from these IFC packages was used as the reference basis for evaluating labour requirements across all sites.

Labour is scaled proportionally to documented signal scope rather than applied uniformly. The resulting allocation reflects the time required to perform engineering and design, RTU configuration and database setup, signal mapping and parameter settings, point-to-point testing of digital and analog signals, control output verification and functional testing, communication validation and SCADA integration, and final commissioning and cutover activities.

Travel time is allocated at 2 hours per day of site presence, reflecting average commute time of approximately 47 minutes[80] each way plus mobilization activities (vehicle preparation, equipment pickup, site access). This results in [redacted] of travel allocation for roles with continuous site presence during the [redacted][81] (i.e., SM Electrician, RTU Technician, PLT Field Resources) and proportionally lower allocations for roles with intermittent site visits (i.e., Engineering, Telecontrol Technologist, Electrical Engineering Technologist, Project Manager). No travel time is allocated for Civil Construction, consistent with NSPI's original estimate.[82]

[77] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 1, .pdf p. 1-73.

[78] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 1, .pdf p. 74-240.

[79] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 1, .pdf p. 241-339.

[80] Exhibit N-2, NSPI Response to I-10(b), Attachment 1.

[81] Exhibit N-2(C), NSPI Response to I-1, Attachment 1, pp. 1-2 of 339.

[82] Exhibit N-2, NSPI Response to I-6(b), p. 5 of 7. “Civil Construction” Time Travel = 0.

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A.2 Comparative Tables

Table 21 presents a Phase-by-Phase labour allocation across nine resource categories, totaling 1,291 hours per RTU, alongside NSPI's filed estimate of 1,939 hours per RTU. The labour comparison is structured using the role definitions in Table 22.

Table 21: Comparative Analysis Against NSPI Filed Estimate (Hours per RTU)[83]

Resource	Design		Installation		Testing / Commissioning		Project Management		Travel		Totals	
	NSPI	Protech	NSPI	Protech	NSPI	Protech	NSPI	Protech	NSPI	Protech	NSPI	Protech
SM Electrician	14		108	80	110	40			40	30	**272**	**150**
Engineering	403	240	7	7	7				14	8	**431**	**255**
Telecontrol Technologist	154	120	7	7	7				14	8	**182**	**135**
PLT – Field Resources				80	144	40			32	30	**176**	**150**
RTU Technician	64	40	164	80	108	40			56	30	**392**	**190**
Electrical Engineering Technologist	148	80	7	7	7	7			14	8	**176**	**102**
Drafting	35	35									**35**	**35**
Civil Construction			100	100							**100**	**100**
Project Manager							168	168	7	6	**175**	**174**
Totals:	**818**	**515**	**393**	**361**	**383**	**127**	**168**	**168**	**177**	**120**	**1939**	**1291**

[83] See *P0822-D008-MDL-R00-EXT - Comparative Analysis.xlsx* for supporting calculations.

1 Table 22 defines the scope of responsibilities for each labour category evaluated in the Project's replacement analysis, as derived from professional experience in utility protection and control projects and aligned with the task descriptions provided in NSPI's labour breakdown[84] and site-specific RFW forms (i.e., for 91V – Fourth Lake Hydro,[85] 74N – Springhill,[86] and 2V – Avon #2 Hydro[87]).

4 **Table 22: Role Definitions and Responsibility Matrix**

Resource Category	Primary Responsibility	Tasks and Deliverables
SM Electrician	Provides senior electrical oversight and technical authority for RTU-related field activities	▪ Interpret ECS drawings, wiring diagrams, and terminal layouts ▪ Supervise electrical installation and verify compliance with standards ▪ Resolve complex field wiring and grounding issues ▪ Coordinate field electrical activities with RTU Technicians and PLTs ▪ Verify readiness for testing and commissioning ▪ Support troubleshooting during commissioning ▪ Enforce electrical safety and lock-out/tag-out procedures
Engineering	Responsible for RTU system design validation and engineering support	▪ Review and approve RTU configurations and point lists ▪ Verify I/O mapping and control logic ▪ Address technical RFIs and design changes ▪ Provide engineering support during installation and commissioning ▪ Confirm final system performance and compliance ▪ RTU setting and configuration

[84] Exhibit N-2, NSPI Response to I-6(b), pp. 4-6 of 7.

[85] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 1, .pdf p. 1-73.

[86] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 1, .pdf p. 74-240.

[87] Exhibit N-2(C), NSPI Response to I-1(b), Attachment 1, .pdf p. 241-339.

Resource Category	Primary Responsibility	Tasks and Deliverables
Telecontrol Technologist	Responsible for RTU communications and SCADA connectivity	▪ Configure RTU communication interfaces (Ethernet, serial) ▪ Set up and validate communication protocols (e.g., DNP3, IEC 61850) ▪ Test RTU communications with the control center ▪ Validate SCADA point status and data integrity ▪ Troubleshoot communication and data transfer issues
PLT – Field Resources	Provides operational support for power system equipment associated with RTU controls	▪ Perform equipment isolation, switching, and outage preparation ▪ Support safe execution of control testing on field equipment ▪ Coordinate switching activities with the control center ▪ Assist with energization and de-energization activities
RTU Technician	Primary technical resource for RTU installation, configuration, and testing	▪ Install RTU hardware, I/O cards, and communication modules ▪ Load and manage RTU configurations and databases ▪ Perform point-to-point testing for digital inputs (DI), analog inputs (AI), and digital outputs (DO) ▪ Troubleshoot RTU hardware and configuration issues ▪ Lead RTU technical activities during commissioning
Electrical Engineering Technologist	Provides technical support bridging engineering design and field execution	▪ Assist with review of wiring and terminal connections ▪ Support I/O verification and testing activities ▪ Provide on-site technical assistance during installation ▪ Assist with troubleshooting and issue resolution ▪ Support RTU setting and configuration
Drafting SME – CADD	Responsible for technical documentation and as-built drawings	▪ Update External Connection Sheets (ECS) and wiring diagrams ▪ Incorporate field redlines into drawings ▪ Produce and quality-check as-built documentation

Resource Category	Primary Responsibility	Tasks and Deliverables
Civil Construction	Executes civil works required to support RTU installation	▪ Install foundations, conduits, and trenches ▪ Prepare mounting locations for RTU cabinets and junction boxes ▪ Restore site conditions following installation
Project Manager	Manages project execution, coordination, and delivery	▪ Plan and schedule site activities ▪ Coordinate engineering, field, and telecom resources ▪ Manage outages, risks, and change control ▪ Track progress and report to stakeholders ▪ Oversee project close-out and documentation

1

APPENDIX B: RESUMES

Please refer to the following pages.

Michael Walsh, MIR

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MIDGARD CONSULTING

PROFILE

Energy executive with international experience who has achieved success in three distinct lines of business: as portfolio manager, energy marketer, and renewable energy development team leader. Fluent in both English and French.

EXPERIENCE

LEADERSHIP

- Built, managed, and mentored professional teams.
  - Team of 10 in Vancouver (Brookfield Renewable Power Inc.).
  - Team of 6 in Latvia (Central Bank of the Republic of Latvia).
- Crafted and implemented strategic undertakings.
  - West coast project development.
  - Foreign exchange reserves investment and risk management.
- Built multi-billion-dollar hydro project development portfolio (50+ projects).
- Board member of various industry associations.
  - Independent Power Producers of British Columbia.
- Association québécoise de la production d’énergie renouvelable.

DEAL MAKING

- Closer: Energy derivatives marketer (helped clients achieve revenue/cost certainty).
- M&A: Lead or co-lead of several hydro transactions.
- Negotiated 2-year ($200M) power sales and transmission agreements.
- Problem Resolver: Power purchase agreements (Enron).
- Negotiated three $100M asset management agreements with Wall Street giants.
- Executed a Power Purchase Agreement with the Government of Sierra Leone.

PROJECT FINANCE

- Fashioned derivative transactions to enable larger corporate loans.
- Participated in project financing efforts (non-recourse financing).
- Thorough capital markets knowledge.
  - Bonds, derivatives, risk management, and options theory.
- Interacted with Federal Reserve and other central banks, World Bank & IMF, Bank for international settlements.

CONTINUAL LEARNING

- Real Options course; Media training; First nations training.
- Swiss National Bank (central banker training course).
- Direct involvement in several electricity policy change efforts.

FIRST NATIONS

- Established First Nation partnerships:
  - Approximately $1.2B hydroelectric project (3 First Nations + crown utility).
  - Approximately $150M hydroelectric.
  - Initiated or supported approximately a dozen other negotiations.

- Board member for First Nation partnerships:
  - Kwagis Power.
  - Wa’as Power.
  - Chewijin Shu Wind Corporation.
- Presenter to First Nation organizations and assemblies.

E M P L O Y M E N T

MIDGARD CONSULTING INC. 2009 - Present

Principal, Vancouver BC

- Providing project management and consulting services for electrical utilities, government, First Nations, and renewable energy project developers.
- Focus on business deal-making, strategic advice, and energy market analysis.

BROOKFIELD RENEWABLE POWER INC. 2002 – 2009

Vice President of Business Development – Canada/Hydro, Gatineau QC & Vancouver BC

- Responsible for project origination, design, permitting and competitive bidding.
- Oversaw budgets of approximately $3M to $7M per year.
- Held various prior positions in the Trading and Market group.

CIBC WORLD MARKETS 1996 - 2002

Director, Commodity Products: Marketer, Calgary AB

- → Achieved annual revenue targets of approximately $2M to $3M per year.
- → CIBC World Market’s 1st Alberta electricity trade.

Associate, Commodity Products: Profit & Loss Officer, Toronto ON

CENTRAL BANK OF THE REPUBLIC OF LATVIA 1993 - 1995

Portfolio Manager, Foreign Exchange Department, Riga Latvia

- Pioneering work (Latvia regained independence in 1991)

E D U C A T I O N

MASTER OF INDUSTRIAL RELATIONS 1995

- Queen’s University
- Published “Reforming the Canada Pension Plan” [http://lccn.loc.gov/98230873]

BACHELOR OF SOCIAL SCIENCE, HONOURS ECONOMICS, MAGNA CUM LAUDE 1993

- University of Ottawa

Matthew Matusiak, P.Eng.

mmatusiak@midgard-consulting.com | 604 353 4509

MIDGARD CONSULTING

PROFILE

A dependable and driven professional engineer with a Bachelor of Science in Electrical Engineering and work experience in technical analysis and project planning, project management, due diligence analysis, and business development activities in the energy industry. Emphasizes completing work in a safe and responsible manner and can convey results to multi-disciplinary personnel and clients through strong verbal and written proficiencies.

INDUSTRY EXPERIENCE

MIDGARD CONSULTING INC. 2021 - Present

Consultant, Vancouver BC

- Delivered consulting services across the electricity industry to clients including electric utilities, municipalities, First Nations, and renewable energy developers.
- Conducted comprehensive analyses of solar photovoltaic systems using PSS/E, assessing integration, performance, and grid impact, including power output, voltage stability, and responses to transient conditions like voltage fluctuations, frequency variations, and disturbances.
- Conducted financial and technical due diligence and financial modeling for the Ontario Financing Authority under the Aboriginal Loan Guarantee Program, supporting Indigenous participation in renewable energy and transmission projects.
- Assisted in preparing intervener evidence for the Alberta Utilities Commission in EPCOR Distribution and Transmission Inc.'s 2023-2025 TFO Tariff Application, evaluating transformer fleet replacement rates and proposing reductions to EPCOR's capital expenditure portfolio.
- Contributed to expert evidence for the Office of the Utilities Consumer Advocate in AUC Proceeding 28174, reviewing AltaLink's 2024-2025 General Tariff Application, focusing on wildfire mitigation, risk assessment methodology, and capital expenditure justifications.
- Assisted in preparing expert evidence for the Newfoundland & Labrador Consumer Advocate, analyzing utility capital budgets and regulatory approvals, including assessments of capital budget envelopes, asset refurbishment prioritization, CAPEX investment outcomes, and reliability metrics (SAIDI/SAIFI).
- Contributed to expert evidence for the Nova Scotia Utility and Review Board in Matter M11927, evaluating Nova Scotia Power Inc.'s Authorization to Overspend Application for the Ruth Falls Main Dam Refurbishment Project, assessing cost overruns, project execution, and past regulatory decisions.
- Managed interdisciplinary teams to prepare regulatory filings and expert reports for the BC Utilities Commission and Manitoba Public Utilities Board.
- Audited Pre-Construction Development Costs (PCDC) of terminated Feed-in Tariff (FIT) contracts from over 150 suppliers in Ontario and conducted screening and on-site audits of solar photovoltaic infrastructure as Vendor of Record for Feed-in Tariff Contract facilities.
- Developed feasibility studies, conceptual designs, and cost estimates to support early-stage renewable energy projects.
- Managed project operations, including coordination of technical consultants, budget tracking, status reporting, and overseeing construction plans, procurement, vendor selection, and commissioning activities.

CANADIAN NUCLEAR LABORATORIES 2021

Electrical Engineering Intern, Chalk River ON

- Designed retrofits and modifications to existing electrical engineering systems.
- Performed electrical power studies (e.g., load flow, short circuit, coordination, and arc flash) using power studies ETAP software.
- Prepared specifications of technical components for electrical systems.
- Prepared design documentation including design plans, concept reports, design requirements, design descriptions, design manuals, design guides, technical specifications, and technical notes.
- Engineering support during the construction, installation, and commissioning project phases.
- Customer liaison.
- Develop engineering specifications and standards facilitating a consistent design approach.

CANADIAN NUCLEAR LABORATORIES 2019 - 2021

Project Engineering Representative, Chalk River ON

- Interacted with design participants, operations engineering, technical staff, and nuclear operators to obtain technical input as required to meet project and client requirements in an Integrated Project Delivery (IPD) method.
- Provided technical support during the design, procurement, construction, and commissioning phases of assigned projects.
- Prepared technical documents, work scopes and specifications.
- Aided in surveillance of design, construction, and commissioning activities.
- Assessed equipment selection options and make recommendations.
- Supported and implemented the project quality assurance plan.
- Assisted in developing project work packages, deliverables, budgets, and schedules.
- Ensured that deliverables meet the quality objectives of the project and are completed on schedule and within budget.
- Identified, assessed, and initiated changes to approved design, work scope, budgets and schedules following applicable change control processes.

CANADIAN NUCLEAR LABORATORIES 2018 - 2019

Co-op Student Designer, Chalk River ON

- Updated multi-disciplinary technical drawings using AutoCAD software.
- Examined technical documentation to extract information on equipment specifications and contractual obligations relating to the construction project and its clients.

CANADIAN NUCLEAR LABORATORIES 2018

Laboratory Renewal Projects Co-op Student, Chalk River ON

- Interpreted engineering drawings by comparing specifications to installed systems on the construction site, checking for errors and overall quality control.
- Maintained a Master Equipment List of all components installed to date in construction.
- Participated in client meetings with the project team to interpret needs and requirements and represent them in the field.

EDUCATION & TRAINING

BACHELOR OF SCIENCE, ELECTRICAL AND COMPUTER ENGINEERING 2019

- University of Victoria, Victoria BC

BUSINESS ADMINISTRATION DIPLOMA 2013

- University of the Fraser Valley, Abbotsford BC

PROFESSIONAL REGISTRATIONS

PROFESSIONAL ENGINEER, BRITISH COLUMBIA

PROFESSIONAL ENGINEER, YUKON

PROFESSIONAL ENGINEER, ONTARIO

Tazrin Priyanka, M.Sc., E.I.T.

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MIDGARD CONSULTING

PROFILE

Energy consultant with experience advising utilities, regulators, municipalities, First Nations, and renewable energy developers on transmission planning, renewable project feasibility, and utility-scale infrastructure investments. Skilled in financial and techno-economic modeling, cost-benefit and portfolio analysis, and scenario-based decision support, with experience preparing regulatory filings and expert reports. Combines strong data analytics and energy system modeling expertise with project management experience to deliver practical, investment-grade solutions for power system planning and long-term strategy.

EXPERIENCE

TECHNICAL EXPERIENCE

- Data Analysis & Statistical Modeling: Proficient in Python, SQL, C++, VBA, MS Access, MS Excel, and SPSS for data management, quantitative analysis, automation, and model development.
- Engineering & Design Tools: Experienced with AutoCAD, SketchUp, Revit, AGi32, and SolidWorks for drafting, 3D modeling, lighting analysis, and engineering design.
- Project Planning & Scheduling: Skilled in MS Project and Primavera P6 for schedule development, critical path analysis, and project controls.
- Energy & System Simulation: Applied HOMER Pro, RETScreen, TRNSYS, HAP, eQuest, MATLAB, and HOT2000 for energy modelling, system optimization, building performance analysis, and renewable integration studies.

EMPLOYMENT

Midgard Consulting INC.

Junior Consultant, Edmonton, AB *June 2024 – Present*

- Delivered consulting services across the electricity sector to utilities, municipalities, First Nations, and renewable energy developers.
- Contributed to transmission route alternatives memo by assessing route length, feasibility, environmental constraints, Indigenous communities, and resource development opportunities.
- Supported cost-benefit analyses and energy portfolio development, including solar and wind site screening across multiple jurisdictions.
- Conducted screening and feasibility assessments for renewable energy projects in multiple regions.
- Developed financial models for utility-scale infrastructure, including scenario and sensitivity analysis to support investment, portfolio optimization, and long-term planning decisions.
- Supported regulators including the IESO, Ontario Energy Board, Building Ontario Fund (BOF, formerly Ontario Finance Authority) and other public-sector stakeholders on power system, financial, and business case matters.
- Managed an interdisciplinary team of engineers to engage in regulatory filings and preparation of expert reports for submission to the BC Utilities Commission, Manitoba Public Utilities Board, Ontario Energy Board, and Nova Scotia Energy Board.
- Worked in a team environment to identify and develop business development opportunities.
- Served as Project Manager for regulatory proceedings, feasibility studies, technology reviews, and economic modeling mandates.
- Oversaw project delivery, including consultant coordination, budget management, status reporting, and cross-team collaboration.

CAN GROW HERE INC.

Research & Design Associate, Edmonton, AB *September 2023 – May 2024*

- Performed building energy simulation in TRNSYS and economic feasibility analysis for controlled CEA facility.
- Performed modeling in SketchUp, Revit and worked in Agi32 for lighting and shading of CEA facility.
- Participated in clean energy generation (solar, wind, hydro) and techno-economic analysis for the CEA environment.
- Performed background research, report writing, grant application writing and PowerPoint presentation.
- Scheduled meetings coordinated interns and collaborated with teams and clients.

UNIVERSITY OF ALBERTA *January 2021 – April 2023*

Graduate Teaching Assistant, Edmonton, AB

- Courses Taught: Vibrations and Sound (Fall 2021); Introduction to Engineering Design, Communication, and Profession (Winter 2022, Winter 2023); Mechanical Engineering Laboratory I (Spring 2022, Fall 2022).
- Trained Undergrad students (in-person and remote) to use different design and analysis software (MS Project, Primavera P6, AutoCAD, SOLIDWORKS), designing, productivity modeling and analysis.

UNIVERSITY OF ALBERTA *January 2021 – April 2023*

Researcher, Future Energy System, Edmonton, AB

- Developed battery electric vehicle charging profile and performed techno-economic analyses.
- Collected and analyzed historical utility consumption data and reported through technical reports.
- Performed hourly energy simulations and building energy modeling to increase energy efficiency.
- Developed mathematical model to optimize per unit electricity cost of a Canadian remote community.

UNIVERSITY OF ALBERTA *January 2021 – April 2023*

Graduate Research Assistant Fellow, Edmonton, AB

- Conducted background research, and emissions analysis on CHP opportunity in Canadian remote communities.
- Identified, tracked and analyzed patterns and trends in the electricity market data of Alberta.
- Attended kick off meeting, conducted technical & financial feasibility study, and visualized results.
- Prepared technical reports, presentations and collaborated with different key stakeholders.

HAWAR INFORMATION TECHNOLOGY *January 2018 – June 2019*

GIS Engineer, Dhaka, BD

- Coordinated projects, meetings, reviewed invoices, tenders and managed GIS databases.
- Prepared proposals, cost estimation, monitored project timelines and controlled inventory.
- Performed data analysis, budgeting, procurement, and schedule management through project filing.

LAFARGEHOLCIM BANGLADESH LTD. *June 2016 – December 2016*

Engineering Intern, Mongla, BD

- Learned about process control, performed financial, and statistical analysis.
- Participated in quality issues analysis, root causes analysis, problem-solving and lean management strategies.

EDUCATION

MASTERS OF MECHANICAL ENGINEERING (ENGINEERING MANAGEMENT) *May 2023*

- University of Alberta

BACHELOR OF INDUSTRIAL & PRODUCTION ENGINEERING *December 2017*

- Rajshahi University of Engineering & Technology, RUET, Bangladesh

Alireza Esmaeili
Electrical Engineer, P.Eng, PE, PMP, MSC

SUMMARY OF QUALIFICATIONS

- Electrical Engineer with more than 20 years of experience in all aspects of utility, substation, Power generation and oil and gas industries engineering, construction and commissioning and experienced project manager in these industries. He has used many different electrical engineer software including, ETAP, Cyme, WinIGS, SKM, SDS (Substation 3D modelling), SDS(schematic and wiring design), etc.
- A lot of experience as an engineering manager, and VP of engineering in multiple utility companies know how to keep the team motivated to meet the goals of the project and maintain the quality of deliverables to meet the clients' expectation.

PROFESSIONAL EXPERIENCE

➢ **Project Mt. Vernon substation, Illinois**

- A new 138kV ring bus. It consisted of an initial four (4) position ring bus but will have an ultimate six (6) position configuration
- Designed a new control house. The control house has twelve (12) panels and space for ten (4) future panels to house all the equipment.
- Designed RTU and protective relays for distance and differential line protection and Breaker failures
- Developed and detailed design of Panel Equipment Arrangement Drawings
- Developed all DC and AC Schematics, wiring and interconnection diagrams for all Circuit breakers, Disconnector switches, CCVTs and all protection relays for the lines
- Removal drawings for All 138kV controls and relay on the existing panels and control building.

➢ **City of Burnaby, Supervisor of Commissioning, Beta Pump Station, Burnaby**

- QA/QC services to the commissioning stage of Beta pump station and supervise the testing activity of the electrical equipment of the project.

➢ **BC Hydro Equipment replacement and upgrading projects**

- Conducted grounding studies of Texada Island reactor, east and west substations, Nile Creek, Cape Cockburn, Invermere, Selkirk, Nicola, Pemberton and Minette substations
- Detailed design of 30 different substation battery replacement project
- SA replacement assessment report for Northeast and Northwest areas of BC for DIL, GRR, KAL, MIN, OFD, PED, STW, TER, FNG, GMS, PCN, PPS, SNK, TLR and WSP
- Led 125V Battery and charger replacement program for VBY-603L, KDY- 841, ACK- 301P, KCL-217, PIK-560, MAN-437, WHY-414A, PVW-805Q, MU2-436, CQM- 413B, ING-435, STW-912A, DGR-455A, KI2-443, CRD- 827, TPY-812B, SNY-500H, WLM-801A, ANN-412A ,LOH-464A, TAC- 802D, CLW-603K, SRS-803C, RIM- 411A, STV-411B substations
- Led Disconnector switch replacement for HMH, BLW, SCK, ESQ, EFT, RBF and BRT
- Led CVT replacement projects for AYH-924, CMX-504D, CRD-827, FVW- 701C, KDS- 834, LNT-912E, NLY-22A, RBW-409E, SAC-475J, SAY- 701S, SKA-907, VNT-309, GLN, MON, BKL, DMR, SVA Substations

- Led recloser switch replacement projects for GLS, AYH, HLD, FM2
- Led CB replacement projects for MDN and ESQ and also Rosemont substation for FortisBC
- SA assessment reports for more than 20 BC Hydro substations all over the province

➢ **Groundbirch Complex - Saturn Electrification (230kV Shell substation)**

- Detailed design of substations, including switchyard layouts, elevations, shielding study and bus short-circuit forces calculations, etc.
- Detailed P&C drawings for circuit breakers, disconnectors, metering, etc.
- Prepared for construction deliverables such as cable tray layouts, sub- station layout, lighting layouts, cable schedules, panel schedules, installation details etc.
- Reviewed of SCADA and Telecom system design.
- Designed underground 25kV cable routes by ETAP (Cable Ampacity)
- Conducted grounding calculations and studies by GroundMat (SKM)
- Prepared specification and support selections and procurement of Electrical Equipment packages
- IEEE 605, IEEE C37.32, IEEE 835, IEEE80

➢ **Ekati mine plant - (69kV substation), Northwest territory, Canada**

- Detailed design of two substations and switchgear buildings, including switchyard layouts, elevations, etc.
- Design reviewed and checked P&C drawings for circuit breakers, disconnectors, metering, etc.
- Load flow study by ETAP
- Designed grounding system of substations
- Prepared specification and support selections and procurement of Electrical Equipment packages

➢ **Chickadee Creek Generation Station, Alberta, Canada**

- Designed and reviewed LV and MV Switchgear, MCC panels, schematic diagrams, cables and cable tray layouts
- Coordinated designs with the Civil and Mechanical Engineering departments
- Conducted weekly meeting with clients
- Prepare RFQ documents for selecting vendors for MCC and auxiliary buildings
- Evaluation of vendor's proposal
- Updating the status reports for the project manager

➢ **Encana, Cabin Gas Plant #1 and Cabin Gas Plant #2, Fort Nelson, BC, Canada**

- Designed cable tray layouts for all industrial buildings and cable routing for all cables (medium voltage (MV), low voltage (LV), control, and instrument cables).
- 3D modelled cable tray layouts for the entire plant in two projects Cabin Gas Plant 1 and Kiwigana Compressor Station
- Studied the feasibility of changing all cable conductors from copper to aluminum
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- Prepared and modified the Engineering Work Package (EWP) for the dehydration building (This package contained: lighting layouts, equipment arrangements, cable tray layouts, grounding systems, lighting and heat tracing panels, junction boxes and termination of all cables.)
- Estimated man hours for preparing of engineering drawings of Cabin 2 in EIC department
- Prepared RFQ of Cable tray, Cable Bus, Junction boxes and Cable vaults for the Cabin 2 project
- Evaluation of vendor's proposal for Cabin 2
- Designed underground routes to feed Cabin 2 from Power plant of Cabin 1
- Designed area 301(dehydration building) electrical equipment, cable tray and grounding layout, as well as wiring in Cabin 1
- Responsible for designing areas 301 (dehydration building) 101(Inlet Separation / Pre- treatment Building) and 601(Sale Gas metering)
- Provided purchase specifications for vendors, chaired clarification meetings, and negotiated with vendors and selected the most suitable

EDUCATION & ACCREDITATION

- **MSc.** in Electrical Engineering IUST(2000)
- **B.Sc.** in Electrical Engineering IUST(1997)
- **USA PE**: **Nevada**
- Professional Engineer British Columbia, **EGBC**
- Professional Engineer, Albert, **APEGA**,

Behrouz Jarrahi
Senior Electrical Engineer

SUMMARY OF QUALIFICATIONS

Professional Electrical Engineer with extensive experience in electrical utility, involved in the projects with diversified complexity. Experienced in areas of equipment engineering, technical document / standard / specification development, planning; leadership, prioritizing multiple assignments to meet corporate objectives, self-initiative and dedicated to task completion.

- Provided technical solutions for equipment design of stations which significantly decreased the cost and complexity of the challenging projects
- Led the multidiscipline engineering team of 50 MVA Synchronous Condenser project.
- Led the team of substation structural and electrical engineering design group
- Led engineering team of 500/240 kV substation project
- Led numerous 400/240/63 kV substation projects.
- Led multidiscipline engineering team of 1170 MW co-gen power plant project
- Led the detailed design of electrical discipline of 1000 MW thermal power plant

PROFESSIONAL EXPERIENCE

- **Protech Engineering Inc.** **Jan 2022 ~ Present**

Senior Electrical Engineer (Part time Consultant)
- Review and update the substations electrical drawings
- Preparing specification for power transformers
- Participate in coordination meetings with the Client and Vendors, where required.

- **Lex Engineering Ltd.** **May 2019 ~ Jun 2021**

Project Engineer
- Seconded in Fortis BC as Project Engineer on T&D Projects
- Led the in-house engineering team of the Fortis BC and consultant engineers for numerous projects
- Reviewed and classified the bidder's technical document.
- Reviewed design basis, planning, constructability, staging and maintainability of the substation projects.
- Reviewed and updated the existing standards and workflow spreadsheet.

- **Wood (AMEC Foster Wheeler)** **May 2016 ~ Apr. 2019**

Senior Electrical Engineer
- Represented Wood as Senior Electrical Engineer in BC Hydro's substation Projects.
- Reviewed the design basis, planning, constructability, staging and maintainability of the substation projects. Provided solution to minimize risks, costs, execution period of the challenging projects.
- Introduced a unique 230 kV HIS equipment to resolve the layout constrain of a brown field station expansion.
- Reviewed / commented the equipment specification, ITPs, FAT and SAT of generating set and breakers
- Prepared technical specification for 230 and 69 kV GIS equipment bid. Reviewed and evaluated the offers. Prepared deficiency list and recommendations to negotiate as subject matter expert of the evaluation team.

- **Midgard Consulting Inc.** **Jul 2015 ~ May 2016**

Alberta Regional Director

- Led business development in Alberta and participate in business development in British Columbia and Saskatchewan provinces.
- Prepared the proposals for different bids including Project Management Services of 60 MW gas turbine power plant design / installation and upgrading existing power plant control system.

- **ATCO Electric** **September 2009 ~ January 2015**

Supervising Engineer – Senior Technical Advisor

- Prepared conceptual project scope specifications and bid evaluation for different projects including AC part of 500 kV HVDC project, 240 / 144 kV substations.
- Provided support and coaching related to design processes for challenging substation and equipment selection
- Led the 50 MVAR synchronous condenser project including related aux. systems and 132 kV substation interconnection.
- Participated the FAT of Synchronous condenser machine at ABB Manufacturing facility in Vasteras Sweden
- Provided technical recommendations on 240 kV GIS substation, reviewed the conceptual engineering documents prepared by consultant engineer for Muskeg River Mining (MRM) oil sand project and provided recommendations for reducing the total cost of the project significantly.
- Chaired design review meetings with participants from all stakeholders at weekly/monthly progress meetings
- Developed safety engineering process, mentored the team in preparing HAZID/HazCOM of each project

- **Alberta Electric System Operator (AESO)** **May 2008 ~ September 2009**

Project Manager

- Participated in all public open houses related to the Alberta North – South transmission development project. Communicated / educated the public on different power transmission technologies and their probable environmental / land impact. Consolidated the public's concerns and questions to prepare the feasibility reports of the project.
- Coordinated preparation of functional specification of 500 kV AC and HVDC terminal station.

- **SNC-Lavalin T&D** **March 2005 ~ May 2008**

Lead / Principal Engineer

- Led detailed design of 240/500 kV Keep Hills and Ellerslie substations, responsible to prepare the equipment specification, scope of work, identified equipment criteria, prepared tender document, bid evaluation, selection of 500 MVA transformers and 500 kV switchyard equipment vendors.
- Prepared the scope of FAT for 500 MVA, 500/240 kV power transformers in ABB facility in Montreal.
- Developed one-line diagram, equipment arrangement and guided preparation of equipment layout and elevation views, lightning protection, grounding grid.
- Reviewed IFC package - scope of work, drawings, specifications, BOM- for quality and completeness

- Led the substation engineering department, a team of over 70 engineers / drafters, technologists, accountable for safety, performance of the team, responsible for resource planning, engineering skill improvement, develop standard drawings/specifications.

➢ **Parsian HV Substation Development Co. (General Turnkey Contractor) 1993 ~ 2000**

Lead Engineer

- Led detailed design of several 400/230/63/25 kV station projects across the national grid of Iran.
- Ensured integrity of physical engineering design for equipment layout, site grading, grounding grid design, equipment selection, requisitioning / purchase order on timely delivery
- Reviewed estimation for labor, equipment and material quantities required for substations design, equipment installation and construction / commissioning / energization / handover

➢ **Ghoods Niroo Power Consultant Engineer (Ex. Monenco Iran) 1986 ~ 1993**

Project Lead Engineer

- Led non-turnkey 1170 MW co-gen power plant. That more than one-billion-dollar project consists of 6 gas turbines, 3 non-fired steam boilers, 3 steam turbines, all auxiliary systems, and 230 substation facilities.
- Participated the FAT of relays & protection equipment at Mitsubishi Heavy Industries in Japan
- Communicated with internal and external stakeholders including functional groups, third party engineering consultants, contractors and vendors

➢ **Moshanir Power Engineer Consultant 1978 ~ 1983**

Electrical Engineer / Site Inspector

- Supervised construction / installation and commissioning of the 230 / 400 kV substations, represented the consultant engineer at site, responsible for safety at site, SAT, FAT, quality and progress of the work.
- Participated the FAT of 400 & 230 kV transformers of different vendors: Fuji Electric and Mitsubishi Electric in Japan, Ex. BBC Germany and Rade Koncar Ex. Yugoslavia
- Performed substation visits at different stages; site selection, preparing functional spec., construction and after energization to gather information, ensure accuracy of layout, and evaluate condition of existing equipment on brown fields

PROFESSIONAL TRAINING

- **PSCAD application** Manitoba Hydro International, Manitoba
- **Project Management Courses** ATCO Electric / MRU and Alberta Electric System Operator
- **GE Multilin Relay & Protection Application** Markham, Ontario
- **HVDC Conceptual Design** Teshmont Consultant
- **IEEE Conferences /Seminars e.g. EPEC 2014** Calgary
- **HazCOM Analysis Training** ABS Consulting

EDUCATION & ACCREDITATION

Bachelor of Science in Electrical Power Engineering
University of Science and Technology, Tehran, Iran

Ali Saffar
Senior Electrical Engineer

SUMMARY OF QUALIFICATIONS

- +15 years of experience as an "**Electrical, protection and control Engineer**" as a consultant and EPC contractor **mainly in HV power substation, and industrial plants**

PROFESSIONAL EXPERIENCE

- **Protech Engineering Inc. (Jun, 2022-Present)**

Head of Substation Primary Design Department

- Design/design review of basic documents such as layout, SLD, 3 Line, protection SLD, Interlocking and logic diagrams, trip/signal tables, communication and automation diagram, AC/DC system calculation, lighting calculation, cable calculation and cable routs and trays, etc.
- Design/ design review AC/DC schematic drawings of control, protection and supply panels
- Preparing bill of material
- Writing technical reports and instructions
- Preparing technical part of tender documents
- Evaluating proposals
- Protection Coordination
- Relay setting / Configuration

- **Monenco Iran Consulting Engineers- (Nov, 2011-Nov, 2021)**

Project Manager/coordinator - (High voltage substation department)

- Project control activities in operation and payments, prepare progress reports and update schedules, track projects to ensure sticking to the plan, achieve milestones and follow the deadlines and provide compensatory solutions if needed.Participation in meetings with consultants and employers as head of design team.
- Coordinate between cross-functional groups of the project.
- Draft agenda, manage and hold meetings, draft MOMs, action points and timing.
- Give assistance services to the project manager
- Review technical/financial documents and cash flow of the project,
- Prepare input to all disciplines, connect field and technical engineers, give feedback, coordinate executing levels, ensure the appropriation of the process and provide operational solutions.

Protection and control engineer – (High voltage substation department)

- Design/design review of basic documents such as layout, SLD, protection SLD, Interlocking and logic diagrams, trip/signal tables, communication and automation diagram, AC/DC system calculation, lighting calculation, cable calculation and cable routs and trays, etc.
- Design/design review schematic drawings of control, protection and supply panels
- Preparing bill of material
- Writing technical reports and instructions
- Preparing technical part of tender documents
- Evaluating proposals

- **Peimann Khotoot Gostar (Parsian Group) - (Sep 2009- Nov 2011)**

Technical engineer – (Control and protection department)

- Drafting of basic documents such as SLD, protection SLD, Interlocking and logic diagrams, trip/signal tables, communication and automation diagram, AC/DC system calculation, etc.
- Drafting schematic drawings of control, protection and supply panels for manufacturing
- Preparing bill of material

EDUCATION

- MSc. in Electrical Power Engineering, University of Isfahan, Iran (2009)
- BSc. in Electrical Power Engineering, University of Mazandaran, Babol, Iran (2006)

MIDGARD
CONSULTING

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