

# Newfoundland and Labrador Pension Investment Board

## A Sustainable Investment Strategy for NLPIB

### Greenback Pension Assets

## Executive Summary

Compared to the current portfolio, our proposed portfolio decreases volatility from 9.95% to 8.94%. This represents an increase in Sharpe Ratio from 0.53 to 0.58. The proposed portfolio is in the 63<sup>th</sup> percentile of portfolios with a similar asset class allocation in terms of sustainability, compared to the current portfolio at the 58<sup>th</sup> percentile.

### Direct Investments

**South White Rose (SWR):** We propose to maintain our investment. Divesting would negatively impact our stakeholders through reduced tax revenue and a knock-on effect on sectors heavily reliant on oil production. We negate returns from oil by channelling excess returns above the required return to a separate repository.

**Labrador Iron Ore (LIF):** We propose to seek a buyer at a fair price over a 10-year period. Though it is not the immediate concern of activists, announcing intention to divest would build goodwill and demonstrate NLPIB's proactive commitment to sustainability. Ore reserves are expected to last for another 25 years, making a 10-year divestment horizon appropriate.

Performance Metrics			
	Allocation		
	Current	Proposed	Long-Term*
Returns	7.33%	7.23%	7.10%
Returns from Indirect Energy	0.31%	0.25%	0.32%
Returns ex Indirect Energy**	7.02%	6.98%	6.78%
Volatility	9.95%	8.94%	7.16%
Sharpe Ratio	0.53x	0.58x	0.71x
Sharpe Ratio ex Energy	0.50x	0.56x	0.67x
VaR 95 (Million CAD)***	1,425.39	1,154.31	768.00
CVaR 95 (Million CAD)***	1,976.22	1,647.27	1,193.97
Morningstar ESG Score	51.96	53.36	53.75

\* Long-term performance metrics do not factor in the possible strategies in direct investments such as the expansion of SJA and Eco-tourism plans

\*\* Returns excluding indirect energy contributions

\*\*\* Value at Risk measures are annualized as a % of 15B CAD portfolio

investment, as it remains the core of NLPIB's commitment to sustainable investing. Additionally, the project is scheduled for completion in 2020 and will thereafter generate returns.

**Saint John's Airport (SJA):** We recommend increasing investment over 10 years, using funds from the sale of LIF, to bolster the tourism sector and reduce reliance on oil & gas.

**Structure:** To manage governance issues, we propose setting up a spin-off asset management subsidiary with a green mandate, known as **Green Horizon**. Green Horizon will manage Muskrat Falls, future green direct investment projects and an 'Indirect Energy' fund.

### Indirect investments

We retained a similar ETF mix as the current portfolio mix. We added 2 new ETFs, namely Real Estate Select Sector SPDR Fund (XLRE) and iShares Core MSCI Total Intl Stk ETF (IXUS). We then optimised the portfolio for risk-adjusted returns through Roy's Sharpe Ratio. Energy-weighted returns will be channelled towards an 'Indirect Energy' fund managed by Green Horizon.

**Our proposed portfolio maintains key local investments while encouraging growth in sustainable sectors.** We improve the risk-return profile, satisfy student voters through environmental consciousness and scholarships, retain jobs for oil and gas workers through not divesting, and manage marine pollution through SWR's discretionary reserves.

### '3R' Investment Strategy

Our 3R strategy is based on 3 key pillars:  
Restructure, Retain and Refine.

**Restructure:** We highlighted the ETF asset class with the lowest ESG score, Real Estate. We compared the existing ETF, VNQ, across other highly liquid ETFs in the same category. In doing so, we added two new ETFs to the asset mix, XLRE and IXUS.

- XLRE's ESG score is higher than that of VNQ. XLRE also possesses lower volatility and correlations with the rest of the portfolio compared to VNQ.
- IXUS, which invests in non-US assets, was added to the asset allocation to address the proposed portfolio's increased weight on US assets<sup>4</sup>. This is an effort to increase geographical diversification.

**Retain:** The current asset allocation has kept the fund relatively well funded. As such, we sought to preserve the current portfolio's risk-return characteristics, including geographical and sector diversification and liability matching. This meant keeping the proposed allocation to asset classes close to the current allocation through a similar asset mix, keeping the direct-indirect investment mix roughly the same (30-70) and maintaining minimum weights in Fixed Income ETFs to retain the cash flow schedule.

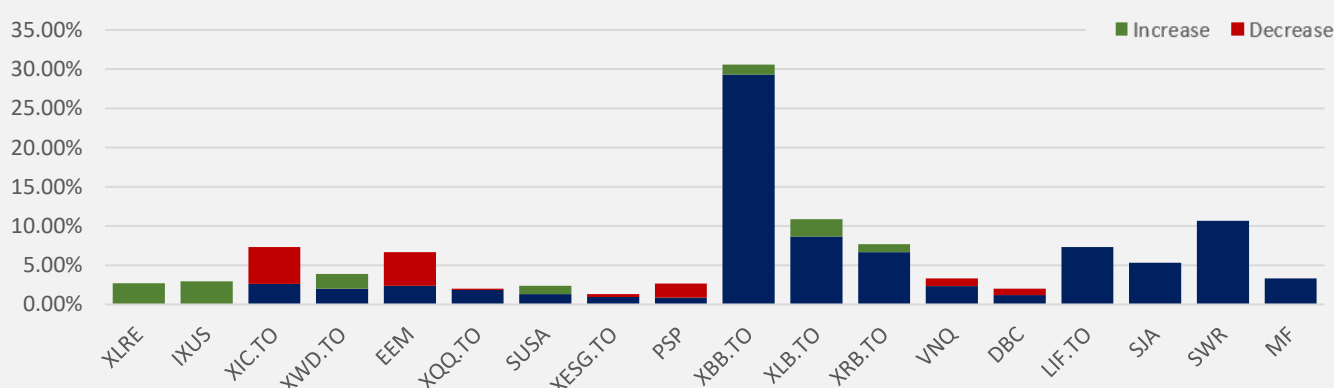
We assigned a minimum weight of 2% to iShares MSCI USA ESG Select ETF (SUSA) for its high ESG score.

**Refine:** The portfolio was then optimised for Sharpe Ratio to maximise risk-adjusted return. Mean-variance optimisation often results in unstable weights. Using weekly data, we ran a mean-variance optimisation across 52 randomly select data points. We then resampled across 1000 simulations by taking the average of all simulations, resulting in more balanced weights. The resulting portfolio increased the weighted-average ESG score from 51.96 to 53.58<sup>1</sup>. By taking a weighted average of ESG scores of the individual ETFs, the resulting optimised portfolio outperforms 64% of ETFs<sup>2</sup> in terms of sustainability.

### Geographical Diversification

The current portfolio allocation has 80% exposure to Canada, with 26.7% coming from NL. Taking into consideration the currency risks that will result from non-Canadian investments, our proposed allocation reduces exposure to Canada to 75.4%. Canadian equity ETFs held in the portfolio (XESG, XIC) also hold higher weights in energy securities; **diversifying away from Canada will reduce overall portfolio weight in energy.**

### Proposed Portfolio Allocation



<sup>1</sup>Table of ESG scores and weights of assets can be found in the appendix.

<sup>2</sup>Calculations can be found in the Appendix.

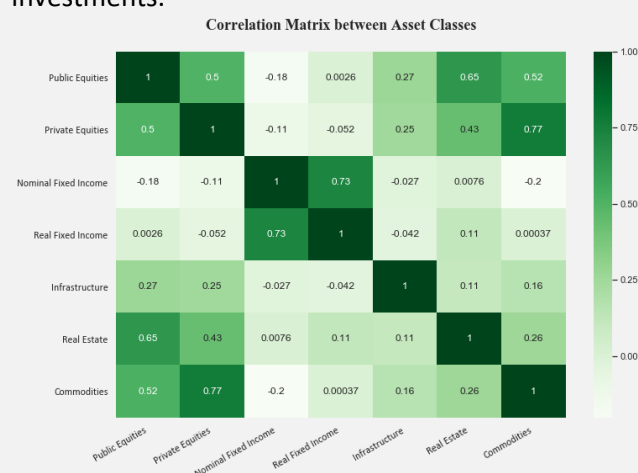
<sup>3</sup>Risk-return profile of all ETFs can be found in the Appendix.

<sup>4</sup>Geographical diversification using the existing ETFs would be challenging, as the only options available were volatile emerging markets (EEM/VWO) or US-asset heavy (XWD). The increased weightage of US assets posed an issue.

### Divesting from “Indirect Oil”

Currently, 4.6% of NLPIB’s indirect investments are energy holdings. As the ETFs held by NLPIB passively track an index, it is not possible to directly divest from these energy holdings. However, divesting from these ETFs would be an effective and immediate solution to the activists demands.

Therefore, to demonstrate NLPIB’s commitment to the environment, we recommend setting aside energy-weighted returns and channelling this amount into an ‘indirect energy’ green fund administered by Green Horizon, which will be discussed in detail later in the proposal. We first break down returns contribution This will effectively negate NLPIB’s returns from energy from its indirect investments.



### Correlation Matrix

Fixed income instruments are **negatively correlated** with other asset classes, which provides a diversification benefit. Fixed income instruments are also crucial in the portfolio to provide cash flow based on the durations, which helps to meet pension liabilities. As such, the composition of fixed-income assets in the portfolio is constrained minimally to the level of the current portfolio.

**Infrastructure** (SJA & MF), **real estate** (VNQ & XLRE), and **commodities** (DBC) asset classes also show low correlations with most other classes, providing avenues for reducing portfolio variance through diversification. The correlation between direct investments were derived through the use of proxies.

A further explanation on the proxies used as well as a deconstructed correlation matrix between each asset can be found in the Appendix<sup>7</sup>, explaining the choice in portfolio constituents.

### Performance Metrics

The current required rate of return is 6.51% (4.5% plus the Canada 20-year government bond yield (net of fees)). The Canada 20-year government bond yield is derived by taking the median of 20-year bond yields over the last twenty years. The horizon of twenty years was chosen due to unusually low interest rates in recent years.

To compare the proposed portfolio performance to its current performance, two key performance metrics are used: firstly, the **Sharpe Ratio**, which indicates the return of the portfolio adjusted for risk; secondly, the **Value-at-Risk (VaR)**<sup>6</sup>, which estimates the value that a portfolio has a 5% probability of losing within a given year.

<sup>5</sup>Explanation of probability metric can be found in the Appendix.

<sup>6</sup>Visualized histogram and PDF fit with Value-at-Risk of each portfolio (current, proposed, and long-term) can be found in the Appendix.

<sup>7</sup>Correlation matrix of individual assets can be found in the Appendix.

### Direct Investments

#### South White Rose - The Divestment Question

The dual mandate of NLPIB consists of generating returns for pensioners and contribution to the local economy. Immediate divestment from SWR and LIF will prevent the realisation of its dual mandate and imperil NLPIB's ability to fulfil its fiduciary duties.

Divesting from SWR would not only have no material change to environmental impact, it would also deprive NLPIB from exerting influence on the oil field's operations to enact safety and environmental guidelines. By maintaining its stake in SWR, NLPIB will firstly be in a better position to take proactive steps to prevent future oil spills. Secondly, the NL government will also lose tax revenue if SWR were sold to an external entity, making the budget deficit worse.

Should NLPIB be unable to find a buyer for its stake, operations will be shut down. This will devastate oil royalties, a vital source of revenue for the NL government, and exacerbate the budget deficit. NL is heavily dependent on resource extraction, as it contributes to 25% of the provincial GDP, and there are inherent limitations to diversifying rapidly.

Thus, we can expect a large shock to the local economy and lost jobs. For a government that is already facing a net budget deficit and is unlikely to be eligible for equalization, a significant reduction in revenues can compromise social services such as education, healthcare and infrastructure maintenance. This, together with the fact that the government is considering raising taxes in a province where taxes are already considered high, can lead to taxpayer dissatisfaction and the current government being voted out.

Actions affecting oil production will also run counter to NLs 'Advance 2030' master plan<sup>8</sup> to increase oil production in the region to 650,000 barrels a day by the year 2030 and will not be feasible for the provincial government. As illustrated by both possible outcomes, divestment from SWR has vastly negative impacts for NLPIB, its pensioners and NL in general.

Excess returns from SWR above the required rate of return should be set aside in a fund that can be drawn upon in years when the required rate of return is not met. Part of this fund should be earmarked for mitigating negative impacts of SWR and oil extraction in the province. It can fund infrastructure improvements for greater safety and energy efficiency, environmental cleaning and waste management, which have seen limited investment due to the provincial government's budget deficit.

In order to quickly effect a positive image with the public in the short-term, we propose that NLPIB sets up a local scholarship for undergraduates. This scholarship will be granted to Inuit youths without the financial means to obtain higher education<sup>10</sup>. Scholarships also generate goodwill among students, who make up the majority of activists<sup>11</sup>.

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<sup>8</sup>Newfoundland Labrador, "The Way Forward on oil and gas," February 2018, from Newfoundland Labrador News Releases, [https://www.nr.gov.nl.ca/nr/advance30/pdf/Oil\\_Gas\\_Sector\\_FINAL\\_online.pdf](https://www.nr.gov.nl.ca/nr/advance30/pdf/Oil_Gas_Sector_FINAL_online.pdf), accessed September 14, 2019.

<sup>9</sup>Offshore Technology, "White Rose Oil and Gas Field." n.d, from Offshore Technology Website, [https://www.offshore-technology.com/projects/white\\_rose/](https://www.offshore-technology.com/projects/white_rose/), accessed September 14, 2019.

<sup>10</sup>Scholarship details can be found in the Appendix.

<sup>11</sup> Neva Welton, *Global Uprising: Confronting the Tyrannies of the 21st Century*, Canada: New Society Publishers, 2001.

# The Divestment Question

## NLPIB

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### Labrador Iron Ore - 10-Year Divestment

Though it is not the primary concern of activists, announcing intention to divest would build significant goodwill and demonstrate NLPIB's proactive commitment to sustainability. As the ore reserves in LIF are expected to last for another 25 years<sup>12</sup>, we project a 10-year divestment horizon would be sufficient to find a suitable buyer to sell the majority stake at a fair value.

### Saint John's Airport - Sustainable Investment

Historically, SJA has a ROE of roughly 11%<sup>13</sup>. Strategic revenue growth can be achieved for SJA via growing non-aeronautical revenue sources, such as retail and F&B. Changi Airport in Singapore provides a great model for tourism infrastructure expansion<sup>14</sup>. From the sale of LIF, an investment of \$300 million over ten years should be made in SJA, to position it as an attractive port of call for travellers. SJA should be the centre of a strategic tourism infrastructure investment portfolio, upon the terminal decline of SWR.

A key limitation of divesting from local oil investments is the knock-on effect it has on other sectors, such as construction and retail, which heavily rely on the infrastructure requirements of oil production. The upgrades to SJA would reduce the reliance of construction and retail on non-sustainable sectors. It can also provide similar economic stimulus as SWR, as it will prop the construction and financial services sectors.

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<sup>12</sup>Labrador Iron Ore, "Corporate Information," n.d, from Labrador Iron Ore Royal Corporation Website, <http://www.labradorironore.com/Corporate-Information/default.aspx>, accessed September 14, 2019.

<sup>13</sup>Using Hamada's Equation. More information can be found in the Appendix.

<sup>14</sup>Civil Aviation Authority of Singapore, New Airport Development Levy From 1 July 2018, CAAS, Available at: <https://www.caas.gov.sg/about-caas/newsroom/Detail/new-airport-development-levy-from-1-july-2018/> Accessed on: 16 September 2019

## Green Horizon

### Spin-off Green Asset Management Subsidiary

#### Muskrat Falls

On the MF project, we recommend **maintaining** the current allocation. MF embodies NLPIB's commitment to sustainable investing, reducing the province's reliance on non-renewables for energy. However, the issue of methylmercury poisoning of the Inuit population has resulted in organised protests, slowing construction.

We acknowledge the potential for negative public perception by maintaining the current stake in the project, especially amongst the Inuit. On the other hand, independent studies have revealed that the increase in methylmercury will be of no concern to the health of the local populace<sup>14</sup>.

With the project scheduled for completion in 2020<sup>15</sup>, we are confident that MF will eventually generate returns while remaining core to NLPIB's commitment to sustainable investing.

#### Eco-tourism<sup>17</sup>

NL has beautiful resources it can tap on to reduce reliance on the oil & gas sector. For example, NL is home to a large faction of Inuits, and has numerous provincial parks with breath-taking scenery. We propose investing in a joint venture to promote eco-tourism in the region, with a projected start time of 8 years from the start of the proposed changes.

The venture will comprise of guided national park tours, regulated whale watching and cultural immersion with the Inuit culture. This would reduce the reliance of construction and retail on non-sustainable sectors.

NL's national parks have the potential to be a large revenue driver: the US National Parks generated US\$154 billion in economic activity and supported 1.1 million tourism related jobs in 2015<sup>18</sup>. The growth rates of eco-tourism<sup>19</sup> are projected to be 10-30% year on year.

#### Electric Vehicle Public & Private Transportation Venture

As the province grows, the use of vehicles for transportation will increase. To combat an increase in the number of petrol and diesel vehicles, we propose investing in a venture to explore Electric Vehicle based public transportation for NL. It can begin with a pilot route from SJA to the town centre. In the appendix is a target timeline for eventual expansion<sup>20</sup>. This builds up the tourism infrastructure of NL and provides synergies with existing investments such as Muskrat Falls and Saint John's Airport, increases the carbon neutral infrastructure, and doubles as a demand generator for MF.

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<sup>15</sup>J.Wells, LCP Methylmercury Environmental Effects Monitoring Plan: Osprey and River Otter, Available at: <https://muskratfalls.nalcorenergy.com/wp-content/uploads/2014/08/Methylmercury-Environmental-Effects-Monitoring-Plan-Osprey-River-Otter.pdf> Accessed on: 23 September 2019

<sup>16</sup>NL Government, Quarterly Project Update March 2019, NL Government, Available at: [https://www.gov.nl.ca/MFOversight/pdf/quarterly\\_report\\_march\\_2019.pdf](https://www.gov.nl.ca/MFOversight/pdf/quarterly_report_march_2019.pdf) Accessed on: 26 September 2019

<sup>17</sup>A detailed summary of possible eco-tourism tours can be found in the Appendix.

<sup>18</sup>National Recreation and Park Association (NRPA), "The Economic Impact of Local Parks", December 2015, from NRPA Website, <https://www.nrpa.org/publications-research/research-papers/the-economic-impact-of-local-parks/>, accessed 18 September, 2019

<sup>19</sup>EBSCO Sustainability Watch, A Look at the Fastest Growing Segment of the Travel and Tourism Industry, EBSCO Sustainability Watch, Available at: <https://ebcosustainability.files.wordpress.com/2010/07/ecotourism.pdf> Accessed on: 27 September 2019

<sup>20</sup>Refer to Appendix.



## Stakeholder Considerations

Your stakeholders' concerns are a major concern, and the guiding force behind the strategies proposed.

**Mr. Anders:** NLPIB scholarships will be popular among students, garnering support for Mr. Anders from a very vocal demographic. NLPIB's proactive commitment to sustainable investing, through holding MF, divesting LIF and holding returns from oil in a discretionary fund for the environment will increase appeal with students.

**Mr. Hutchinson:** Maintaining stake in SWR allows NLPIB to enact safety and environmental regulations to reduce the likelihood of another oil spill. The environmental clean-up initiatives funded by the SWR discretionary fund will address marine pollution concerns.

**Ms. Ross:** Scholarships are granted to Inuits, giving them opportunities. Increases in methylmercury levels at MF poses no health concern for locals. LIF is divested in 10 years, with SWR being replaced with sustainable investments after decommissioning, conserving natural habitat. Inuits have strong potential for economic growth through eco-tourism investment.

**Mr. Rogers:** The risk of the proposed allocation is lower than the current allocation, while enhancing returns. The portfolio is more geographically diversified, while maintaining roughly the same sector diversification. As risk-adjusted return is improved, the proposed initiatives are consistent with the board's fiduciary duty to pensioners.

**Mr. Butler:** Not divesting our stake in SWR means that oil and gas workers remain employed. Additionally, investments in SJA and eco-tourism will create tourism-related jobs, allowing workers to transition when SWR and LIF are decommissioned.

**Mr. Frank:** The risk-return profile of the proposed allocation improves from the current allocation while still maintaining the same level of fixed income ETFs for liability matching.

**Ms Michael:** Divesting from SWR has been highlighted to have negative impacts on the government, and the economy. Other stakeholders are also considered:

- Provincial government: Oil and gas will continue to generate revenue, ensuring funding for infrastructure, social services and benefits. The SWR discretionary fund also finances environmental clean-ups, reducing strain on government. In the long term, investments in SJA and eco-tourism will reduce reliance on the oil and gas sector.
- Taxpayers: The government will be able to continue to fund infrastructure, social services and benefits. Furthermore, scholarships provide two levels of benefits: students benefit from free education, seniors benefit from the scholar's volunteer work.
- Pensioners: By maintaining fixed income ETF allocation, liability matching is maintained, and current beneficiaries will continue receiving benefits as promised. On the portfolio level, there is a shift towards sustainable investments, while not lowering returns.
- Indigenous Groups: LIF, which damages the natural environment, is divested from within 10 years. Eco-tourism is promising as a new direct investment. Inuits are also granted scholarships which will improve their quality of life.
- Labour Unions: Labour unions will be satisfied with the retention of jobs in SWR. Further efforts can be made to transition the workers to other industries, after the terminal decline of SWR.

<sup>1</sup> Interpreting the Morningstar ESG Score

Score	Description
40	1 Standard Deviation below Median
50	Median
60	1 Standard Deviation above Median

(1 Standard Deviation --> 10 Score)

Calculating Portfolio ESG Score

$(53.51 - 50) / 10 = 0.351$  Standard Deviations

$CDF(0.351) = 63.73\%$

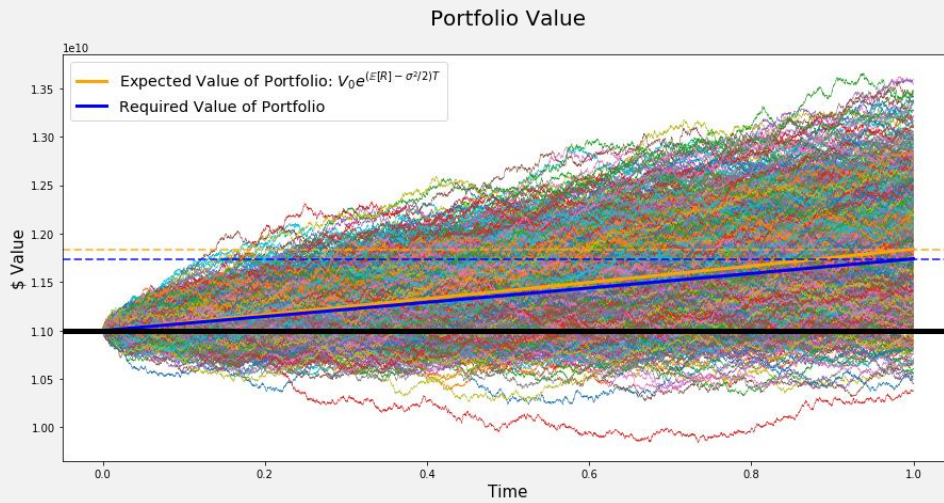


<sup>2</sup> Table of ESG Scores – Current vs Proposed vs Long-term

Ticker	Gross ESG Score	Current Weight	Proposed Weight	Long-Term Weight
XLRE	50.68	0.00%	3.00%	3.00%
VWO	48.47	0.00%	3.00%	3.00%
IXUS	54.88	0.00%	3.00%	3.00%
XIC	52.62	7.33%	1.00%	5.00%
XWD	55.99	2.00%	2.00%	6.00%
EEM	49.48	6.67%	3.00%	3.00%
XQQ	55.65	2.00%	7.67%	9.67%
SUSA	58.85	1.33%	2.00%	6.00%
XESG	53.76	1.33%	2.00%	5.00%
PSP	0	2.67%	1.00%	1.00%
XBB	0	29.33%	29.33%	29.33%
XLB	0	8.67%	8.67%	8.67%
XRB	0	6.67%	6.67%	6.67%
VNQ	47.37	3.33%	0.00%	0.00%
DBC	0	2.00%	1.00%	2.00%
ESG Score		51.96	53.51	54.26

<sup>3</sup> Risk>Returns Table (Annualised)

Ticker	Expected Returns	Volatility	ESG Score
XLRE	11.44%	14.66%	50.68
VWO	6.62%	31.03%	48.47
IXUS	6.47%	13.82%	54.88
XIC.TO	8.35%	15.63%	52.62
XWD.TO	11.74%	12.60%	55.99
EEM	6.43%	36.63%	49.48
XQQ.TO	16.52%	16.97%	55.65
SUSA	9.58%	17.25%	58.85
XESG.TO	7.86%	8.31%	53.76
PSP	2.32%	28.60%	-
XBB.TO	3.89%	5.12%	-
XLB.TO	5.37%	8.06%	-
XR.B.TO	3.81%	9.24%	-
VNQ	12.62%	30.20%	47.37
DBC	-0.15%	19.16%	-
LIF.TO	14.27%	40.69%	-
SJA-PE	11.25%	56.32%	-
SWR-PE	6.51%	36.87%	-
MF-PE	0.00%	22.02%	-

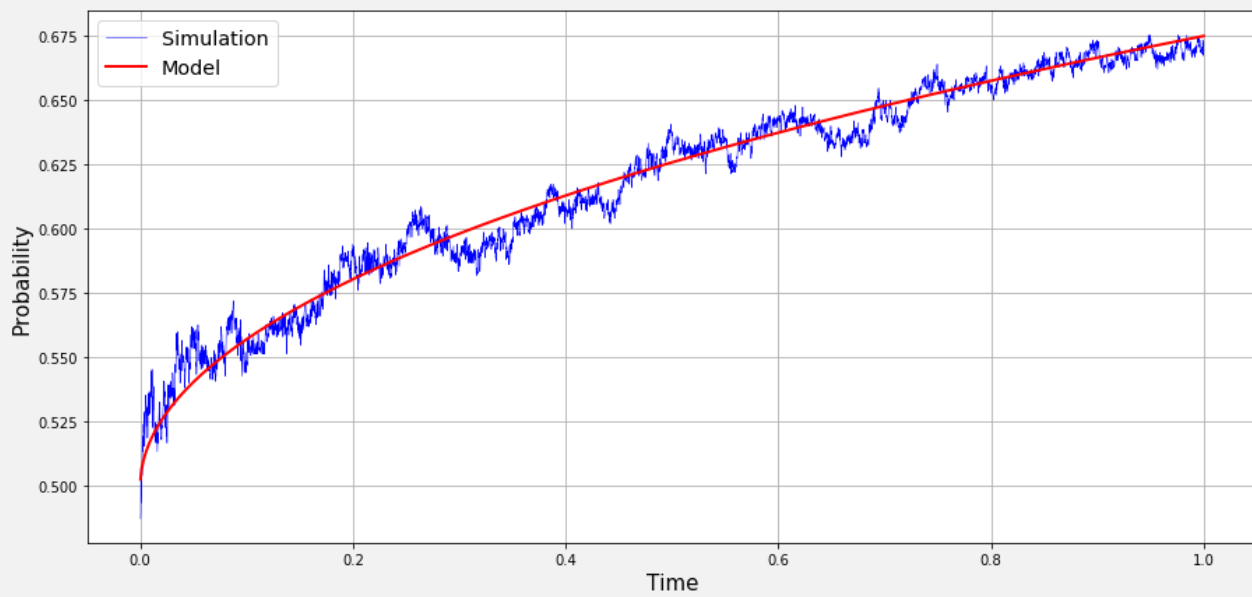
<sup>5</sup> Probability of meeting required returns

The Probability of meeting the required rate is formulated with the Merton Credit Default Risk model, with the assumption of normality in portfolio returns in a Geometric Brownian Motion. This estimates the probability of falling below the 4.5% Required + 2.01% Risk-free rate with Cumulative Distribution Function of the -Z-score as Probability of being above the required rate. The required return is formulated as a function of time to reflect the compounded requirements of returns:

$$Probability = CDF \left( \frac{\ln \left( \frac{1}{1 + R_{req} + R_f} \right) T + \left( E[R] - \frac{\sigma^2}{2} \right) T}{\sigma \sqrt{T}} \right)$$

With the Merton's credit default equation in  $N(d2)$ , we can estimate the probabilities with the equation, which is inline with the probabilities from simulation.

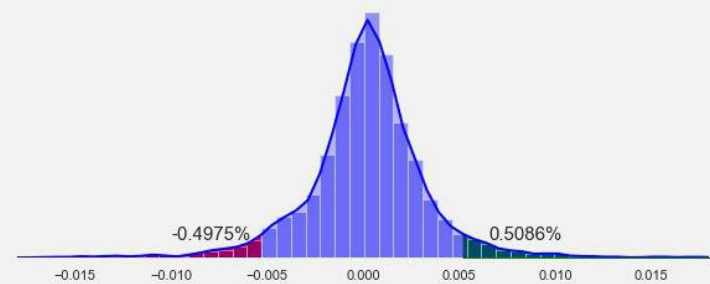
Probability of Meeting Required Rate



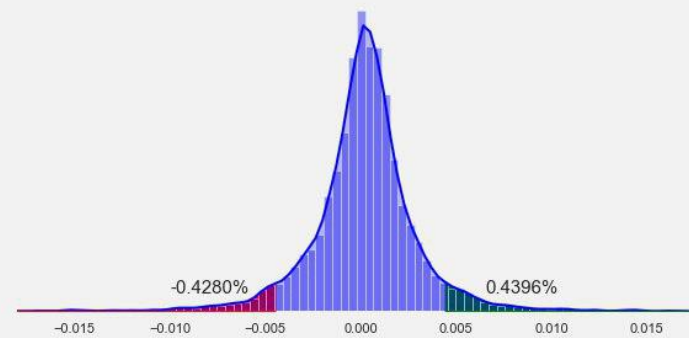
6 Value-at-Risk

The historical distribution of returns of both the current and proposed portfolio is visualized. The Value-at-Risk is sampled from the historical distribution at the 5th percentile. As already shown in the \*Returns Table\* above, the proposed portfolio has a higher expected return, at a lower volatility. This is visualized with the distribution shifted slightly to the right, with a more leptokurtic appearance.

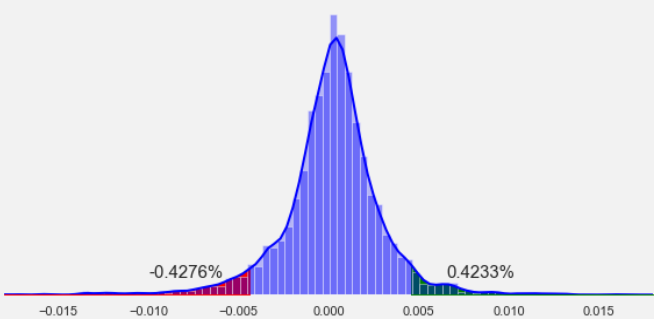
Current Portfolio's Daily 5% Value at Risk



Proposed Portfolio's Daily 5% Value at Risk

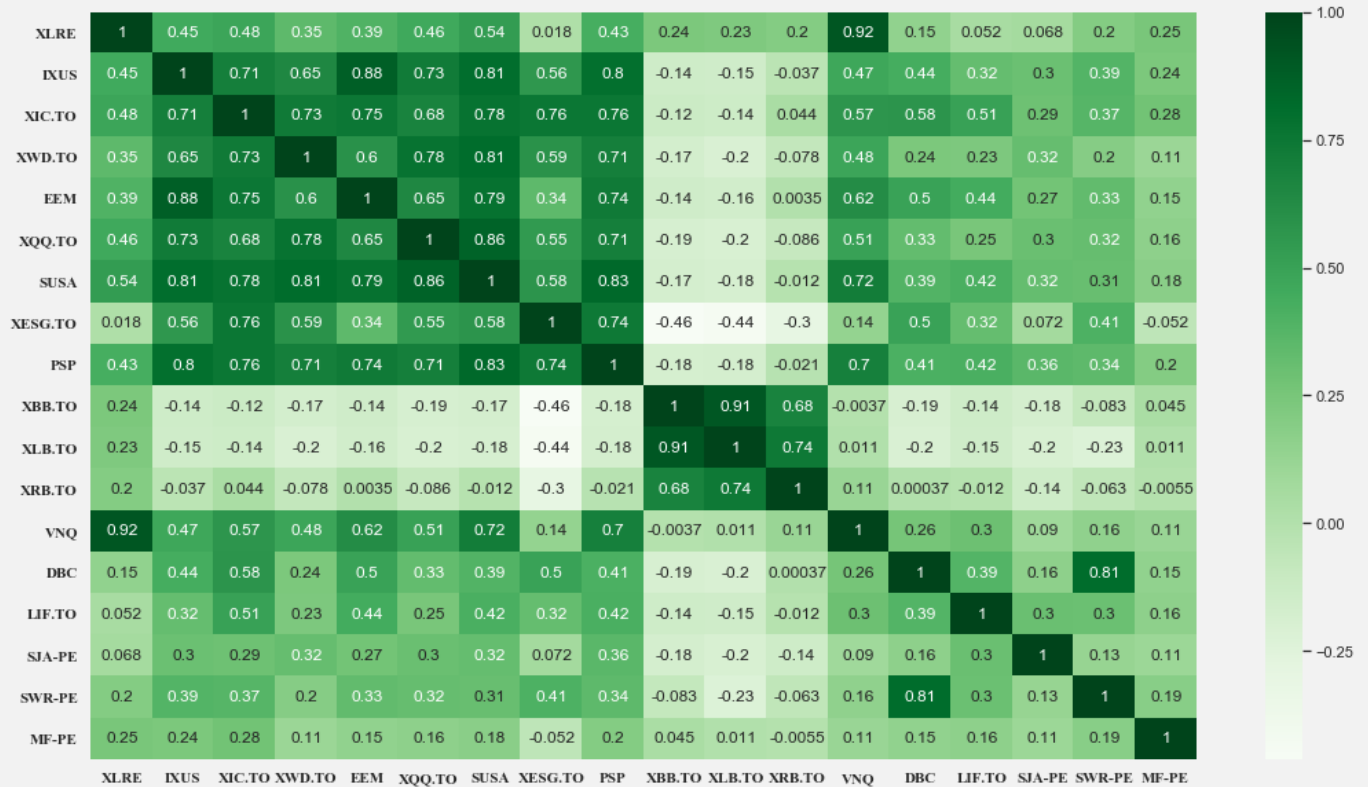


Long-Term Portfolio's Daily 5% Value at Risk



<sup>7</sup> Comprehensive Correlation Matrix

Correlation Matrix between Individual Assets



#### <sup>10</sup> NLPIB Scholarship Details

##### NLPIB Inuit Development Scholarship

- Undergraduate from any discipline
- Awarded to Inuits in need of financial aid
- Must be of Inuit descent residing in Newfoundland and Labrador
- Quantum of CAD34,000 (\$8,500 a year, based on undergraduate tuition fees of Memorial University)
- No bond



<sup>13</sup> Estimating Direct Investments Risk-Return Profiles

Direct Investment	Returns	Volatility Proxy
Labrador Iron Ore*	-	-
Saint John Airport	Hamada's Equation**	Air Canada
South White Rose	4.5% + 2.01% (Rf)***	Crude Oil
Muskrat Falls	Zero Returns	Northland Power Inc.
*Stock price data available for public equity		
**Average unlevered beta of international airports and re-lever		
***Excess returns set aside into separate fund		

Labrador Iron Ore

LIF.TO is a public equity and thus stock price data is directly used to estimation of returns, volatility, and correlation.

South White Rose

Returns on SWR is capped at 4.5% + Risk-free rate of 2.01%, as the rest will be set into a fund for future shortfalls. Volatility and Correlation of SWR is estimated by taking Crude Oil prices as proxy.

Hydro Firms	Ticker	Levered Beta	Debt/Equity Ratio	Tax Rate	Unlevered Beta
Northland Power Inc.	NPI.TO	0.51	523.24%	15.5%	0.0937
Innergex Renewable Energy Inc.	INE.TO	0.39	676.08%	17.0%	0.0588
Muskrat Falls		<b>0.17</b>	143.90%	16.3%	0.0763

Muskrat Falls

Returns: 0% as Muskrat Falls has not been making a profit as the project is not completed.

Volatility and Correlation is estimated with Northland Power as proxy. Northland Power Inc is a Canadian public company producing energy through wind, natural gas, biomass, and solar technology.

Airport	Ticker	Levered Beta	Debt/Equity Ratio	Tax Rate	Unlevered Beta
Flughafen Zürich AG	FHZN.SW	0.49	45.38%	20.5%	0.3587
Auckland International Airport Limited	AIA.NZ	1.07	37.70%	19.5%	0.8192
Grupo Aeroportuario del Pacífico, S.A.B. de C.V.	GAPB.MX	0.67	90.60%	27.0%	0.4025
Fraport AG	FRA.DE	0.61	121.21%	25.0%	0.3195
Airports of Thailand Public Company Limited	AOT.BK	0.96	11.45%	19.5%	0.8772
Saint John's Airport		<b>1.23</b>	136.90%	10.65%	0.5554

\*Levered beta of Saint John Airport estimated with Hamada's Equation

Saint John's Airport

International Airports are taken as comparables, whose Betas are unlevered based on the individual capital structure and tax-rates with the Hamada's Equation. The average Unlevered Beta is calculated and levered back to Saint John's Airport's capital structure and tax-rate to estimate the Levered Beta, which is then plugged into the Capital Asset Pricing Model to estimate the returns on equity for Saint John's Airport.

Assumptions:

1) International Airports' betas reflect the sensitivity relationship between airports and their respective economies.

2) Capital Asset Pricing Model is sufficiently accurate in estimating returns on equity.

Saint John's Airports Volatility and Correlation with the rest of the portfolio is estimated by taking Air Canada's Stock prices as proxy.

#### <sup>17</sup> Possible Eco-tourism Strategies: The Hidden Gem of the Atlantic

We propose a joint venture with a local tour operator<sup>1</sup> to promote eco-tourism in the region, with a projected start time of 8 years from now. The project will involve 3 major drivers: indigenous tours, whale watching expeditions, and national park trails. To fund the project, \$800 million from the sale of LIF will be earmarked for investment. Eco-tourism is a form of tourism involving visiting relatively undisturbed natural areas, intended as a low-impact alternative to commercial tourism.

##### Indigenous Tours - Inuit Culture

Indigenous groups, such as the Inuit people, often lag in growth compared to their urbanised counterparts. This dissonance can breed misunderstanding and cause conflict. Indigenous tours, where eco-tourists receive an immersive experience in the indigenous culture, can act as a vital thrust for prosperity among the indigenous groups, strengthen the voices of the indigenous leaders in a leading sector of the economy, all while promoting NL as a global leader in tourism. The tours can also lead to community development and draw attention to the indigenous people, who may be sidelined in discussions.

##### Whale Watching Expedition

Historically, animal watching has proven to be detrimental for the environment, causing stress, habitat displacement and increased mortality<sup>2</sup>. This is often a product of poor tourist management, with weak enforcement of guidelines that protect the animal population. However, this need not be the norm. Investments in proper management and strict regulation of tourists visiting protected areas can mitigate potential negative impacts.

##### Provincial Park Trails

NL is home to 13 provincial parks, each with a rich history and breathtaking scenery. Parks have the potential to be a large revenue driver: the US National Parks generated US\$152 billion for the US economy and supported 1.1 million tourism related jobs in 2015. However, a major concern is usually the desecration of protected environment. Through investing in guided tours and ethical operators, the provincial parks of NL can become a stable revenue source.

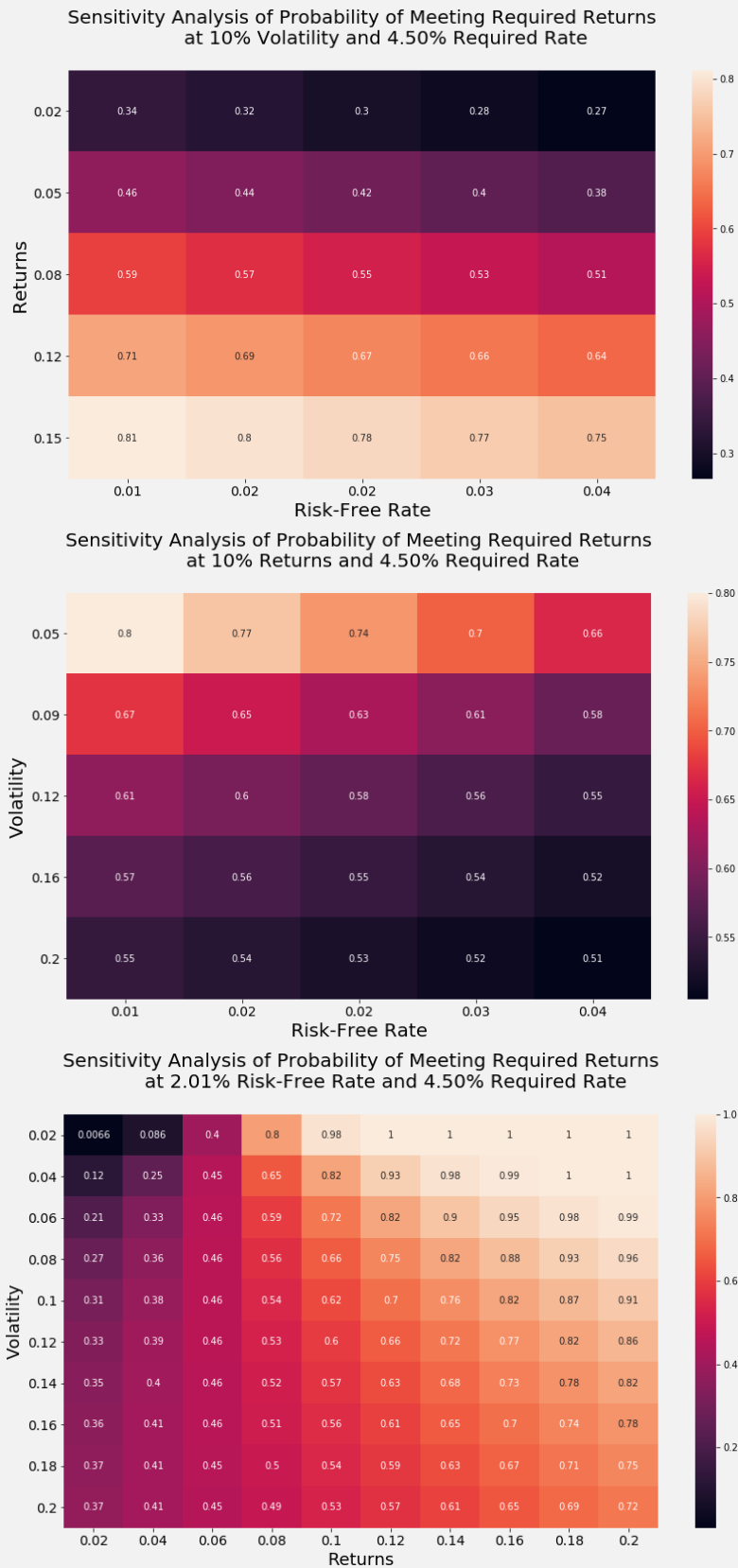
By leveraging on NL's inherent natural beauty and the strong potential for growth in the tourism sector, we believe that the investment will reap extensive benefits for the environment and satisfy all stakeholders involved.

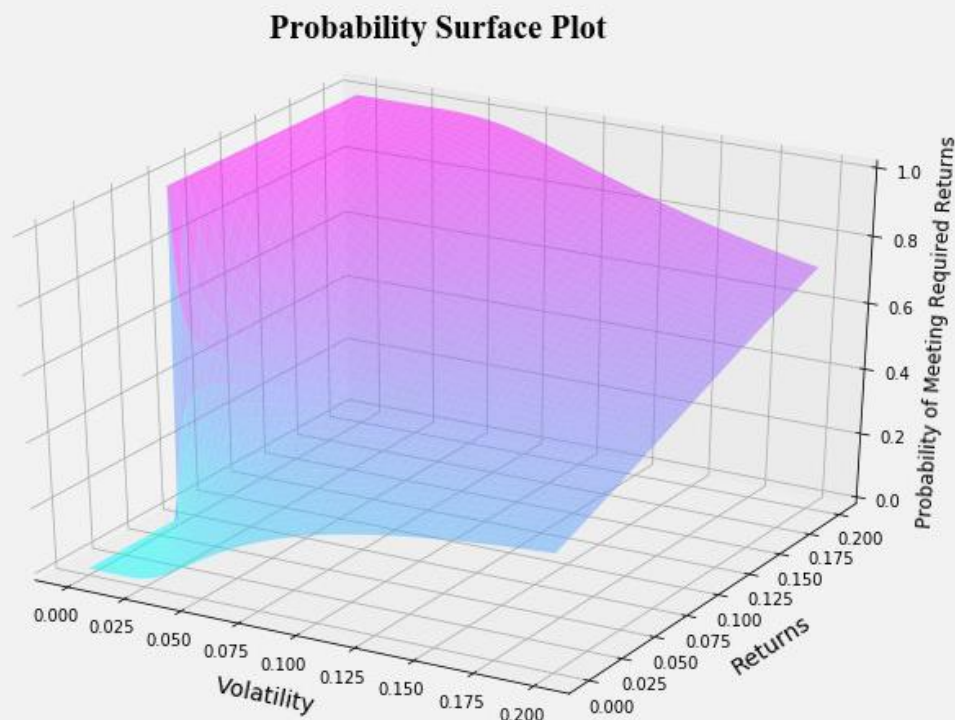
<sup>20</sup> Electric Vehicle Public Transport Masterplan

Year	Target
2030	200 electric vehicle fleet
2040	20% of NFL commuters will use EV public transit 75% of taxis and transportation network vehicles are electric
2050	100% of public transportation will be carbon neutral 100% of light duty vehicles are electric

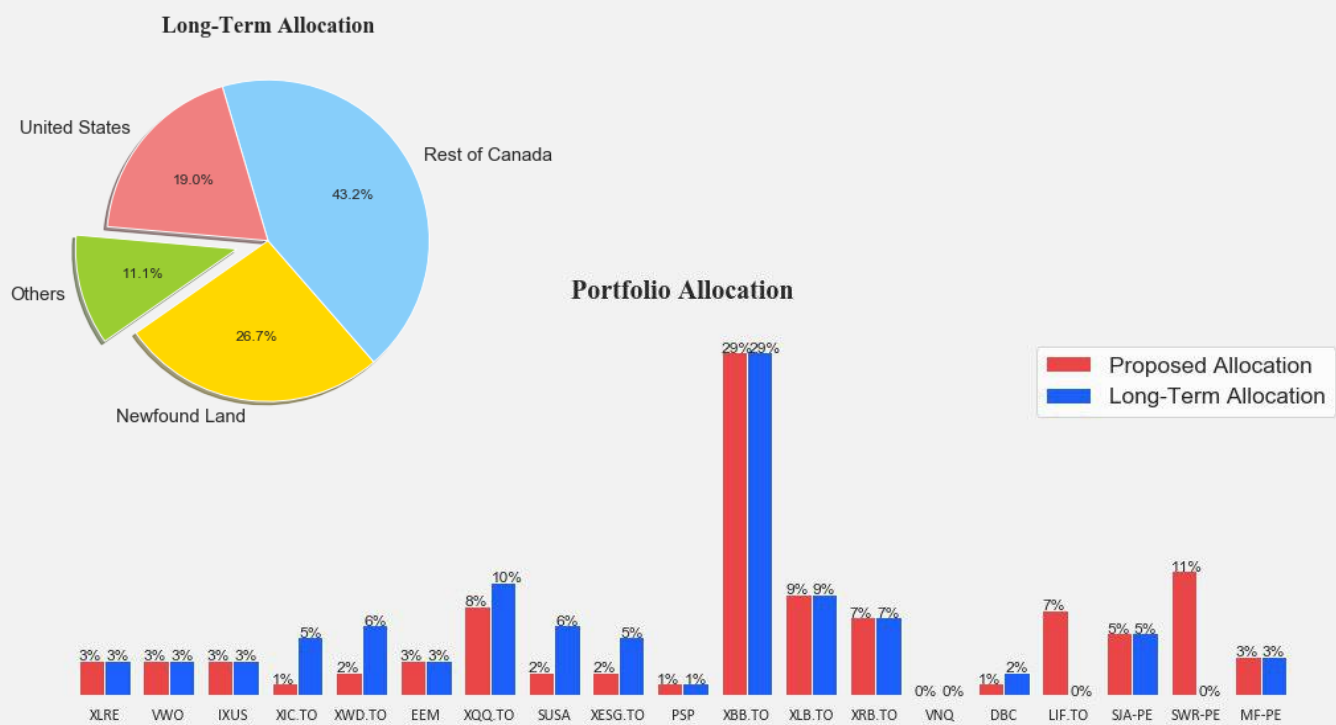
### Sensitivity Analysis of Probability of Meeting Required Returns

In the estimation of probabilities, sensitivity to risk-free rate is marginal, compared to expected returns and volatility.





In the sensitivity table of probabilities to expected returns and volatility, possibilities of probabilities at different combinations of returns and volatility of the portfolio is visualised. A probability surface is also plotted to reflect the relationship between return and volatility to the probability. Higher returns increase probabilities, with volatility being beneficial when expected return is below the required rate, while detrimental when expected return is above the required rate.



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