A Fair Distribution of Oil and Gas Revenues for Newfoundland and Labrador: A Feasibility Study

by

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Abstract

This study aimed to investigate a way to a sustainable future of Newfoundland and Labrador through the introduction of a Sovereign Wealth Fund (SWF) using the province's oil and gas resources. The theoretical frameworks for this study are the capital approach of weak sustainability, environmental justice, and resource curse. With these frameworks, a comparative case study analysis has been adopted to investigate cases of two jurisdictions that are already successfully operating SWFs funded by oil and gas revenue to build more sustainable societies by sustaining their economic, environmental, human, and social capitals. Based on the case studies, this feasibility study examined the following questions: 1) What impacts did the Norwegian SWF have on the sustainability of Norway? 2) What impacts did the Alaskan SWF have on the sustainability of Alaska? 3) How does the oil and gas industry affect Newfoundland and Labrador's sustainability and what improvements should be made? 4) Will Newfoundland and Labrador be able to ensure sustainability with their oil and gas revenue? The study concludes that introducing a SWF could help to ensure the sustainability of Newfoundland and Labrador, with several supporting policies, such as diversified funding sources, building a framework that can benefit local people, and achieving social consensus.

General Summary

This study aimed to investigate a way to a sustainable future of Newfoundland and Labrador through the introduction of a Sovereign Wealth Fund (SWF) that is collected from non-renewable resources revenues and is managed by the provincial government. The cases of Norway and Alaska that are already successfully operating SWFs are investigated and are compared using SWOT analyses to draw lessons for Newfoundland and Labrador's sustainability. The study uses as theoretical frameworks the concepts of sustainability and environmental justice. It concludes that introducing a SWF could help ensure the sustainable development of Newfoundland and Labrador, economically, socially and environmentally. Several supporting policies are recommended, such as diversified funding sources for the proposed SWF, building a framework that can effectively benefit local people from using their oil and gas resources, and achieving social consensus.

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Table of Contents

List of Tables

List of Figures

List of Symbols and Abbreviations

ANCSA	Alaska Native Claims Settlement Act of 1971
APF	Alaska Permanent Fund
APFC	Alaska Permanent Fund Corporation
BOE	Barrels of Oil Equivalent
BBbls	Billion barrels
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CERI	Canadian Energy Research Institute
EA	Environmental Assessment
FISH-NL	Federation of Independent Sea Harvesters of Newfoundland and Labrador
FFAW	Fish, Food and Allied Workers Union
GPFG	Government Pension Fund Global
GHG	Greenhouse Gas Emissions
GDP	Gross Domestic Product
IWI	Inclusive Wealth Index
METRR	Marginal Effective Tax and Royalty Rate
MMbbls	Million Barrels
NLPPF	Newfoundland and Labrador in the Pooled Pension Fund
NOK	Norwegian Krone
OECD	Organisation for Economic Co-operation and Development
PFD	Permanent Fund Dividend

SCC	Social Cost of Carbon
SWF	Sovereign Wealth Fund
SDFI	State’s Direct Financial Interest
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TAPS	Trans Alaska Pipeline System
UNEP	United Nations Environmental Programme
UNCLOS	United Nations Conventions on the Law of the Sea
UNU-IHDP	United Nations University's International Human Dimensions Programme on Global Environmental Change
US	United States of America
USD	United States Dollar
EIA	United States of Energy Information Administration
WCED	World Commission on Environment and Development

1. Introduction

1.1 Introduction

The oil and gas industry is an important component of Newfoundland and Labrador's economy. The oil and gas industry yielded about 21% of the province's industrial gross output in 2016, and this contribution is a larger contribution then even manufacturing industry in Newfoundland and Labrador (Statistics Canada, 2020). The dependency, however, has been a double-edged sword for the economy of Newfoundland and Labrador. When oil price was high, Newfoundland and Labrador has experienced economic growth with more employment and fiscal benefits; however, the economic boom brought by oil can rapidly come to an end (Palladini, 2015; Seth Kwei, 2019). On the other hand, when oil price is low, just as the current low oil price since mid-2010s, Newfoundland and Labrador experienced huge losses of welfare and economic downturn (Carbone & McKenzie, 2016). In 2008, the contribution to GDP of the oil and gas industry reached its highest level with $11.7 billion, however, it decreased to $4.7 billion in 2017 with the slumping oil price that began late in 2014 (Government of Newfoundland and Labrador, 2009, 2019c). Newfoundland and Labrador is now one of Canada's most economically challenged provinces. The province is experiencing the greatest decrease of the number of young labour force since 2012, and the unemployment rate was 13.8% in 2018 which was much higher than the national unemployment rate of 5.8% (Government of Canada, 2020). The provincial government's debt hit the record high with $15.4 billion in 2019 (Auditor General of Newfoundland and Labrador, 2019).

The future of the oil and gas industry in Newfoundland and Labrador seems to be not great either. The Carbon Tracker, an independent financial think tank, asserted that there will be low demand for oil and gas resources from Newfoundland and Labrador's offshore because of the increasing risk of climate change and its higher production cost on Newfoundland and Labrador's offshore than its production cost on other offshores (Atlantic Business, 2019). Also, the oil price trend is not helpful either. Recently, the United States Energy Information Administration (EIA) has insisted that the oil price will not be recovered in a short-term as they predict that the annual average price of Brent crude oil, which is a benchmark for Newfoundland and Labrador oil, will be $34.14/barrel in 2020 and $47.81/barrel in 2021 which is significantly lower than its price of $64.37 in 2019 (U.S. Energy Information Administration, 2020b). Without any significant changes in policies for their oil and gas resources, the future of Newfoundland and Labrador is seems to be downfall.

Meanwhile, in 2018, the provincial government of Newfoundland and Labrador unveiled a plan named "the Way Forward" that included plans to drill over 100 new exploration wells and double its oil production by 2030 (Oil and Gas Industry Development Council, 2018). Therefore, aside from the plan to increase oil and gas production, Newfoundland and Labrador needs to figure out how to make the benefits from the oil and gas industry sustainable, even when there is a downturn in the global oil market or when its oil and gas resources are no longer available.

From this awareness, this study aims to search for a way to a sustainable future of Newfoundland and Labrador using their oil and gas resources, with an assumption that the oil price will stabilize again after the Covid-19 outbreak is over and economies start working again. In other words, how benefits from oil and gas resources should be distributed between the oil and gas companies and the province of Newfoundland and Labrador to sustain the benefits of oil and gas resources and keep the benefits at a sustainable level is a major concern of this study. The ideal way of benefit distribution from oil and gas resources in this study is a "fair distribution" which is considered as a condition for sustainability (Alshuwaikhat & Mohammed, 2017; Van de Kerk & Manuel, 2008). There are two aspects of fair distribution, which are inter-generational fair distribution and intra-generational fair distribution (Lamorgese, 2014; Warhurst Alyson, 2002). Inter-generational fair distribution refers to a fair distribution between succeeding generations (Warhurst Alyson, 2002). Intra-generational fair distribution refers to a fair distribution of resources within the current generation, such as between oil companies and local people (Elliott, 2005; Lamorgese, 2014). The fairness does not only mean economic fairness, but it includes social and environmental fairness also.

To distribute the benefits of resources fairly, a fund-based approach is frequently used in non-renewable resource sectors (Atkinson & Pearce, 1993; Hite, 2015). Under the fund approach, the government accumulates a significant amount of financial assets through oil production, which can be used and invested to satisfy the needs of the current and the future

generations. Fund-based approaches facilitate a fair distribution of benefits to the public from extractive industries that utilize non-renewable natural resources, as they involve dispersing cash benefits for specific purposes (Hite, 2015). When the government owns a fund with investment strategies for macroeconomic policy purposes, the fund is generally called a Sovereign Wealth Fund (SWF) (Alhashel, 2015; Das & Lu, 2009; Beck & Fidora, 2008). SWFs are usually sourced from commodity export revenues, and they aims to stabilize government and export revenues, accumulate savings for future generations, and manage foreign reserves (Alhashel, 2015).

1.2 Research Background: Oil and Gas Industry in Newfoundland and Labrador

The first exploration oil well in Newfoundland and Labrador was drilled in 1966 on the east coast. The economic viability, however, was not enough to begin commercial production of oil because there were many other oil fields globally capable of cheaper and easier production (Fusco, 2007). The situation changed dramatically after the first global oil crisis in 1973. With the surge of oil prices in 1973, interest in the oil resources of Newfoundland and Labrador started to rise significantly (Fusco, 2007).

Canada commenced negotiations on the continental shelf boundary at the United Nations Convention on the Law of the Sea (UNCLOS) conference in July 1970 and established a 200-nautical-mile off shore fishery zone in 1977, which was agreed to in 1982 (Esearch, 2019; Miller, 2007). It confirmed Canada's authority over the development of the oil and

gas resources on the Grand Banks (Esearch, 2019), but without defining jurisdictional control of the provincial government of Newfoundland and Labrador. The province of Newfoundland and Labrador has tried to claim jurisdictional control over its territorial sea and continental shelf (Fitzgerald, 1991). The province of Newfoundland and Labrador outlined an approach to develop their offshore resources in a government White Paper in 1977, which was to include:

> 1) A system of exploration and development permits for the lands claimed by Newfoundland and Labrador which ensures that work is actually done by permit holders; 2) Development and production of the resource in a reasonable time-frame consistent with other objectives (rather than leaving the resource unexplored and underdeveloped); 3) Maximization of the economic rents to be earned from the resource for the public sector; 4) Control of the rate of development to ensure maximized benefits and minimum disruptive impacts; 5) Environmental protection, with particular concern to protect the fishery; 6) Participation and involvement of residents of the province in planning offshore development. (Voyer, 1983, p.38).

On October 24, 1977, the province of Newfoundland and Labrador enacted offshore petroleum regulations that includes the following provisions:

> 1) preference for Newfoundland labor, goods, and services, 2) compulsory training, research, and development programs in the province, 3) the landing in the province of any oil and gas produced offshore, 4) minimum expenditures within the province,

> 5) preference for local refining, processing, and consumption of oil and gas, and 6) provincial control over the rate of development. (Fitzgerald, 1991, p.6)

In 1979, the first major oil field in the Newfoundland and Labrador offshore was discovered at Hibernia on the Grand Banks off Newfoundland and Labrador. Both the provincial government of Newfoundland and Labrador and the federal government of Canada recognized the oil field as an important part of its energy strategy (Fusco, 2007). After years of negotiation between the federal government and the provincial government, they established a joint management system called the "Atlantic Accord" for Newfoundland and Labrador's offshore, recognizing the priority of the province, and created the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) to manage the offshore on behalf of both governments in 1985 (Fusco, 2007). The Atlantic Accord in 1985 aimed "to provide resource revenues to Newfoundland and Labrador as well as Canada, the attainment of national self-sufficiency and security of supply, and a stable and fair offshore management regime to the oil and gas industry" (Government of Newfoundland and Labrador, 1985, p. 1).

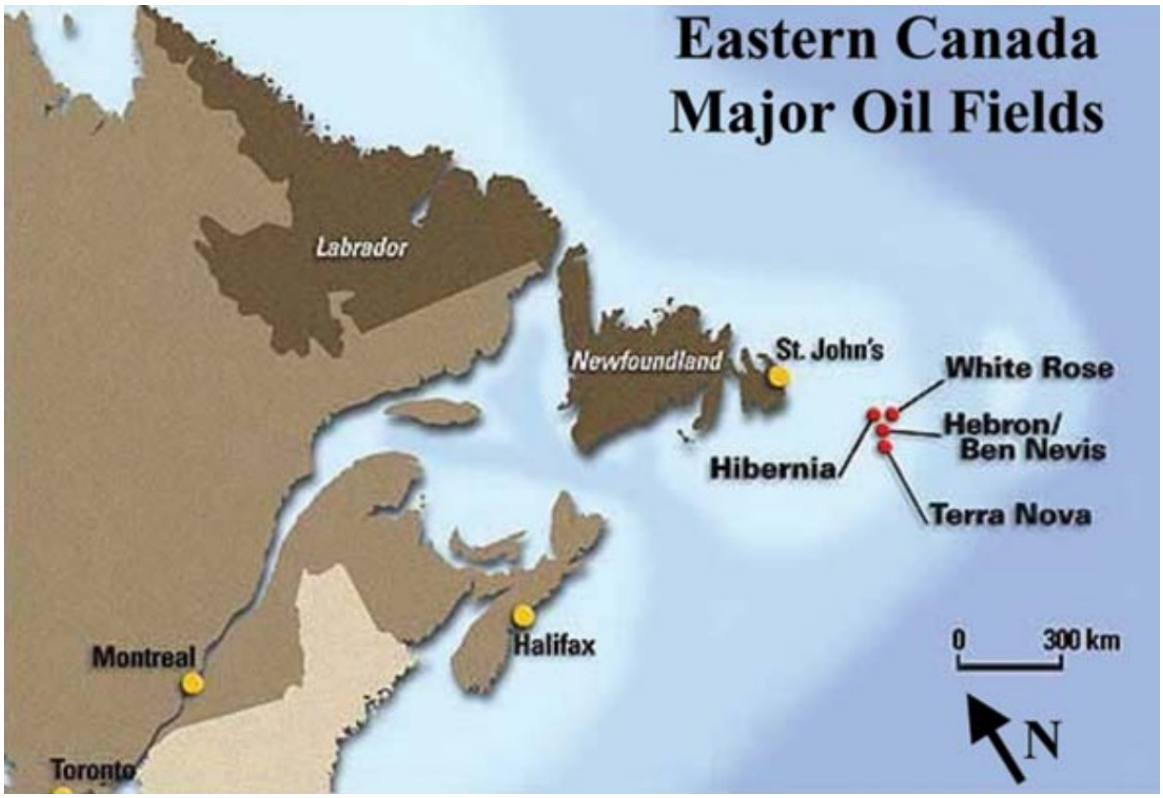

Figure 1. Location of Major Oil Fields, Offshore Newfoundland, Eastern Canada. Reprinted from **"**Reservoir connectivity analysis of a complex combination trap: Terra Nova Field, Jeanne d'Arc Basin, Newfoundland, Canada", by Richards, F. W., Vrolijk, P. J., Gordon, J. D., Miller, B. R. 2010, Geological Society Special Publication, 347, p.334

After the discovery of the Hibernia oil field, the Hebron oil field was discovered in 1980, then the Terra Nova and White Rose oil fields were discovered in 1984. The production of crude oil from the Hibernia oil field, however, was not started until 1997 because of the declined oil price, a prolonged development process, engineering problems, and the increasing price tag of the project due to those delays (Fusco, 2007). After a long-awaited

process of development, Hibernia crude oil production started in 1997, and the oil and gas industry has become a more important basic industry than the fishing industry that was declining due to resource depletion (Coulombe, 2012). After the first crude oil production, Terra Nova crude oil production began in 2002, and White Rose oil production began in 2005 (Bott, 2004).

According to the Oil and Gas Industry Development Council (2018), Newfoundland and Labrador's offshore has 2.2 Billion Barrels (BBbls) of discovered oil reserves left and 12.6 trillion cubic feet of natural gas discovered which needs to be developed. It is also estimated that there is 37.5 BBbls of oil and 133.6 trillion cubic feet of natural gas undiscovered in the West Orphan and Flemish Pass regions (Oil and Gas Industry Development Council, 2018). So far, the total amount of oil already produced in the Newfoundland and Labrador's offshore is about 1.7 BBbls. Based on the "Way Forward" plan, the province of Newfoundland and Labrador plans to drill over 100 new exploration wells, and increase the daily production to over 650,000 barrels of oil equivalent per day (boe/d) by 2030. That is more than twice the current daily production. Other than these plans, the "Way Forward" plan includes long-term plans of starting commercial natural gas production, growing the supply and service industry, and creating a world-class energy cluster (Oil and Gas Industry Development Council, 2018).

Despite such positive forecasts, the oil and gas industry in Newfoundland and Labrador is undergoing hard times with the falling crude oil price started in late 2014. The price of Brent crude oil, which is a benchmark for Newfoundland and Labrador oil, was at US$105.79 in July 2014, however, it dropped to US$ 59.29/barrel in December 2014 (U.S. Energy Information Administration, 2020b). Since then, the average annual crude oil price was US$48.66/barrel in 2015, US$43.29/barrel in 2016, US$50.80/barrel in 2017, US$65.23/barrel in 2018, and US$57.00/barrel in 2019 (U.S. Energy Information Administration, 2020b). The situation got much worse in 2020. As tensions between Russia and Saudi Arabia are escalated and global oil demands are significantly reduced mainly due to the COVID-19 pandemic, the monthly oil price in April 2020 dropped to US$16.55 and daily spot oil price once fell as low as minus $36.98/barrel (U.S. Energy Information Administration, 2020b). As oil prices fell, the oil industry in Newfoundland and Labrador, where production costs were higher than in other oil-producing regions, has been significantly impacted. The planned expansion process of the oil fields in Newfoundland and Labrador, such as the drilling program in the Hibernia oil field and the development of the West White Rose oil fields, has been suspended or deferred (Graney, 2020).

1.3 Research Objectives and Questions

This study aims to investigate a way for Newfoundland and Labrador to utilize its oil and gas revenues to secure the sustainability of the province of Newfoundland and Labrador, as announced in the "Way Forward" plan, which planned to increase oil and gas production. This study assumes that the current pandemic will end and the oil price will rise again, but

Newfoundland and Labrador could suffer if there are no political changes to its management of oil and gas resources, as global crises like the current situation can come again at any time. As aforementioned, the current management of oil and gas resources is not sustainable, so to convert them into sustainable benefit streams, which include environmental and social benefits as well as economic benefits, it is necessary to create a sizable fund and transfer the oil and gas revenues to the fund. There are two cases that have successfully done this, which are found in Norway and Alaska.

Norway and Alaska are both considered as good examples of jurisdictions that have created and managed SWFs successfully with their rich oil and gas endowments. Norway has the world's largest SWF which was about 1,148 billion USD in 2019 (Norges Bank Investment Management, 2019a), and Alaska has the largest SWF amongst any territorial entity within a country, which was about 66 billion USD in 2019 (Center for the Governance of Change, 2020). Although there is a difference between Norway and NL, as Norway is a country and NL is a province in Canada, the considerations for a provincial fiscal policy are not much different from those for a national fiscal policy, as they are mainly a matter of economic variables, for instance, the size of the economy, the unemployment rate, and the debt capacity (Barber, 1968). The characteristics of different SWFs are determined by their objectives, such as stabilizing the economy, saving for a pension, or long-term development of the domestic economy (International Monetary Fund, 2008), and they are already widely and internationally adopted in many countries and provinces (states) regardless of the size of the economy (Eldredge, 2016).

While Norway's Alaska's present good examples of SWFs, their primary way of spending the fund is different. While Norway's SWF's focus is to save the fund and finance future liabilities, Alaska's SWF has a unique fund dividend system which provides a basic income for their residents. Alaska is the one US state that has a significantly lower poverty rate of 10.2% than the national average of 14.6%, thanks to the SWF funded by oil and gas revenue (Welfareinfo, 2017). Therefore, the SWFs of Norway and Alaska will be discussed as benchmarks for oil wealth distribution and investment, using oil and gas revenues (Murphy & Clemens, 2013; Olawuyi & Onifade, 2018; Truman, 2009). Here, the distribution and investment of oil wealth means a stock of assets that includes economic, environmental, human, and social capitals to build sustainable society. What NL needs is to get the continued benefits from their oil and gas resources to sustain the development of the province as well as their environmental, human, and social capitals, not just gaining temporary economic benefits the way they have done so far. Thus, this study examines whether lessons from SWF frameworks can be applied to NL, based on the case studies of Norway and Alaska, to investigate a way for NL to utilize oil and gas income to secure the province's sustainability. To achieve this research goal, the study aims to address four objectives and research questions:

1) The Norwegian SWF and the sustainability of Norway: What impacts did the Norwegian SWF have on the sustainability of Norway?
2) The Alaskan SWF and the sustainability of Alaska: What impacts did the Alaskan SWF have on the sustainability of Alaska?

3) The oil and gas industry and the sustainability of Newfoundland and Labrador: How does the oil and gas industry affect NL's sustainability and what improvements should be made?
4) The feasibility of the introduction of a SWF in NL and identify the challenges based on the case study results of Norway and Alaska: Will NL be able to ensure sustainability like Norway and Alaska with their oil and gas revenue?

Norway and Alaska are cases to demonstrate that SWF is an instrument that has the potential to maintain sustainability and achieve a fair distribution of wealth by using non-renewable resources. By examining the factors that led to the success of Norway and Alaska, this study intends to argue that it is feasible for NL to achieve sustainability through the introduction of a SWF using the oil and gas resources in the province, after the Covid-19 outbreak is over and economies start working again, with an assumption that the provincial government of NL has the political will for a sustainable future for the province.

1.4 Overview of This Study

This study consists of seven chapters. This first chapter provides the background and objectives of this study, to explain the rationale of this research. Chapter 2 provides a literature review that covers concepts and theories which are conceptual frameworks for this study. The concepts and theories in this chapter explain what factors should be reviewed to investigate sustainability issues related to the fair distribution of oil and gas revenues. Chapter 3 provides a research methodology and outlines the research design.

Chapter 4 and Chapter 5 provide the case studies of Norway and Alaska. These chapters investigate the background of how Norway and Alaska created their SWF frameworks; the impacts of the SWFs on the sustainability of their societies; and compare the results of the case studies to provide implications for NL. On the basis of these results, Chapter 6 investigates a way for NL to utilize its oil and gas revenue to secure their sustainability and discusses its feasibility and challenges. Lastly, Chapter 7 provides a summary and conclusion of this study, and outlines some policy recommendations aimed to ensure the sustainability of NL. It also discusses the limitations of the study and makes recommendations for further research.

2. Literature Review

2.1 Introduction

The issue of distribution of wealth generated from natural resource extraction has received growing attention, especially when focused on non-renewable/exhaustible resource extraction. The wealth from non-renewable resource extraction has generated both positive and negative effects on the sustainability of a society that relies for its development on non-renewable resources. To discuss how to fairly distribute the wealth generated from natural resource extraction, the concepts related to those effects on sustainability need to be investigated.

The revenue from non-renewable resources exploitation needs to be managed carefully to assist in achieving the sustainability of a society. The natural resources are key inputs for sustainable development; however, the nature of non-renewable resources inevitably raises concerns on the issues of sustainability. The first reason is that natural resource abundance is not always considered a blessing which guarantees high economic growth due to the so-called "resource curse" (Sachs & Warner, 1997, 2001). The second reason is that the development using the revenue from non-renewable resources raises concerns on global environmental justice, which refers to justice in terms of cross-border distribution of environmental burdens and benefits because the cost of development can be imposed on the group who does not benefit from the development (Blake, 2011). The revenue from

non-renewable resources should be managed for minimizing these impacts. A SWF is one type of financial instrument to manage the revenue from non-renewable resources towards sustainable outcomes, as it is largely motivated by the need for ensuring the stability and security of a nation (Sun et al., 2014). This study considers creating a SWF for the province of NL in Canada as a way to reduce the aforementioned problems of development using non-renewable resources, because a SWF can be used to convert oil and gas revenue into financial capital that can be invested for the public good.

This chapter will examine the concepts related to the distribution of oil and gas revenues, as they are presented in the existing literature. The literature examined in this section includes peer-reviewed papers, reports from think tank institutions, international organizations, and theses. Those literatures published cover publications mostly from 1990 to 2019 with several exceptions of those published in 1980s and 1970s. Several themes can be identified in the literature, which are: 1) the difference between the concepts of wealth and revenue, and how they can be used to achieve sustainability of a society; 2) how sustainability in a society can be accomplished with non-renewable resource revenue; 3) what a SWF is and why it is important when it comes to the fair distribution of oil and gas revenue.

2.2 Wealth and Sustainability

The emergence of the concept of wealth is related to the concerns about sustainability and the struggle to overcome the limitations of traditional macroeconomic variables, such as gross domestic product (GDP). The ultimate goal of this study is to figure out how to make the NL province benefit from its oil revenue not only for the future generations but also for the current generation by attaining sustainable socio-economic outcomes using their oil and gas resources. This is in line with the classical definition of sustainable development from the World Commission on Environment and Development (WCED) report of 1987 that states: "Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 16). Considering this concept of sustainable development, sustainability in this study can be defined as preserving the level of well-being over time with the capacity to sustain the well-being for the future generations as well as for the current generation at the same level (Vivien, 2018). GDP cannot measure sustainability since it measures only current income and production of goods and services without considering the assets for long term development (The World Bank, 2018). For example, GDP can be boosted by over-exploiting natural resources, however, this process lowers the opportunity of future production capacity. Sustainability is about sustaining and enhancing the opportunities available to both current and future people in society, and the opportunities depend on the accumulation of wealth (Weitzman, 2016) not only on GDP growth. Wealth in this study is considered a stock of assets including all tangible and intangible assets an economy has minus its liabilities, while income is considered a flow

which measures the amount of money (or goods) that is obtained over a given interval of time and gets added to the stock of wealth. Therefore, the level of GDP cannot be equated with the level of well-being in a society, and the policy decisions based on only traditional economic indicators lead to poor decisions without full information. To address the well-being of society, inspecting the level of various capital stocks used jointly to produce well-being over time is considered a coherent approach (Uwasu & Yabar, 2011).

Early studies on sustainable development, such as Solow (1974) and Hartwick (1977), theoretically presented that economic growth can be sustained when earlier generations draw down the finite pool of non-renewable natural resources optimally and they add optimally to the stock of reproducible capital. The reproducible capital refers to man-made capital such as machines, which is considered as compensation for non-renewable resources used (Hediger, 1997). According to Solow (1974), the proportional rate of change of the marginal productivity of the resource should always equal the level of the marginal productivity of reproducible capital to be on the optimal path of development. The approach to measuring the sustainability of society by estimating these capitals is called the "Capital approach". The significance of the capital approach is that the stock of capitals is considered to give the capacity to grow the stream of goods and services in the society (Ekins et al., 2003)., and the stock of capitals should be non-decreasing. Atkinson and Pearce (1993) provided a crystallized explanation of the capital approach to sustainability in the early stage. In the capital approach, the amount of goods and services produced in society is linked to the level of various types of capital existent in the society which is used for the

production process. The amount of these capitals is used to estimate the level of wealth. Atkinson and Pearce (1993) assumed that there are 2 types of capital, which are man-made capital and natural capital, and they can be substituted each by the other. Atkinson and Pearce (1993) assert that an economy is sustainable if the economy saves more than the combined depreciation of the capitals. This is referred to as a weak sustainability rule. According to the study, the value of saving in a society, which is the potential source for future investment, must be larger than the summation of the value of depreciation of man-made capital and the value of depreciation of natural capital to maintain the weak sustainability of a society. On the strong sustainability rule, there is a critical quantity of natural capital (resources) that must be maintained intact if the well-bring of the future generation is not to decline, which implies the non-substitution of man-made capital for natural capital (Hamilton, 1995).

Based on these works, many studies introduce the concept of wealth as an indicator of the sustainability of the national economy. A theoretical concept of wealth relating to economic theory is the present value of future consumption which is dependent on amount of capitals in a society (The World Bank, 2006, 2011, 2018). Hence, the estimates of wealth can provide a useful indicator of the sustainability of society as the amount of wealth is founded on the amount of capitals that future generations can consume (The World Bank, 2018). If the wealth was distributed unfairly, the sustainability of the economy cannot be achieved. Unfair wealth means wealth that is immediately gained owing to consuming the private or public wealth already saved up by others (Savin & Rovenskaya, 2011). Since wealth is

about the sustainable growth of a society, unfair wealth can decline the sustainability and living conditions of the public. Chang (2012) mentioned that social relationships regarding resource allocation among people are also important and there will be no efficiency without a fair distribution of wealth. Therefore, there should be a policy instrument to make an unfair wealth distribution fair in order to sustain well-being in a society.

The significant linkages between wealth and sustainability have noticed by a series of papers since the 1990s, such as the World Bank (1997), Hamilton and Clemens (1999), and Dasgupta and Mäler (2000). The World Bank (1997) report explores indicators of environmentally sustainable development that include the links between environmental quality and economic growth and between the consumption of resources and the quality of the resource stock. The focal point of this report is that "economic growth that causes rapid resource depletion, degradation, major health problems and productivity impacts on the public is neither sustainable nor desirable" (The World Bank, 1997, p. 11). This is worthwhile to mention because it notes that the impact of economic growth on human as well as resource depletion and degradation has an important impact on creating wealth. Hamilton and Clemens (1999), motivated by the World Bank (1997) report, developed the theory of "genuine savings" which describes the relationship between the wealth account and resource depletion, environmental degradation, and the value of investments in human capital (Hamilton, 1994). They explore the connections between changes in wealth and changes in intergenerational well-being. The rationale of considering "genuine savings" as an indicator for national wealth is "the incomplete treatment of resource issues" within the

system of national accounts (Hamilton & Bolt, 2007. p. 292). For example, commercial natural capital stocks are measured in the national accounts, but there is no adjustment to reflect the consumption of capital when these stocks are decrease as they are exploited (Hamilton & Bolt, 2007). When the depletion of natural capital is ignored within national accounts, it brings unsustainability of the country, as the depletion may be harmful for future generations. The measurement of genuine savings takes into account the depletion of natural assets that is calculated as a rental rate on commercial resource production plus global damages from CO_2 emissions to valuate wealth. This makes the sustainability of natural capital an important factor when measuring wealth using the concept of genuine savings. This is important since the over-exploitation of natural resources without considering the sustainability leads to declines in economic growth and social welfare (Lampert, 2019). Based on this deliberation, the World Bank has published national "genuine savings" estimates in their reports, annually. The genuine savings measurement encompasses physical, human and natural capital based on weak sustainability, which is premised on substitutability between physical, natural and human capital (Pillarisetti, 2005). Therefore, one of the policy implications of the theory of genuine savings is that negative rates of genuine savings lead to declining well-being; however, policymakers can make achievable interventions to increase sustainability based on this relationship (Hamilton & Clemens, 1999). Hamilton et al. (2006) extended the findings of Hamilton and Clemens (1999) to analyze the role of the management of wealth through saving and investments. Their emphasis on saving is a core aspect of development as there is no way for countries to escape poverty without making a surplus for investment. Arrow et al. (2010) extended the theory of genuine savings to provide a consistent framework that incorporates

population growth, technological change, human capital, and environmental quality. Also, they incorporated the effects of expected capital gains in natural resource stocks and health as a kind of capital within their model.

In June 2012, the United Nations University's International Human Dimensions Programme on Global Environmental Change (UNU-IHDP) and the United Nations Environmental Programme (UNEP), a biennial series of reports on the sustainability and wealth of countries at the Earth Summit 2012 (Rio+20). UNU-IHDP and UNEP (2012) discussed the construction of the wealth accounts, proposing the concept of the Inclusive Wealth Index (IWI). This index provides quantitative information on human well-being and measures of sustainability on a long-term perspective. There are a few differences between "genuine savings" and IWI in terms of how to calculate the level of capitals and sustainability, but the IWI also offers a capital approach to sustainability considering natural capital, produced capital, human capital, and social capital and measures the social value of capital assets of nations. The value of natural capital is measured based on everything in nature capable of providing human beings with well-being, such as fossil fuels, forest resources, agricultural land, and fisheries (UNU-IHDP and UNEP, 2014; UNU-IHDP & UNEP, 2012). The value of produced capital is measured based on equipment, roads, buildings, machinery, and others which are usually accumulated from the investment of national income (UNU-IHDP & UNEP, 2014; UNU-IHDP & UNEP, 2012). The value of human capital is measured based on the knowledge, skills, competencies, and attributes embodied in individuals, such as population size, life

expectancy, mortality probability, employment, educational attainment, employment compensation, and labor force (UNU-IHDP and UNEP, 2014; UNU-IHDP & UNEP, 2012). The value of social capital is measured based on the social relationships and institutions that facilitate action, in terms of the importance of obligations and expectations, information channels (UNU-IHDP and UNEP, 2014; UNU-IHDP & UNEP, 2012). And each capital category embeds intangible asset, which is hard to be quantified, in order to capture as much wealth as possible within the categories. IWI is considered as a stand-out indicator of sustainability and well-being as it has a theoretical foundation from economics and can give policy implications to decide where to invest to increase the level of sustainability in a society (Ikeda et al., 2017; Roman & Thiry, 2016). The UNU-IHDP and UNEP (2012) reports, which is the first series of reports that utilize IWI to address national sustainability, have specified several lessons of the IWI on the policy making considering the sustainability of the nations. Firstly, The IWI assumes that capitals can be substitutes for each other. Therefore, under the inclusive wealth framework, the reason why natural capital is preserved is not only because natural capital needs to be preserved, but also because the natural capital can be converted to other forms of capital to achieve sustainable development. The possible substitution between capitals apply to other capitals, too. This assumption is criticized by other studies due to the limited substitutability between capitals, especially because natural capital cannot or should not be substituted (Bailey, 2017; Cohen et al., 2018; Ekins et al., 2003). Second, as a part of measuring natural capital, UNU-IHDP and UNEP (2012) bring up the interconnected externalities of global environmental issues. The reports especially point out climate change as an important transboundary threat on inclusive wealth while there are other issues such as biodiversity loss and loss of fisheries.

The third is the shadow price of capitals. The shadow price reflects the degree of substitution between capitals assets, intergeneration benefits by the capitals, and the scarcities of the capitals (UNU-IHDP & UNEP, 2012). Theoretically, a shadow price should be properly reflected in the market price of the capital. However, on the practice of sustainability study, the shadow price of capitals is problematic as those are usually not observable on the market, especially for natural capital, human capital, and social capital, in that order (UNU-IHDP & UNEP, 2012).

Although there are some theoretical differences between the sustainability accounts proposed, sustainability of nations is about having many types of capital and how they might be substituted for one another over time to meet the needs of the current generations and of the future generations (Hamilton & Hartwick, 2014). Using these capitals more efficiently and increasing their productivity are crucial for sustainable economic growth (Sustainable Prosperity, 2014). The capital approach to sustainability has a strength that provides a constructive guide to policymakers to manage national wealth (Atkinson & Atkinson, 2008). Produced capital (human-made capital) is capital that can be used "repeatedly or continuously in production processes for more than one year, such as machinery, buildings, roads, harbours and airports and stocks of raw materials, semi-finished and finished goods held for future sale and intangible types of goods" (Saunders et al., 2010, p.6). Natural capital refers to "the stock of natural ecosystems that yields a flow of valuable ecosystem goods or services which do not have substitutes from produced capital" (Maack & Davidsdottir, 2015). Human capital is regarded as "the stock of

economically productive human capabilities, such as knowledge, skills, competencies, and attributes embodied in individuals"(Saunders et al., 2010, p.7). Social capital consists of "a stock of trust, mutual understanding, shared values and socially held knowledge which impact on society's productivity" (Maack & Davidsdottir, 2015), such as political, legal, and commercial institutions, sense of community, participation, and interaction in local and external networks. The Organisation for Economic Co-operation and Development (OECD) defines social capital as "the social norms, shared values and institutional arrangements that foster co-operation among population groups" (OECD, 2020, p. 234). The capital approach incorporates the four capitals that are relevant to sustainability (OECD, 2004). And aside from these capitals, some scholars include the financial capital in their approach for sustainability that is a liquid asset which allows interchange between capitals and can be invested in production activities, saved in the form of the national currency that is expected to rise in value, or in ownership shares (Goodwin, 2003; Maack & Davidsdottir, 2015). It is also used to own or control the four capitals above mentioned (Goodwin, 2003).

2.3 Non-renewable Natural Resources and Sustainable Development

According to the aforementioned discussion on sustainability, natural capital is a critical input for sustainable development. The inevitably finite nature of non-renewables, however, has raised concerns on the issues of sustainability, such as inter-generational access to these

resources, the environmental impacts associated with their production and use, and the social impacts on local communities (Cowell et al., 2000). The publication of the Club of Rome's report in the 1970s, "The Limits to Growth", increased these concerns, as the report showed that exponential population growth and exhaustible resource use would lead to decline in the quality of life in the world (Meadows et al., 1972).

However, some authors consider that there are still several ways to maintain weak sustainability with non-renewable natural resources with proper management of the resources, even though the non-renewable natural resources cannot be renewable in a predictable time span. Auty (2014) pointed out that sustainable development and harnessing of non-renewable resources are compatible if the potential environmental damage arising from the exploitation of non-renewable resources can be substituted with other natural resources. He asserted that a sufficient fraction of rent from non-renewable resource development must be invested to substitute for the damages. Therefore, the exploitation of non-renewable resources does not necessarily bring the non-sustainability of society. Rather, resource development can yield many benefits for sustaining weak sustainability. Söderholm and Svahn (2015) categorized the types of benefits from non-renewable natural resources into monetary benefits and non-monetary benefits. The monetary benefits include development and investment funds, equity sharing, and tax sharing with governments, and the non-monetary benefits include educational facilities, medical facilities, employment goals, local procurement, training of staff, and improved service access (Söderholm & Svahn, 2015). Sequeira and Sarkar (2017) categorized the

types of benefits by the phase of resource development. In the short and medium run, communities can get benefits from local employment, opportunities for local suppliers, skills training, and road construction. In the long run or in the focus on sustainability, communities can get benefits from community development programs, the shared revenue stream from royalties, and livelihood activities, and these benefits are tied to investing companys' profits.

However, aside from the finite nature of the non-renewable natural resources, there are more factors that can diminish the sustainability of society. The development of oil and gas brings booms and busts in an economy as a part of its history (Shields, 1998). Although there is a lack of consensus on its causes and consequences, the "resource curse" phenomenon is a challenging issue for the countries exploiting oil and gas resources. Moreover, the fundamental problem of non-renewable natural resource use for sustainability is that every stage in the life cycle of a non-renewable natural resource is associated with activities that are potentially harmful to the environment (Shields, 1998). These potential harms are global in nature and thus bring concerns about global environmental justice. The following subsections explain these concepts.

1) The "Resource Curse"

There has been a belief that natural resources, such as oil and gas, are a blessing that lets countries base their development on these resources (Badeeb et al., 2017a). The belief

collapses in some resource-rich countries as seen from case studies such as Amuzegar (1982), Gelb (1988) and Auty (1990). Amuzegar (1982) has found out that increased dependence on petroleum in oil-rich countries brings budgetary deficits, external debt, unemployment, and, most importantly, declined sources of livelihood and growth (Amuzegar, 1982). Gelb (1988) has found that oil exporting countries experienced a more serious deterioration during the boom period of 1971–1983, and the cost of using oil windfalls offset the gains from the oil windfalls. After that, a sizable literature showing that natural resource abundance can be a curse has emerged since the 1980s and has increased over time (Badeeb et al., 2017b). The "resources curse" refers to the paradox that countries with great natural resources, specifically exhaustible resources, tend to grow more slowly than resource-poor countries (Sachs & Warner, 1997, 2001). There are several different explanations of why a resource curse can happen in some countries. Explanations can be divided into two distinct but overlapping categories, which are, economic factors, such as the “Dutch disease” and price volatilities, and political factors, such as corruption and institutional quality (Badeeb et al., 2017c).

Corden and Neary (1982) and Corden (1984) made large contributions to developing a model of the “Dutch Disease” phenomenon named after the decline of Dutch manufacturing after the discovery of natural gas in the North Sea. The “Dutch Disease” refers to the adverse effects on the Dutch manufacturing sector of the natural gas discoveries through the subsequent appreciation of the real exchange rate of the Dutch gulden (Corden, 1984) which had diminished the country’s net exports. “Dutch disease”

occurs when natural resource booms increase incomes and the demand for goods, and these increases generate inflation and appreciation of the country's currency real exchange rate (Badeeb et al., 2017c). The "Dutch Disease" is likely to happen when the countries fails to promote a competitive manufacturing sector and depend largely on resource revenues as the inflow of resource revenue can appreciate the country's currency (Li, 2013). Humphreys et al. (2007) pointed out another unique characteristic of resource revenue as a reason for the resource curse. The generation of natural resource wealth can occur independently of other economic processes that take place in a country (Humphreys et al., 2007). For example, it can take place without major positive contribution to other industrial sectors and the participation of a large portion of the domestic labor force when they are operated by multinational enterprises or joint enterprises (Humphreys et al., 2007). Also, resource wealth tends to be repatriated rather than reinvested in the domestic economy (Heinrich, 2011). In this case, there are limited chances to promote domestic industries related to resource extractions and benefits from the extraction are unlikely to be reinvested for the development of the domestic economy (Heinrich, 2011).

Also, resource extraction decisions can take place quite independently of other political processes, when a government can access natural resource wealth without any prior agreement of the citizens or institutions (Humphreys et al., 2007). These distinguishing features of natural resource wealth use can cause the "resource curse". Therefore, both the government and the companies can and should develop a scheme to ensure more effective and fair development of oil resources (Humphreys et al., 2007).

Bauer (2013) brings up the volatility issues of resource revenue. Over the short to medium term, the volatility of resource revenue leads to "wasteful spending, poor quality investments, unpredictable business environments, and ultimately slow growth of relevant sectors" (Bauer, 2013, p.1). Over the longer term, the finite nature of oil and gas revenues leads to "economic depression and difficulty in scaling up public investment efficiently" (Bauer, 2013, p.1). Davis and Tilton (2005) point out that commodity price volatility causes fluctuations in government revenue and export income. Particularly, oil-exporting countries, such as Canada and Norway, can be negatively impacted by oil price volatility in terms of GDP and industrial production (Elder & Serletis, 2009; van Eyden et al., 2019; Wang et al., 2013). Carbone and McKenzie (2016) also found large welfare losses in the oil-rich provinces in Canada, such as Newfoundland and Labrador, Alberta, and New Brunswick, due to the oil price shock since late 2014. The province of NL has been affected the most amongst the provinces in terms of economic welfare and there was a 5.4% decrease in provincial income due to the oil price shock (Carbone & McKenzie, 2016). Meanwhile, Wenar (2008) pointed out the property rights issues in exploitation of natural resources. The companies/institutions which gain the right to sell the resources can use the money in a way that produces/aggravates the "resource curse", not in a way that increases the wealth of the people who should be beneficiaries of the resource wealth (Wenar, 2008).

Some studies suggest that political factors also may have a role in causing the resource curse. Gylfason (2001) found out that natural capitals in countries with low corruption

contribute more to increasing national wealth than natural capitals in countries with high corruption. Kolstad and Wiig (2009) make several points referring to why a lack of transparency of the government can cause a "resource curse" in the case of developing countries. In brief, a lack of transparency makes corruption look less risky, makes it hard to work with efficient people or institutions, and obstructs information which can help optimal decision making (Kolstad & Wiig, 2009).

However, despite the considerable amount of literature that asserts an inverse relationship between natural resource use and economic growth, there is still no consensus on the existence of the "resource curse" phenomenon or what brings about a "resource curse", as not all countries with abundant natural resources are economically underdeveloped (Badeeb et al., 2017c). Therefore, what needs to be discussed further is evidence-based policies to avoid the "resource curse" phenomenon, through a better distribution of resource wealth, using mechanisms such as funds, tax systems, royalty systems, or payment to citizens from resource revenue (Ross, 2015). In line with the capital approach, the national wealth can be sustainable when the non-renewable resources revenue is transformed into financial capital that can be invested in other forms of capitals to support sustainability (Moe et al., 2013). Therefore, in this case, the discussion on how to avoid the "resource curse" is about how to save financial capital and invest it in a way that can boost the sustainability of the NL province.

2) Global Environmental Justice

The activities to extract, produce, and use non-renewable resources, especially fossil fuels, are significantly related to global climate change. Exploitation and utilization of fossil fuels account for 65% of the global greenhouse gas emissions contributing to global climate change (US Environmental Protection Agency, 2017). Nevertheless, the real cost of greenhouse gas emissions is not properly priced, and implementing the policies to price them right is complex, especially because it requires differentiated responsibilities and duties between countries (Covert et al., 2016). As a consequence, climate change brings significant global environmental justice issues between countries, in addition to the significant environmental problems (Baer et al., 2000; Norgaard, 2006; Roberts, 2001; Schlosberg, 2013).

The concept of environmental justice was theorized by Bullard (1990) with concerns about the problems of distribution of social and environmental costs between different groups based on race, income, location, and gender. Equity of the cost distribution between these groups was a key focus in the early discourse, and it has quickly expanded to include a range of issues from the unequal nature of environmental protection to the distribution of environmental goods (Schlosberg, 2013). Environmental justice scholars and advocates identified four distinct aspects of environmental injustice experienced by historically marginalized communities (Gonzalez, 2015; Kuehn, 2000). This literature review adopts Kuehn (2000)'s framework : first, distributive injustice arising from disproportionate exposure to environmental hazards and limited access to environmental amenities

(Gonzalez, 2015; Kuehn, 2000); second, procedural unfairness caused by these communities' exclusion from decision-making on issues of environmental issues (Gonzalez, 2015; Kuehn, 2000); third, corrective injustice as a result of inadequate enforcement of environmental legislation (Gonzalez, 2015; Kuehn, 2000); forth, social injustice because environmental degradation is inevitably related to deeper social structural ills, such as poverty and racism (Gonzalez, 2015; Kuehn, 2000). Based on these four aspects of environmental injustice experienced, there are four different notions of environmental justice. The first one is environmental justice as distributive justice. Distributive justice means "the right to the same distribution of goods and opportunities as anyone else has or is given" (Dworkin, 1977, p273). In this context, environmental justice involves the equitable distribution of the burdens or benefits arising from the exploitation of natural resources. The second one is environmental justice as procedural justice. Procedural justice involves "the right to have equal concern and respect in the political decision about how the goods and opportunities are to be distributed" (Dworkin, 1977, p.273). In this context, environmental justice means democratic policy decision-making processes based on mutual respect and justice that is free from bias or discrimination, with the participation of equal partners at every level of decision-making. The third is environmental justice as corrective justice. Corrective justice involves the fairness of punishments for lawbreaking and damages inflicted on individuals and communities (Kuehn, 2000). Environmental justice as corrective justice involves fairness for the development and enforcement of environmental laws, regulations, and policies including attempts to restore the damage from unjust activities. The fourth is environmental justice as social justice. Social justice is defined as the fair distribution of important components

of living conditions that are needed for individuals, households, and the social stability of society (Manderscheid, 2012). In this context, environmental justice is the movement intertwined with other forms of social and economic justice-related social problems, such as poverty, racism, and political issues (Gonzalez & Atapattu, 2017).

The discourse on environmental justice is further complicated in terms of its geographical scope. In the 1980s political scientists started to engage in topics of environmental justice in the global south (Temper et al., 2018). Jamieson (1994) points out the juxtaposition of the idea of global justice with that of environmental justice, and defines global environmental justice as justice between nations and notions of responsibility and moral obligations that are mediated by various non-governmental forms of association. Jamieson (1994) has mentioned the issues arising from the fact that the poor suffer disproportionately from the environmental pollution produced by society; these issues are also raised in the international context (Jamieson, 1994). Szasz and Meuser (1997) also pointed out that there was a clear overlap between political science and environmental justice since environmental injustice is a global phenomenon in terms of distributing the benefits and burdens of environmental commodities. From these aspects, the term "global environmental justice" refers to the global distribution of environmental burdens and benefits (Blake, 2011). In the Blake (2011) study, the author mostly focused on the distributive justice side of global environmental justice.

Meanwhile, Roberts (2001) put more focus on the procedural justice side of global environmental justice. Roberts (2001) broadly described the inequality between rich and poor countries in climate change and described how it has led to the problem of global climate change. The author argued that "the only way out of the conundrum of inequity and climate change is by both addressing inequality and delinking carbon and development"(Roberts, 2001, p. 502). Norgaard (2006) presented the issue of global environmental justice in four ways: first, rich countries contribute to climate change highly disproportionately compared to the other countries; second, low-lying geography and less developed infrastructure in poor countries make the people in these countries vulnerable; third, the outcomes and processes of global climate change treaties in general have favored the industrialized countries; forth, the current generations are negatively affecting the environment and reduce its capacity to sustain life for future generations. These issues mostly focused on the problem that less-powerful groups have disproportionate exposure to environmental problems which are generated by the more powerful groups (Bullard, 1990). Accordingly, rich countries, especially for oil exporters, tend to take less responsibility than they have contributed to environmental degradations, while poorer countries take more damage than they have contributed. To sum up, the issue of environmental justice is related to this study in several aspects. The residents of the regions where oil and gas exploration takes place are exposed to environmental damages such as long-term pollution without proper compensation from the oil and gas companies. Also, marine ecosystem changes and climate change caused by the exploitation of oil and gas affects residents of other countries.

2.4. Sovereign Wealth Funds

A Sovereign Wealth Fund (SWF) is defined as a state-owned investment vehicle that is created and owned by the government for macroeconomic purposes and employs a set of financial investment strategies which include investing in various types of assets, such as domestic/foreign equity and real estate, with funding, withdrawal, and spending rules to benefit society (Alhashel, 2015; Das & Lu, 2009; Beck & Fidora, 2008). In August 2018, total assets managed by SWFs globally were estimated at 8,109.46 billion USD. The amount of assets sourced by oil and gas-related revenue was estimated at about 4,410.58 billion USD of the total and the amount of assets sourced by the other commodities was estimated at about 3,698.88 billion USD (Sovereign Wealth Fund Institute, 2018). The Norwegian petroleum fund is commonly regarded as a successful product of economic foresight in a country with strong traditions of long-term planning (Lie, 2018) and is the world's largest SWF. The Alaska Permanent Fund is another good example of a SWF. The Alaska Permanent Fund has helped Alaska attain the highest economic equality in the United States (Karl Widerquist & Howard, 2012).

The history of SWFs dates back to 1953 when the Kuwait Investment Board was instituted for investing surplus oil revenues to reduce the reliance of Kuwait's economy on oil and gas resources (Beck & Fidora, 2008). After that, many resource-rich countries have established SWFs to accumulate foreign assets with their natural resources. Although

various sources can fund the SWFs, the major countries that have created SWFs are resource-rich countries that benefit from high oil and commodity prices (Beck & Fidora, 2008). There are several reasons why establishing a SWF with revenue from oil and gas is beneficial to the states.

Barnett and Ossowski (2002) explain why the oil revenue in an oil-producing country should be managed by government policy based on the characteristics of oil revenue. The first reason is the exhaustibility of oil revenue, which raises issues of sustainability and intergenerational resource allocation of oil revenue. The second reason is the uncertainty and volatility of oil revenue. Since policymakers cannot control oil prices, to create and implement fiscal policies to mitigate the impact of the oil price volatility on macroeconomy is challenging. The third reason is that oil revenue largely depends on foreign demand, while the fiscal use of oil revenue has significant consequences for the domestic economy. For these reasons, Barnett and Ossowski (2002) recommend that the government should accumulate substantial financial assets over the period of oil production. Furthermore, they claim that the use of financial assets from oil production should support macroeconomic objectives, such as macroeconomic stability, growth, and an efficient allocation of resources. Therefore, a proper management of oil revenue is key to ensure a sustainable benefits flow derived from oil and gas development. Barkhordar and Saboohi (2013) also point out that the mismanagement of oil revenue could lead to a decline in production, overvaluation of the foreign exchange rate, and an increase in non-oil imports, and ultimately lead to lower economic growth. They analyzed the trade-off between spending

and saving for a resource-rich country focused on the medium-term effects of windfall management strategies of resource revenue. The results revealed that investment in physical assets of oil windfalls leads to higher economic growth in the medium run and investment in financial assets of oil revenues leads to higher economic growth in the long run. Nguyen et al. (2013), however, show that resource-rich countries tend to underinvest in their public capital stock while their resource revenues should be used primarily to finance domestic investment in order to expand the capital stock and promote growth. These studies show that the revenue from resource extraction should be controlled by the government, and the government should invest the revenue leading to higher economic growth in the long run and promoting the sustainable use of natural resources.

The main purposes of SWFs are stabilizing government revenues and the accumulation of savings in resource-rich countries for future generations to offset the future lack of resources for growth (Das & Lu, 2009). The investment portfolio of a SWF helps maintain the stability of the domestic economy as well as guarantees a stable and sustainable source of future income (Reiche, 2010; Sun et al., 2014). Al-sasi et al. (2017) and Tehranchian and Seyyedkolaee (2017) also assert that establishing SWFs protects the economy from the risk of oil price/market volatility and thereby positively affects economic growth.

However, some scholars do not agree with the practicality of establishing a SWF. Truman (2007) asserts that a SWF generally has a lack of transparency, potential to disrupt financial

markets, and the risk that political intentions might influence the management of a SWF. Drezner (2008) also insists that establishing a SWF will increase market volatility when the size is too large and investment policies are not transparent. The author has mentioned that "sovereign wealth funds are simply the latest manifestation of explosive asset growth" (Drezner, 2008). Enderwick (2017) also asserted that a SWF is seen as potentially unstable, as it is sensitive to changing economic conditions, which can impact on both its source as well as its returns. Therefore, the proper operation of the SWF after establishment is also important to avoid potential shortcomings.

The following studies state that several conditions are required for a successful SWF. Humphreys and Sandbu (2007) mention that withdrawal decisions should be regulated in part by clear rules rather than general guidelines, key decisions should be made by bodies representing the interests of diverse political constituencies, and there should be high levels of transparency regarding their status and operation, and in particular, there should be a unified budgetary process and public reporting of payments, holdings, and investments (Humphreys and Sandbu, 2007). Balding (2012) presents three primary factors that make a SWF successful. First, a successful SWF needs a predictable and dedicated capital source. Second, without clear and defined rules for withdrawal of fund capital, a SWF is little more than political slush funds. Third, a SWF should be free from political winds and capriciousness to ensure the highest degree of independence possible. Le and Munthe-Dahl (2014) assert that the funds from resource revenue should be used based on strict rules for increasing transparency and for reducing expenditure volatility. Expenditure volatility and

sustainability can be addressed by setting restrictions on fund spending, including both budgetary and extrabudgetary spending (Le & Munthe-Dahl, 2014). They also said that transparency is an important prerequisite for a natural resource fund to avoid the resource curse in the long run. Therefore, SWFs need to have clear rules and policies regarding their source and expenditures and especially establish a clear relationship between the fund and the government budget.

2.5 Conclusion

This chapter has reviewed the concepts and definitions which are key elements to establish the research framework of this study. The goal of this study is to suggest a way forward for the sustainable development of the Newfoundland and Labrador province by using its oil and gas revenue. In line with the capital approach to sustainability, the sustainability of Newfoundland and Labrador can be achieved when four capitals (produced capital, natural capital, human capital, and social capital), which contribute to the formation of wealth, are maintained at the sustainable level. On the other hand, development based on the oil and gas industry is recognized as not being sustainable in the long run, especially for the reasons of the "resource curse" and "environmental injustice". One way to sustain the development based on the oil and gas industry is to accumulate financial capital using oil and gas revenue that can be invested to build other capitals and minimize the negative impact of the development. A SWF has been defined as a state-owned investment vehicle that can increase the benefits to society from oil and gas revenue and helps achieve sustainable development when it is properly managed and invested to protect or grow the four capitals.

Therefore, a SWF has the potential to bring the long-term benefits arising from the development of the oil and gas industry to the Newfoundland and Labrador province.

3. Research Methods

3.1 Introduction

The goal of this feasibility study is to explore the validity of introducing an oil revenue-sharing instrument for the province of NL, aiming to secure a fair distribution of revenues from the oil and gas development and maintain the sustainability of the province of NL. The analysis is especially focused on the conditions for establishing a SWF funded by revenues from oil and gas extraction. There are two alternatives for the government to collect and redistribute resource revenue, which are direct use and indirect use. Direct use of resource revenue means a direct deposit of resource revenue into government revenues to reduce taxation and increase spending (Erwin, 2020; Pretes, 2005). This can boost short-term economic growth, however, it is often problematic as it can lead to inflation and even the collapse of the economy, if the capacity for growth is exhausted (Pretes, 2005). The other alternative, indirect use of resource revenue, is to establish funds by which resource revenue is isolated and stabilizes its entry to the economy (Pretes, 2005). The investment vehicles that are created and owned by the government for specific policy purposes are called Sovereign Wealth Funds (Alhashel, 2015; Das & Lu, 2009; Beck & Fidora, 2008). SWFs help to secure government revenue and spending, stabilize the domestic economy, and accumulate sustainable sources of future income (Das & Lu, 2009; Reiche, 2010; Sun et al., 2014).

Since there is no such fund in the province of NL yet, the analysis has started with a thorough literature review, and will be followed by case studies of two regions that already have a SWF mechanism funded by oil and gas revenue. These are Norway and the Alaska.

3.2 Research Design

Case studies will be conducted to provide implications about how to boost the sustainability of a jurisdiction using SWFs funded by resource revenues. From the literature review of chapter 2, sustainability can be determined by analyzing how to manage the four capitals (produced capital, natural capital, human capital, social capital) to keep them undiminished. The amount of these capitals cannot be solely captured by market value or quantitative data (Ekins et al., 2008; Maack & Davidsdottir, 2015). Therefore, this study adopts a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis for the comparative case studies to explore the feasibility of a SWF for NL. SWOT analysis is defined as a tool for analyzing internal and external environments by focusing on the strengths, opportunities, weaknesses, and threats to support the decision-making process (Ghazinoory et al., 2011). The result of the SWOT analysis presents internal and external factors that help to understand the current status and provide a basis for successful future strategies (H. H. Chang & Huang, 2006; Rachid & El Fadel, 2013).

The case studies consist of three parts. The first part looks at the sustainability issues of the regions, related to the oil and gas industry. In the second part, a SWOT analysis of the SWF in the region is carried out based on the outcomes of the first part. Based on these results, the implications of how to promote the NL's sustainability using its oil and gas revenues are identified in the last part of this study.

1) Case Study

The main objective of this study is to find out if it is possible to save and use a part of the oil revenue from the off-shore oil extraction in NL to contribute to the sustainability of NL, under the hypothetical scenario that the province creates a SWF using its oil and gas revenues. This study will employ a comparative case study approach using qualitative methods to investigate the feasibility of creating a SWF for NL by investigating cases of two jurisdictions that are already managing SWFs funded by oil and gas revenue.

A comparative case study approach is “an in-depth investigation of the similarities and differences across cases to verify a proposition about whether an intervention should be made or not and how to tailor the intervention to accomplish intended outcomes” (Goodrick, 2014, p.1). Qualitative research using a comparative case study has the strength of using multiple sources of data that help to construct the validity of the research (Nyambi, 2012; Yin, 2009). The comparison can bring a deeper understanding of knowledge that the researcher may not have been when cases are compared in relation to the same concepts

(Gharawi et al., 2009). In this study, the target issue that needs to be addressed is "how could the SWFs funded by resource revenue contribute to the sustainability and development of the society?" The comparative analysis is built on similarities and differences of the cases and it is pivotal to investigate the connections and causalities brought by the differences between cases (McFarlane & Robinson, 2012). Norway and the US state of Alaska have similarities by being resource-rich countries, but they have a different framework for how to collect and spend the fund along with the different historical backgrounds, which will be discussed in later chapters.

On the other hand, there are inherent challenges of a comparative approach, especially when a qualitative cross-national research is carried out. The information needs to be interpreted across historical, cultural, institutional, and socio-political contexts, which provides significant difficulties (Quilgars et al., 2009). Also, even statistical data often have a lack of standardization as a result of institutional differences between countries, and the researcher can confront un-interpretable material due to language barriers (Jørgensen, 2015; Quilgars et al., 2009). Therefore, it should be recognized that all findings from the case studies are conditional based on spatial and temporal factors (Hantrais, 2000). This is substantially challenging as this study investigates three different cases and there were a few instances where literature about Norway had to be excluded as it is written in Norwegian, although it appeared to be useful for this study.

The data for the case studies include primarily a literature review of published reports, government papers, books, periodicals, newspapers, and peer-reviewed papers published by November 2019. The keywords for searching the literature initially were selected among a set of sustainability issues regarding the oil and gas industry identified in the Sustainability Accounting Standards Board (2018).

2) SWOT Analysis

The SWOT analysis has been proposed by Ken Andrews in 1971 as a strategic analysis tool for management (Mobaraki, 2014). SWOT analysis is defined as a tool for analyzing internal and external environments by focusing on the strengths, opportunities, weaknesses, and threats in order to promote a systematic approach and support for decision-making (Ghazinoory et al., 2011). The process of the SWOT analysis includes exploring the internal and external environments of a proposed project and extracting implementation strategies based on its strengths, weaknesses, opportunities, and threats (Ghazinoory et al., 2011). Strengths represent available resources that help to improve its performance and make it effective; weaknesses are weak spots that can cause decreased competitiveness, efficiency, or financial resources; opportunities are exogenous changes that can cause additional development or future improvement; and threats are external factors that may induce problems (Chen et al., 2014; Paliwal, 2006). After examining the strengths, weaknesses, opportunities, and threats of the issues, the future strategy can be developed based on the results, and the one advantage of the strategies derived from the SWOT analysis is that they provide historic insights from the previous strategies implemented

successfully (Houben et al., 1999). The result of a SWOT analysis provides a rich array of factors for future strategic initiatives (Dyson, 2004). The results of the SWOT analysis carried out in this study provide insights to explore the validity of introducing an oil fund system for sustainability in NL.

3) Selection of Cases

The first step of a case study is to decide how many cases will be included (Meyer, 2001). Case studies can include single or multiple cases, and there are no simple rules to decide the number of cases (Jennifer, 2000). Generally, single case studies are preferred when the case is unique for some reason and multiple case studies are preferred when there are theories to be substantiated through the case studies (Jennifer, 2000; Meyer, 2001). According to the Sovereign Wealth Fund Institute (2020), there are 122 SWFs in the world as of 2020. These include 42 SWFs funded by oil and gas and others funded by non-oil and gas commodities and some instances with countries having multiple SWFs.

This study is not intended to prove that the introduction of a SWF generally achieves the sustainability of a society using non-renewable resources, but seeks to find implications for successful designs of SWFs. While 122 SWFs cases all have their characteristics and implications, it is technically impossible to analyze or elaborate the characteristics of all 122 cases to select the best cases for this study. Therefore, this study chooses two cases of SWFs that are commonly considered as good benchmarks of SWFs funded by non-renewable resources in existing literature (Alhashel, 2015; Ang, 2010a, 2010b; Das & Lu,

2009; Fiedorczuk, 2015; Halvorssen, 2009; Hartzok, 2012; Murphy & Clemens, 2013; Reiche, 2010; Widerquist & Howard, 2012a), which are the Norwegian SWF and the Alaskan SWF. Two case study designs allow for comparison between the two cases as well as a deeper look at each case (Meyer, 2001). As mentioned in Chapter 1.2, Norway has the world's largest SWF and Alaska has the largest SWF amongst any territorial entity within a country as of 2019. A few Organization of the Petroleum Exporting Countries (OPEC) member countries have substantially-sized SWFs too, but they are not considered as good benchmarks for analysis due to lack of transparency of their management (Bazoobandi, 2011). The two-case studies chosen show different practices of SWFs, as Norway's SWF's focus is to finance future liabilities while Alaska's SWF provides a basic income for Alaskans. Therefore, the analysis of the two cases could deliver significant implications to the future of the oil and gas industry and in NL.

4. Case Study 1: Norway

4.1 Introduction

This chapter provides the case study of Norway. The Norwegian experience of SWFs has been considered as a successful case of the management of oil and gas resources (Ang, 2010a; Bagattini, 2011; Onditi, 2019; Polus & Tycholiz, 2017). Oil booms can bring incredible wealth to some countries, while it is not the case for other countries which may experience the "resource curse" phenomenon. Norway is often seen as a country that avoided the "resource curse" owing to its successful management of the revenue from oil and gas resources by using a SWF (Elwerfelli & Benhin, 2018). The social-democratic ideas dominating in Norway's society were the background conditions that had led Norway to manage its oil wealth successfully. The Norwegian people have valued highly the equality and integrity of the individual, and the ideas of Norwegian egalitarianism have inspired a range of legal provisions for equality between the genders, and a progressive system of taxation and subsidies (Didier, 2011; Friedson et al., 2013; Øterud, 2005; Truman Phillips, 2008). Accordingly, Norway has adopted a solid social democratic rule with the legitimacy of a strong state (Olsen, 2002; Visher & Remoe., 1984). The role of the state generally encompasses regulating the market, the development of social trust, and redistributing wealth, as well as promoting economic development (Herreros & Criado, 2008; Visher & Remoe., 1984). The social value of the equality and integrity and the legitimacy of a strong state has allowed the Norwegian government to establish a state-controlled joint-stock company "Statoil" for the oil and gas development and to create the

Norwegian Sovereign Wealth Fund (SWF) (Edwards, 1987; Onifade, 2015). With the Statoil company, Norway has control over their oil and gas revenue and can turn it into long-term wealth to sustain the benefits for the Norwegian people (Onifade, 2015).

4.2 Norway's SWF: The Government Pension Fund

Norway's exploration of oil and gas resources started in 1962 when the country started to collect seismic data of the Norwegian continental shelf. The first exploration well was drilled in 1966 and the first oil well on the Norwegian shelf was discovered in 1967, however, it was not considered economically feasible at that time (the Ministry of Petroleum and Energy, 2014). The first successful oil field on the Norwegian continental shelf, Ekofisk, was discovered in 1969. Ekofisk was the largest offshore oil field ever discovered in Norway, and its commercial production started in 1971. After the discovery of Ekofisk, there were a series of discoveries of large oil fields, such as Statfjord, discovered in 1974, Gullfaks, discovered in 1978, Oseberg, discovered in 1979 and Troll, discovered in 1983. The Norwegian oil era set off with these developments.

By the time those oil fields were discovered, state-led development was common in many industries because of the common belief about the state-capital relationship and the role of the state in providing for the community (Truman Phillips, 2008). In a social-democratic welfare society, the state can to exert control over industry (Visher & Remoe., 1984).

Moreover, Norwegian society also has skepticism toward foreign capital from a wide range of actors, including business and economic sectors (Ryggvik, 2015; Truman Phillips, 2008). Rather, they have valued highly the equality and integrity of the Norwegian people (Eriksen, 1993) and believed that the resources in Norway belonged to the nation (Olsen, 2002). Therefore, Norway has set solid social democratic rules with the legitimacy of a strong state to benefit the society as a whole from oil and gas development (Visher & Remoe, 1984; Olsen, 2002). Norway acknowledges that future generations should also be eligible for the oil and gas benefits (Onifade, 2015). Additionally, at the time, there was a need for a new industry to drive the growth of existing industries and the formation of capitals in Norway (Ryggvik, 2015). The development of the series of oil fields required unprecedented investment, and the off-shore related industries that already existed in Norway, such as the shipbuilding industry, the power plant construction industry, and the other offshore-related service industries, were potential beneficiaries (Ryggvik, 2015). These views on the state-capital relationship and the industrial needs have led the Norway government to make important policy decisions to avoid the "resource curse" at the early stage of oil and gas development.

In 1972, the Norwegian parliament (Storting) founded the Norwegian state-owned oil and gas company Statoil (the name has changed to Equinor in 2018), and the Parliament enacted the 50% ownership of the government in each oil and gas production license (the Ministry of Petroleum and Energy, 2014). Thus, Statoil paid a 50% share of costs of oil and gas production activities and received a 50% share of returns (Poelzer, 2015). As of 2018, the

Norwegian government has a 67% ownership share in Statoil. As the cash flow from the oil and gas production to the government revenue increased, the Norwegian government has been able to use fiscal policy to respond to external economic shocks, such as the oil shock in 1973 (Halonen, 2014).

As cash flow into Statoil increased, in 1985, the Norwegian government created the State's Direct Financial Interest (SDFI) to reorganize the management of assets (Poelzer, 2015) The SDFI is a system establishing that the Norwegian government owns a share in oil and gas fields, pipelines and onshore facilities. The ownership interest is set in connection with the award of production licenses, and the size of the interest varies from field to field (the Ministry of Petroleum and Energy, 2014).

In 1990, The Government Pension Fund Global (GPFG) was established to ensure the oil and gas wealth can benefit both current and future generations when using the Norwegian government's oil and gas revenues. The transfers to the GPFG started in 1996 (the Ministry of Petroleum and Energy, 2014). The GPFG is a type of a SWF as it draws its funding from oil revenues and has a mandate beyond financing pension expenditures (Blundell-wignall et al., 2008). An important reason for the success of the GPFG has been the strong democratic tradition of Norway. A SWF allows the state itself to build up a source of revenue distinct from its traditional fiscal base and the future growth of capital returns to be leveraged for public purposes, rather than driving inequality (Neill, 2016). The fact that

Norway facilitates saving to finance pensions based on the principle of intergenerational equity, makes the Norwegian SWF different from the SWFs in other countries.

The fund was accumulated from the revenue from the oil and gas activities, and grows its income through returns, including interest and yield on the fund's investments. The oil and gas companies are charged a 27% corporation income tax and a 51% special tax rate for the extraordinary profit associated with recovering the oil and gas resources, a total of 78% tax rate as of 2018 (the Ministry of Petroleum and Energy, 2014). Norway's oil and gas tax revenues are estimated to around 119 billion Norwegian Krone (NOK) (about 14 billion USD) in 2018 (Norwegian Petroleum, 2019c). The Ministry of Finance is responsible for this oil and gas industry taxation. The revenue from oil and gas development was gradually phased into the economy by covering the structural non-oil and gas deficit (the Ministry of Petroleum and Energy, 2014).

There are distinguishing features of the GPFG that have helped to avoid the "resource curse" in Norway by utilizing the fund. First, the GPFG does not invest in the domestic sector to protect the non-oil sectors in Norway from the volatility of oil and gas revenue by reducing the impact of oil price changes on the fund value (Roach et al., 2015). At the end of 2018, the fund was invested in a total of 9,158 companies, 4,811 bonds, and real estate in 73 countries (Norges Bank Investment Management, 2018). Second, short-term spending can be either higher or lower than the expected real returns of the fund investment; however,

its long-term spending has to be below the fund's expected real returns. On average, the Norwegian government has spent only under the expected real investment return which is generally 3% to 4% (Norges Bank Investment Management, 2019a; Poelzer, 2015). The fund, however, is so large that the 4% of GPFG is more than the Norwegian government's needs (Poelzer, 2015). 10,088 billion NOK (1,148 billion USD) in 2019, which makes it the world's largest sovereign wealth fund (Norges Bank Investment Management, 2019a).

4.3 The Sustainability of Norway and the Oil and Gas Industry

4.3.1 The Oil and Gas Industry and Financial Capital

The oil and gas industry has a crucial influence on the Norwegian economy. The oil and gas industry in Norway accounted for a 17% share of GDP in 2018 and made the largest contribution in added value to government revenues, investments and export value (Norwegian Petroleum, 2019c). Since oil and gas production started in the early 1970s, the oil and gas industry has contributed more than NOK 14,000 billion (about USD 1,630 billion) to Norway's GDP (Norwegian Petroleum, 2019c). The total export value of oil and gas in Norway in 2017 was about NOK 442 billion (about USD 51 billion) and it is about 50% of the total value of Norway's exports of goods (see Figure 2) (Norwegian Petroleum, 2019b). About 79.2% of crude oil produced and 76.3% of natural gas produced in 2017 was delivered to other countries, such as countries in Europe, Canada, and China

(Norwegian Petroleum, 2019b). Norway is the 3rd largest exporter of natural gas in the global market and supplies about 25% of the EU gas demand. Norway also covers about 2 % of the global crude oil demand (Norwegian Petroleum, 2019b).

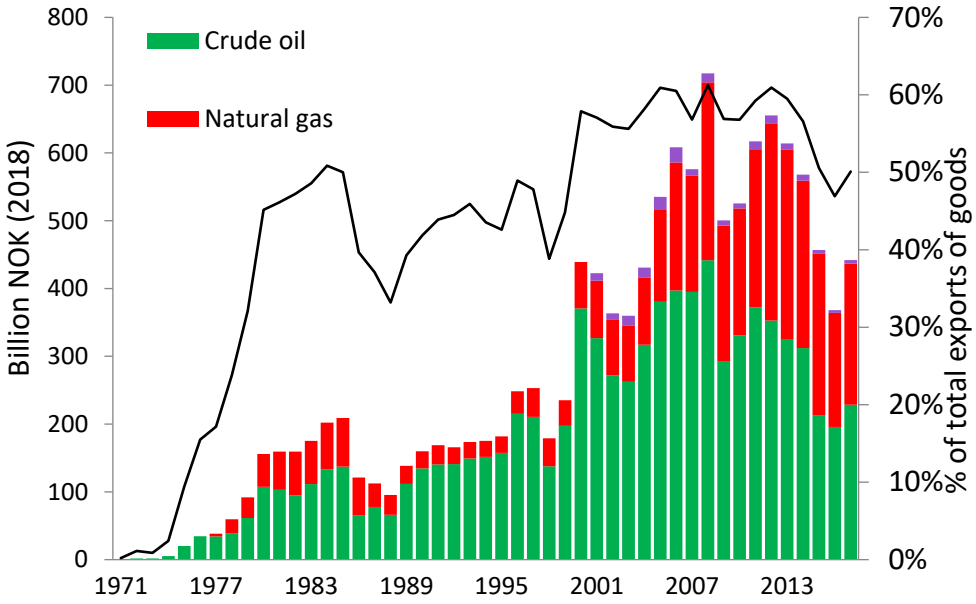

Figure 2. Export Value of Norwegian Petroleum, 1971-2017

Source. Reprinted from the Export value of Norwegian petroleum, 1971-2017, by Norwegian Petroleum Directorate, retrieved from: https://www.norskpetroleum.no/en/production-and-exports/oil-and-gas-production/#

The Norwegian SWF (GPFG) aims to make the oil and gas wealth benefit both current and future generations (the Ministry of Petroleum and Energy, 2014). The current and future generations get benefits from alleviated economic fluctuations, sound capacity utilization

of the fund, the relatively low tax rate for residents and low unemployment (the Ministry of Petroleum and Energy, 2014; Fischer, 2007). The total value of the GPFG has steadily increased, and the expected total value was 10,088 billion NOK (1,148 billion USD) in 2019 which is the largest SWF in the world (see Figure 3). Owing to the high tax rate (78% in 2018) on the oil and gas production and the robust spending limits, which is under the expected real investment return (usually 3% to 4%), GPFG has established a solid foundation.

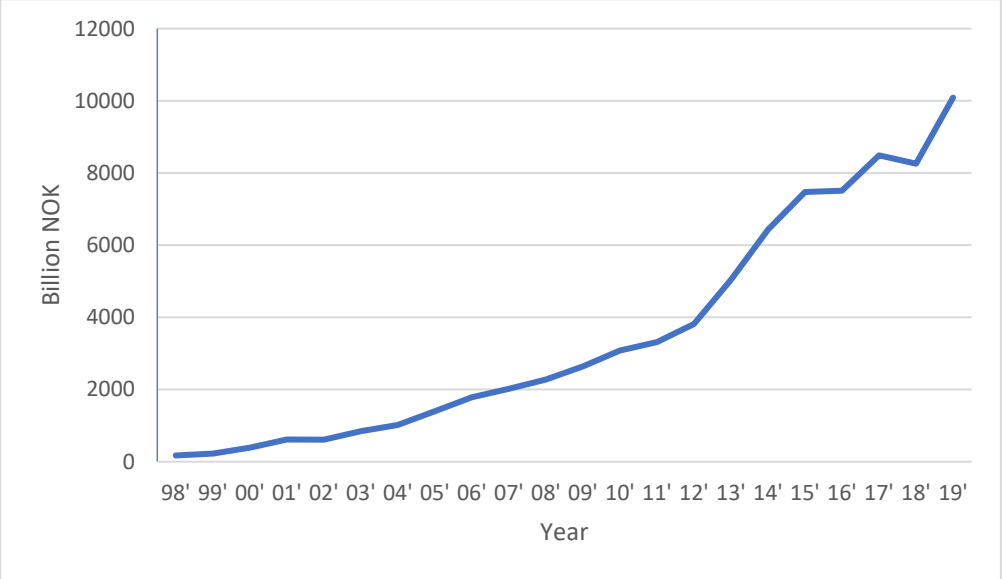

Figure 3. Total Market Value of the Government Pension Fund Global

Source. Data from Norges Bank Investment Management (2019)

4.3.2 The Oil and Gas Industry and Produced Capital

Norway has been the world's 13th largest oil producer and 7th largest gas producer as of 2017 (BP, 2018). All of the Norwegian oil reserves are located offshore on the Norwegian continental shelf, which is divided into the North Sea, the Norwegian Sea and the Barents Sea (U.S. Energy Information Administration, 2016). The total Norwegian proven oil reserves have been estimated at 7.9 billion barrels at the end of 2017, which accounts for 0.5% of the world's proven oil reserves (BP, 2018). The total Norwegian proven natural gas reserves have been estimated at 1.7 trillion cubic metres at the end of 2017, which accounts for 0.9% of the world's proven natural gas reserves (BP, 2018). Norway's daily oil production is around 2 million barrels, and its natural gas production is around 120 billion cubic metres per year (International Energy Agency, 2017) (see Figure 4). The daily production of oil now is about 40% below the peak in 2001 and 6% lower in 2018 than in the previous year; however, the oil and gas companies in Norway are planning to increase their production of oil and gas from 2020 to 2023 due to the high demand for gas from Europe (Norwegian Petroleum Directorate, 2018).

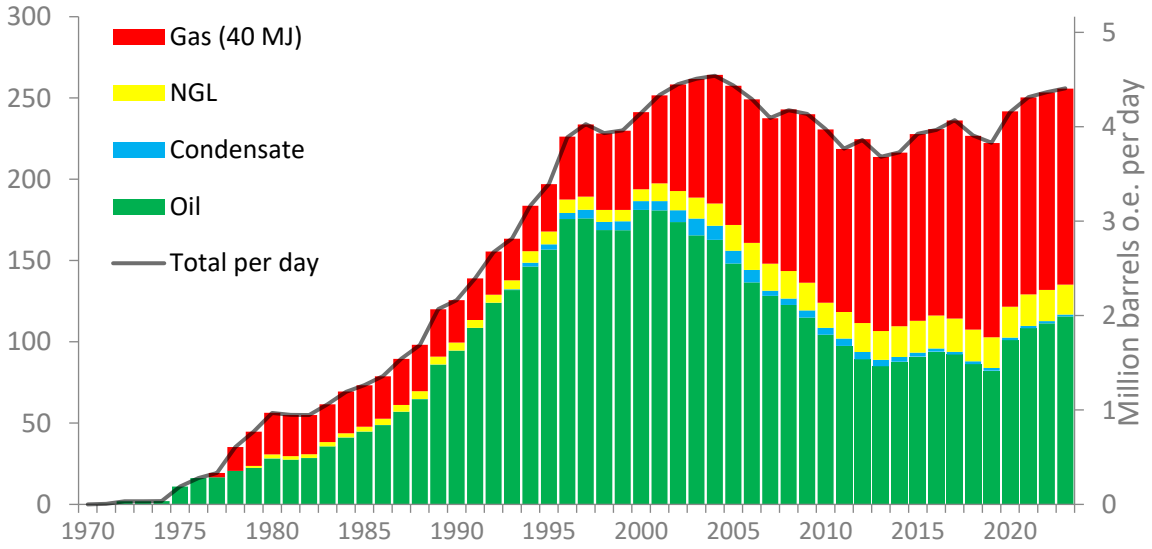

Figure 4. Historical and Expected Oil and Gas Production in Norway, 1970-2023

Source. Reprinted from Historical and expected production in Norway, 1970-2023, by Norwegian Petroleum Directorate, retrieved from: https://www.norskpetroleum.no/en/production-and-exports/oil-and-gas-production/#

4.3.3 The Oil and Gas Industry and Natural Capital

The oil and gas exploitation can deteriorate the ecosystem through every stage of the activities from exploration to transportation and the process by which its products are consumed. According to Stiansen and Filin (2008) which reviewed the environmental risk of oil and gas exploitation on the Barents sea adjacent to the northern part of Norway, the key risk related to oil and gas exploitation is an oil spill accident during exploration or production. Norway already has experienced several oil spill accidents. The first and biggest oil spill that happened in Norway was on the Ekofisk oil field, which is the first oil

field on the Norwegian continental shelf. Oil spilled from the Bravo production platform on the Ekofisk oil field on April 22 in 1977, and the total amount of spilled oil was estimated to be up to approximately 202,380 barrels at the rate of 1,170 barrels per hour (National Oceanic and Atmospheric Administration, 2016). The oil slick from the accident covered about 1500 km^2 of the Norwegian sea, and threatened herring, haddock, sprats, and mackerel, especially since it was shortly before the spawning season (Hudson, 1977). The second accident was at the Statfjord oilfield, which is the largest oil field in Norway, on December 12, 2007. About 21,750 barrels of oil spilled, and this is the second-largest oil spill accident in Norwegian history (BBC, 2007). The accident occurred while the tanker was loading oil from storage. The oil spill made an oil slick 10 km long and 5 km wide (Kelly, 2007).

In Norway, an environmental impact assessment must be conducted prior to drilling, when opening a new oil and gas field. In terms of the ecosystem, the environmental impact assessment aims to protect valuable and vulnerable areas, fisheries, and sensitive species (Cordes et al., 2016). The environmental impact assessment includes an assessment of the possible impact of an oil spill accident. The process of the environmental impact assessment for the possible impact of an oil spill accident focuses on the impact on eggs or larvae without considering the dynamic movement of the ecosystem (Hjermann et al., 2007). However, the actual long-term impact of oil spill accidents on the ecosystems is difficult to estimate, as they are affected by numerous parameters, such as weather conditions, location and depth of the oil spill, spawning time and site of fishes, density of

the eggs, length of the spawning season, the amount of persistent oil residues, and other factors which are unknown (Cordes et al., 2016; Hjermann et al., 2007; Wake, 2005).

The fishing industry had played central roles until the oil and gas industry has started dominating the Norwegian economy, and still is one of the dominant industries in Norway (Ramsey, 2014). In 2018, fish and other fishing products were the fourth largest export product with 6.1% of the total export value after crude petroleum and natural gas (52.8%), coke and refined petroleum products (8.7%), and basic metals (6.9%) (Statistics Norway, 2019b). Since the offshore oil and gas development started in Norway, the fishing industry and oil and gas industry have coexisted for nearly 50 years.

However, Arne (2012) points out that the Norwegian fishers feel that the oil industry threatens the ecosystem in the ocean as the fish stocks and catches have declined compared to the stocks before the era of oil and gas. However, they admit that part of the reason was overfishing by international fleet and the consequent changes in spawning areas (Arne, 2012). Therefore, there has been a conflict between fishers and the oil and gas industry since the beginning of the oil and gas production on the Norwegian shelf in the 1970s (Arbo & Thuy, 2016; Arne, 2012). The Norwegian government has tried to improve the relationship between the fishing industry and the oil and gas industry. As stated by the Research Council of Norway (2012), the Norwegian government adopts many instruments to contribute to good coexistence between the fishing industry and oil and gas industry,

including the impact assessment on industries, society, and the environment by the ministry of energy and petroleum and oil and gas companies. Also they prohibit oil and gas activities on important fishing grounds, spawning areas, and nursery areas, provide the compensation program for fishers when the oil and gas industry causes economic loss, restrict discharges of effluent, and fishery liaisons participate in seismic surveys of oil and gas industry (Research Council of Norway, 2012, as cited in Arbo & Thuy, 2016).

Another big concern related to oil and gas exploitation and the natural capital is CO_2 emissions from the oil and gas extraction and burning processes (Sollund, 2012). Although Norway has succeeded in reducing carbon dioxide emissions slightly over the last decade, oil and gas extraction accounted for about 31.2% of the total CO_2 emissions amount in Norway in 2018 (see Table 1). The share of CO_2 from oil and gas development in Norway's total domestic CO_2 emissions in the 2000s has increased significantly at relatively steady rates in the 2010s, considering that the share of CO_2 from oil and gas development in 1990 was 22.2% (Table 1). Besides, the Norwegian oil and gas industry is a big contributor to global CO_2 emissions as they export a large amount of oil to other countries. Many global energy experts have pointed out the high total carbon footprint of Norway's fossil fuels generated outside of Norway's borders, although Norway has progressive policies on climate change (Kaye, 2017). According to McKinnon at al. (2017), the CO_2 emissions amount due to using the Norwegian oil and gas industry products outside of Norway is about 10 times more than the domestic CO_2 emissions in Norway, which makes Norway the seventh-largest CO_2 emissions exporter. Peters and Hertwich (2006) also showed that

Norway's global CO_2 emissions are 67% greater than its domestic emissions (Peters & Hertwich, 2006). Kartha et al.(2018) also asserted that Norway should make 50 percent more mitigation efforts than the average OECD countries in tonnes of CO_2 per capita considering that their prosperity has been based on fossil fuels.

Table 1. CO_2 emissions to air in Norway 1990 - 2018 (unit: 1000 tonnes)

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Total	35,323	33,818	34,737	36,224	38,087	38,704	41,824	41,920	42,211	42,962
O&G industry	7,850	7,681	8,149	8,572	9,318	9,481	10,333	10,738	10,437	10,965
O&G/Total	22.2%	22.7%	23.5%	23.7%	24.5%	24.5%	24.7%	25.6%	24.7%	25.5%
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Total	42,515	43,867	42,984	44,323	44,646	43,951	44,496	46,239	45,382	43,891
O&G industry	12,242	13,140	12,911	13,161	13,365	13,414	13,114	14,489	14,240	13,171
O&G/Total	28.8%	30.0%	30.0%	29.7%	29.9%	30.5%	29.5%	31.3%	31.4%	30.0%
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	
Total	46,229	45,512	45,022	44,947	44,890	45,304	44,462	43,760	43,933	
O&G industry	13,341	13,091	13,203	13,181	13,901	14,404	14,083	13,909	13,701	
O&G/Total	28.9%	28.8%	29.3%	29.3%	31.0%	31.8%	31.7%	31.8%	31.2%	

Source. Data from Statistics Norway (2019a)

4.3.4 The Oil and Gas Industry and Human Capital

There is no significant investment or contribution of the SWF to the human capital in Norway. There are expected indirect contributions from oil and gas industry and the GPFG to the human capital in Norway, however. According to the World Economic Forum (2017), the level of human capital of a country is affected by several factors that are related to industrial activities, such as employment rate, knowhow, and staff training. Considering the amount of jobs provided by the oil and gas industry (see Table 2), maintaining the oil and gas industry will also be important for maintaining human capital. The oil and gas industry is an important source of job creation in Norway. In the 1990s, the number of people employed in the oil and gas industry accounted for about 1% of the total labor force of Norway, and the number increased up to 2.5% in 2013 (see Table 2). However, the share has decreased to below 2% in recent years as there were industrial efforts to comply with future de-petrolization trends (Table 2) (Norwegian Petroleum, 2019a). In 2018, the number of employees in the oil and gas industry was about 51,600 persons (Table 3). If we include all the employees in industries that are directly or indirectly related to the oil industry, however, the number goes up much higher. Brasch, Hungnes, and Strøm (2018) claim that about 17,200 persons, which accounts for 6.1% of Norway's labor force, were employed in the industries directly or indirectly related to the oil and gas industry.

Table 2. Number of Employees in Oil and Gas Industry in Norway 1990 - 2018 (unit: 1000 persons)

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Total	2057.7	2038.4	2034.2	2048.6	2076.5	2119.7	2162.5	2225.9	2285.4	2306.5

O&G extraction	21.3	21.8	23.1	24.7	24.9	24.0	24.5	26.7	27.5	27.3
O&G/Total	1.0%	1.1%	1.1%	1.2%	1.2%	1.1%	1.1%	1.2%	1.2%	1.2%
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Total	2319.7	2334.5	2323.2	2287.6	2293.7	2318.5	2392.5	2484.6	2564.2	2554.6
O&G extraction	25.7	29.4	32.4	32.3	32.8	35.0	37.3	45.4	48.7	51.7
O&G/Total	1.1%	1.3%	1.4%	1.4%	1.4%	1.5%	1.6%	1.8%	1.9%	2.0%
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	
Total	2547.4	2584.2	2637.1	2666.4	2694.0	2706.8	2714.8	2747.4	2792.5	
O&G extraction	53.9	56.8	61.8	65.8	66.8	61.4	54.0	51.4	51.6	
O&G/Total	2.1%	2.2%	2.3%	2.5%	2.5%	2.3%	2.0%	1.9%	1.8%	

Source. Data from (Statistics Norway, 2019c)

4.3.5 The Oil and Gas Industry and Social Capital

Social capital is rather confusing to define and hard to measure (Maack & Davidsdottir, 2015; Zhao, 2002). In general, social capital is defined as "the social norms, shared values and institutional arrangements that foster co-operation among population groups" (OECD, 2020, p. 234). Based on the report from the Organisation for Economic Co-operation and Development (OECD), Norway is the top performing country among the OECD countries in terms of managing social capitals, and one of the factors that build social capitals in Norway is the public trust in government (OECD, 2020b).

While there are no studies on the direct relationship between the social capital in Norway and GPFG, the Listhaug (2005) study seems to be the only study so far investigating the relationship between oil wealth and public trust in the government in Norway. The findings from the study provide interesting points about the management of oil wealth. First of all, it is true that Norwegian people have high trust in their government compared to the other countries in the world (Listhaug, 2005). Second, however, they also showed mild dissatisfaction about the fact that the growing oil wealth cannot be utilized to meet the public demands, such as more public services and lower taxes, and they want more spending of oil wealth immediately as the oil wealth becomes more visible (Listhaug, 2005). The author pointed out that this dissatisfaction can lead to less political trust. It is hard to generalize the result of this analysis as there were no following or related studies after this, however, the study shows the potential effect of oil wealth spending and saving on the dynamics of trust in government.

Meanwhile, the Norwegian government has set up regulations and frameworks to ensure that oil and gas development has a positive impact on society. The Norwegian economy and the standard of living intimately depend on oil and gas production. Expansion of oil and gas production in Norway in the 1990s, after its beginning in the 1970s, contributed significantly to the Norwegian economy and the high standard of living, allegedly placing Norway among the few countries in the world that have highly benefited from fossil fuels (Norgaard, 2006). Various institutions, including the Storting (Parliament), government,

and ministries, are in charge of managing the oil and gas industry based on a hierarchical structure (Hansen & Midtgard, 2008). The Storting is in charge of passing legislation, adopting propositions, responding to white papers, and supervising the government and the public administration, and the government has the executive power over oil and gas policy (Hansen & Midtgard, 2008). The Ministry of Petroleum and Energy is responsible for the management of oil and gas resources based on the guidelines drawn up by the Storting and the government with the Norwegian Petroleum Directorate which is an important advisory body for the Ministry of Petroleum and Energy (Hansen & Midtgard, 2008). On June 14, 1971, the Storting (Norwegian Parliament) submitted a white paper aiming to ensure that the entire society enjoys the benefits of oil and gas resources (Norwegian Ministry of Petroleum and Energy, 2011). The paper includes 10 principles that should be reflected in the oil and gas policies. These principles refer to the fact that Norwegian resources should be managed by the Norwegian governmental authority in a way that ensures the benefits for the entire society. The principles are:

1. That national supervision and control of all activity on the Norwegian Continental Shelf must be ensured.

2. That the petroleum discoveries must be exploited in a manner designed to ensure maximum independence for Norway in terms of reliance on others for supply of crude oil.

3. That new business activity must be developed, based on petroleum.

4. That the development of an oil industry must take place with necessary consideration for existing commercial activity, as well as protection of nature and the environment.

5. That flaring of exploitable gas on the Norwegian Continental Shelf must only be allowed in limited test periods.

6. That petroleum from the Norwegian Continental Shelf must, as a main rule, be landed in Norway, with the exception of special cases in which socio-political considerations warrant a different solution.

7. That the State involves itself at all reasonable levels, contributes to coordinating Norwegian interests within the Norwegian petroleum industry, and to developing an integrated Norwegian oil community with both national and international objectives.

8. That a state-owned oil company be established to safeguard the State's commercial interests, and to pursue expedient cooperation with domestic and foreign oil stakeholders.

9. That an activity plan must be adopted for the area north of the 62nd parallel which satisfies the unique socio-political factors associated with that part of the country.

10. That Norwegian petroleum discoveries could present new tasks to Norway's foreign policy.

(Norwegian Ministry of Petroleum and Energy, 2011, p. 8)

The Norwegian government takes a share of the revenue from the oil and gas industry through taxes, charges, direct ownership, and dividends from ownership (Hansen & Midtgard, 2008). In the late 1990s, the inflow of money to the fund increased significantly, and there was a need for guidelines on how much of the fund should be spent (Holden, 2013). In 2001, the Norwegian government set the first fiscal rule for the GPFG. The new fiscal rule incorporates the following features: "the fund should be invested in a diversified portfolio"… "Each year, the expected real return from the fund should be transferred back to cover the non-oil structural budget deficit on the government budget" (Holden, 2013, p. 874).

The GPFG also has an ethical mandate to offset the harm from environmental degradation from the production and use of oil and gas and ensure the long-term growth of the society. The Ministry of Finance is in charge of the management of the GPFG, and the Ministry of Finance views the management of GPFG as reflecting "a fundamental social perspective" (Ministry of Finance, 2008). The Fund's mission has evolved to include ethics as a core component of the investment policy, projecting Norwegian beliefs around the world (Clark et al., 2010). In Section 5.1 of the Guidelines for the Management of the Fund, the Ministry sets out two statements of principle: first, ''the Fund is an instrument for ensuring that a reasonable portion of the country's petroleum wealth benefits future generations'' and ''financial wealth must be managed with a view to generating a sound return in the long term, which is contingent on sustainable development in the economic, environmental and social sense''; Second, ''the Fund shall not make investments that entail an unacceptable

risk that the Fund is contributing to unethical acts or omissions'', including violations of humanitarian principles, human rights, gross corruption, and severe environmental damage.

The current legal framework of the GPFG is set by the Government Pension Fund Act No. 123 of 21 December 2005, which clearly states the purpose of the Fund, the management of the fund, specification of the income to the fund, and the use of the capital of the fund, and it is easily accessible for the public (Halonen, 2014). This information can be easily accessed and is easy to understand, and it helps the fund appear credible and stable for the public (Halonen, 2014).

4.4 SWOT Analysis

1) Strengths

The first strength of the Norwegian SWF is its strong accumulation system. The fund was accumulated from the revenue from the oil and gas activities, and income through returns, including interest and yield on the fund's investments, and it is the largest SWF in the world with the size of 10,088 billion NOK (1,148 billion USD) in 2019 (Norges Bank Investment Management, 2019a). Its long-term spending has to be below the fund's expected real returns as well, which is about 4% (Norges Bank Investment Management, 2019a). The 4% of the GPFG is larger than the Norwegian government's need for a year. In terms of weak sustainability, the GPFG seems sustainable within the Norwegian borderline.

Its capacity to deal with external economic shocks, such as oil price fluctuations, is another strength of the GPFG. This strength is coming from the strong accumulation and its responsible and diversified investment portfolio. For example, Norway was one of the oil producing countries that minimized the impact from the global economic shock arising from a 40% drop in crude oil price in 2015 (Giles, 2014; Waldholz, 2016). Thanks to their world's largest SWF that has twice the size of its economy, the Government of Norway could balance its budget (Giles, 2014; Waldholz, 2016). Also, the GPFG has helped Norway to get through the COVID-19 pandemic. Norway plans to draw 382 billion NOK (US$37 billion) from the fund to minimize damages from the pandemic (Bloomberg, 2020b). Also, according to the Bloomberg (2020a) report, the GPFG's return has suffered less than other funds from the COVID-19 pandemic, thanks to its ethical investment strategy.

Another strength of the GPFG is its transparency. The legal framework of the GPFG is clearly set by the Government Pension Fund Act No. 123 of 21 December 2005, which includes the purpose of the Fund, management of the fund, specification of the income to the fund, and the use of the capital of the fund, and it is easily accessible for the public (Halonen, 2014). It makes the GPFG more credible and stable.

2) Weaknesses

The weakness of the GPFG is the fact that its accumulation is based on the revenue from fossil fuel productions which are non-sustainable and environmentally unjust. In 2017, the Norway's Ministry of Petroleum and Energy has announced its new offshore licensing round consisting of 102 blocks, 9 in the Norwegian Sea and 93 in the Barents Sea, which is a part of the Artic Sea. The Minister of Petroleum and Energy, Terje Søviknes, said: "Profitable petroleum activity is important to maintain our welfare and the further development of our society." (Marex, 2017, para 3). This means that Norway has to keep damaging and exploiting natural resources to continue supporting the social welfare of Norwegian people using the GPFG. The expanding petroleum activity is accompanied by environmental impacts which can damage the Norwegian public, workers in fisheries, and people in other countries in the world due to potential threats of oil spills and greenhouse gas emissions. For example, Tol (2019) has estimated the long-term damage caused by climate change that is called the "social cost of carbon" (SCC), and has found out that poorer countries are more vulnerable to climate change, especially when governments prioritized their countries' benefits without being responsible for global climate change. Paul et al.(2017) also estimated the SCC, and found out the SCC of Norway is lower than of other developed countries, such as Sweden, Germany, the United Kingdom, and the United States (U.S.). Based on their calculation, the SCC of Norway in 2030 is valued at $106 per ton while the SCC of Sweden is $168 per ton, the SCC of Germany is $171, and the SCC of US is $118 per ton. This is unjust when considering that Norway has a high carbon footprint because Norway is the seventh-largest CO_2 exporter (Kaye, 2017; McKinnon et al., 2017). Due to these facts, SWFs funded by fossil fuel revenues such as Norway's GPFG are arguably operated at the expense of the global sustainability.

3) Opportunities

Patton (2012) pointed out that one of the opportunities of a SWF is providing liquidity of capital for achieving long-term goals. The GPFG provides Norway the opportunity to reduce its dependence on fossil fuels, and this is called “a Norwegian Paradox”. Norway is aiming to shrink its own carbon emissions by 40 percent, however, Norway has sought to reduce its carbon footprint without reducing their oil production (Sengupta, 2017). For example, Norway planned to sell only electric cars by 2025 with support from attractive government subsidies (Sengupta, 2017). They also have funded to fight against the global deforestation with GPFG support, according to the Fund’s ethical guidelines for responsible investment (Rainforest Foundation Norway, 2019). In March 2019, they announced that GPFG will dump stocks in 134 companies that explore for oil and gas, and will begin to invest in renewable energy infrastructure projects (Digges, 2019b, 2019a). These efforts are in line with Norway’s plan to reduce risks from the volatility of oil market and climate change.

4) Threats

A major threat could be the aging population of Norway. The rapid aging of the Norwegian population could result in escalating pension payments. As stated in the Eifert, Gelb, and Tallroth (2002) study, long-term demographic projections suggest that escalating pensions payments and health care expenditures for the elderly with the rapid aging of the Norwegian

population will coincide with tapering off of Norway's oil export income, as Norwegian oil reserves are expected to be exhausted over decades (Eifert et al., 2002). The Norwegian Ministry of Labour and Social Affairs (2016) also pointed out that the aging population issues are one of the major factors that will increase government spending.

Table 3. The SWOT Matrix for the Case Study of Norway

Strengths	Weaknesses
- Strong accumulation from stable composition and low spending rate - Transparency - Capacity to deal with economic shocks	- Non-sustainable sources of the fund - Environmental injustice
Opportunities	Threats
- Investment opportunities to recover sustainability	- Risks embedded in equity investments - Escalating pensions payments

Table 3 summarizes the strengths, weaknesses, opportunities, and threats of the GPFG identified on this chapter.

4.5 Conclusion

Norway has adopted a good framework to transform oil revenue into wealth of the Norwegian people. The key factors of the success of the GPFG are: creating an ownership share for government from the early stage of oil and gas development, based on the social values of equality and integrity, with large savings from oil revenue (about 50%) and less spending than its average annual return. Although Norway has established a solid fund amount already, the source of the SWF has fundamental weaknesses, namely that the fund has been built on the cost of exploitation of fossil fuels, which has a significant contribution

to the global warming problem. Norway is trying to compensate this negative contribution by investing in clean technologies, such as electric cars, renewable energy, and fighting to stop global deforestation.

The experience of Norway shows how to create and manage a SWF for long-term prosperity build upon resource revenues. The accumulation framework for the GPFG provides a good example of how to establish a solid SWF by using oil revenue. Its drastic saving pattern, however, was possible due to timely and forceful intervention by the government based on the country's social values of equity and integrity. Therefore, how to achieve a social consensus on those drastic saving measures that could limit the benefits to the current generation will be key to introducing this model for other governments as the difficulty of social consensus makes very difficult to sell politically. In addition, investment strategies must be made to ensure long term sustainability, as its accumulation is based on climate change. The fund should be operated to lower the risk of volatility of the oil prices and to ensure environmental sustainability in the long term.

5. Case Study 2: Alaska

5.1 Introduction

The first discovery of the Prudhoe Bay oil field in 1968 has brought profound economic and social changes for everyone in Alaska (Marks, 2017; Mikkelsen et al., 2008). The economy of Alaska has become significantly dependent on the oil and gas industry, and the interaction between the community near the oil field and the outside world has increased (Mikkelsen et al., 2008). The government of Alaska established its own Sovereign Wealth Fund (SWF) in 1976 because they knew the windfall of oil and gas development would be temporary and wanted to make sure everyone in Alaska gained benefits from it (Widerquist & Howard, 2012b). When the government of Alaska decided to establish the SWF in Alaska, they took a different path from Norway especially about how to spend the savings from resource revenues. SWFs can have different objectives, such as economic development, economic diversification, saving surpluses of resource revenue, or growing wealth for the future generations (UN Environment, 2018). For the government of Alaska, the Alaska Permanent Fund (APF) has been an important way of contributing to individual freedom of the public as well as sharing resource revenue (Carter, 2012; Casassas & Wispelaere, 2012). The idea of the regular dividend of the APF has been influenced by the movement for basic income discussed widely in the United States in the 1960s and 1970s (Widerquist & Howard, 2012b). The residents of Alaska have benefited from the oil and gas industry by receiving an annual grant called the Permanent Fund Dividend (PFD) from APF, while most countries having a SWF usually seek to maximize financial returns for

the long-term policies (Bernstein et al., 2013). However, there are concerns about the sustainability and stability of the PFD although the APF is renowned as a successful case of SWF (Goldsmith, 2012; Guettabi, 2019; Marks, 2017).

5.2. Alaska's SWF: The Alaska Permanent Fund

In 1968, the Prudhoe Bay oil field, the largest oil field in North America, was discovered on the North Slope of Alaska. The discovery precipitated profound changes for everyone in Alaska in terms of economic and social development (Mikkelsen et al., 2008). Before the discovery, the economy of Alaska had been dependent on federal government spending. In 1960, the government and military employments accounted for 57% of employment in Alaska, and construction employments, which accounted for 6% of employment in Alaska, were mostly under government contracts (Cliff Groh & Erickson, 2012). The North Slope area is the traditional territory of Inupiat, a group of Alaska Natives who used the area for hunting, fishing, travel, and other subsistence activities.

In 1969, after oil discovery, there was a big capital inflow to Alaska, and a North Slope lease sale was about 5 times the annual budget of Alaska (Kasson, 1997). The government of Alaska spent the revenue from the lease sale to build the infrastructure required for the future oil and gas development, schools, loan programs for college students, and the other needs for future development. However, Alaskans knew the windfalls from oil and gas resources would be temporary and they may have little benefit because they had

experiences of being exploited by outside interests for Alaska's fur, fisheries and mineral resources (Cliff Groh & Erickson, 2012; Widerquist & Howard, 2012b). There were also growing concerns about the expected damage to wildlife, marine resources, and other subsistence values (Mikkelsen et al., 2008).

The production of the oil field was expected to start in 1973, however, it was delayed until 1977 because of political and economic angst. During the 4 years of delay, Alaskans discussed and voted about what they wanted to do with the benefits of oil and gas development (Cliff Groh & Erickson, 2012). As a result, a primary consensus was reached for saving the oil money in a fund, and the consensus led to the creation of a separate fund to save oil and gas revenue (Cliff Groh & Erickson, 2012). In 1976, the constitutional amendment to establish the Alaska Permanent Fund (APF) was passed by the voters of Alaska. The amendment required the dedication of income-related oil production to the fund by the following:

> At least twenty-five percent of all mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue-sharing payments and bonuses received by the state shall be placed in a permanent fund, the principal of which shall be used only for those income-producing investments specifically designated by law as eligible for permanent fund investments. All income from the permanent fund shall be deposited in the General Fund unless otherwise provided by law.
>
> (Alaska Permanent Fund Amendment, 1976, Section 15)

This amendment included the idea of how to build the fund from a portion of mineral income, but it did not specify the policy purpose for expenditure (Anderson, 2002). Over the next 3 years, a study commission had discussions about the purpose of the fund (Anderson, 2002). This led to the establishment of a state-owned corporation to manage the APF, the Alaska Permanent Fund Corporation, and created legislation which in 1980 articulated the purpose of the APF as follows:

> 1. the Fund should provide a means of conserving a portion of the state's revenue from mineral resources to benefit all generations of Alaskans.
>
> 2. the Fund's goal should be to maintain safety of the principal while maximizing total return.
>
> 3. the Fund should be used as a savings device managed to allow the maximum use of disposable income from the Fund for purposes designated by law.
>
> (Alaska Statutes 37.13.020., 1980)

Meanwhile, Jay Hammond, Alaska's governor from 1974 to 1982, was concerned that the APF could be spent by politicians in a way that does not benefit everyone in Alaska, including the future generations (Marks, 2017). Thus, he promoted the idea to directly give the money to the residents of Alaska in the form of dividends; thus, individuals could decide how to utilize the money (Kasson, 1997; Marks, 2017). In 1982, the legislation authorizing equal dividend payments to the residents living in Alaska for more than six months was approved, and the first dividend checks were distributed. The first payment was $1,000, and since the following year, the dividend has been calculated as 21% of the net income of

the APF for the last five fiscal years. The current deposit of the APF is comprised of a non-spendable part and a spendable (assigned) part. The non-spendable part of the APF is invested in various assets, such as public equities, private equities, real estate, and the assigned part of the APF is assigned to Alaskans by the Alaska State Legislature and the governor. The Alaska Permanent Fund Corporation transfers about 50% of the income available to the APF for dividend payments.

5.3 The Sustainability of Alaska's Oil and Gas Industry

5.3.1 The Oil and Gas Industry and Financial Capital

Alaska's economy is highly dependent on the oil and gas industry. The oil and gas industry in Alaska accounts for a 21% share of the total GDP of Alaska, with $11.0 billions of contribution to GDP in 2017 (Sauter, 2019). Including all taxes and royalties levied on the oil and gas industry, the government of Alaska received $447 million from the oil and gas industry in 2016, which is about 26% of the total tax revenue (McDowell Group, 2017). During the same period, the mining industry paid $81 million in mining royalties to the state government, which is about 4.5% of the total tax revenue (McDowell Group, 2017). With the fluid cash flow from the oil and gas industry, Alaska is the only state in the US that has a 0% personal income tax and state sales tax.

With the solid earnings reserve and principal (corpus), the value of the APF reached over $66.30 billion as of June 30, 2019 (Alaska Permanent Fund Corporation, 2019b). In 2018, the dividend was paid to 639,247 residents of Alaska, which is about 87% of the total population of Alaska (Table 4). The residents of Alaska, including minors with a sponsor, are entitled to receive the dividend if they are not absent from Alaska for more than 180 days and not sentenced as a result of a conviction of a felony. The amount of the annual dividend (PFD), usually ranging from roughly $1,000 to $2,000 (see Table 4), is adjusted to preserve the dividend program. For example, the amount of the dividend per person in 2009 was nearly 60% that of the dividend in 2008, because of the US economic crisis from 2008 to 2009 (Erickson & Barker, 2015). Also, the amount of the dividend per person in 2016 was nearly 50% that of the dividend in 2015 and has since remained lower than before 2016, in response to Alaska's fiscal crisis from the depressed oil prices (Walker, 2018). Furthermore, there was a bad evolution in the industry, when British Petroleum (BP), which had been the central player in the development of the Prudhoe Bay oil field and the pipeline which moves oil for export at the Port of Valdez, announced the sale of its Alaska operations in August 2019 (Cunningham, 2019; Harball, 2019). BP sold its Alaska operations to Hilcorp Energy Co, and about 200 people lost their jobs (Anchorage Economic Development Corporation, 2020).

Table 4. The APF Balances and Dividends

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Fund Value	$3.28 Billion	$4.43 Billion	$5.04 Billion	$6.75 Billion	$8.48 Billion	$8.93 Billion	$9.49 Billion	$10.57 Billion	$11.49 Billion	$12.46 Billion
Dividend/ 1 person	$1,000	$386	$331	$404	$556	$708	$827	$873	$952	$930
Application Paid	470,897	458,213	482,135	519,413	533,315	530,594	519,724	508,710	498,447	512,764
State Population	464,300	499,100	524,000	543,900	550,700	541,300	535,000	538,900	553,171	569,054
	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Total Fund Value	$14.76 Billion	$15.46 Billion	$15.22 Billion	$16.58 Billion	$18.39 Billion	$21.10 Billion	$23.88 Billion	$25.13 Billion	$26.51 Billion	$24.82 Billion
Dividend/ 1 person	$916	$949	$984	$990	$1,131	$1,297	$1,541	$1,770	$1,964	$1,850
Application Paid	523,099	528,399	535,178	542,397	546,651	555,289	565,657	573,324	583,633	586,848
State Population	586,722	596,906	600,622	601,581	605,212	609,655	617,082	622,000	627,533	632,241
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Total Fund Value	$23.53 Billion	$24.19 Billion	$27.40 Billion	$29.96 Billion	$32.91 Billion	$37.83 Billion	$36.53 Billion	$29.92 Billion	$33.25 Billion	$40.14 Billion
Dividend/ 1 person	$1,541	$1,108	$920	$846	$1,107	$1,654	$2,069	$1,305	$1,281	$1,174
Application Paid	590,031	596,176	599,992	597,639	595,166	600,278	616,484	624,888	637,873	644,959
State Population	640,544	647,747	656,834	663,253	670,053	674,510	679,720	692,314	710,231	722,190
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**		
Total Fund Value	$40.33 Billion	$44.85 Billion	$51.21 Billion	$52.80 Billion	$52.77 Billion	$59.79 Billion	$64.89 Billion	$66.30 Billion		
Dividend/ 1 person	$878.0	$900.0	$1,884	$2,072	$1,022	$1,100	$1,600	$1,606		
Application Paid	641,644	634,366	637,289	641,561	638,178	633,005	639,247	-		
State Population	732,298	736,399	735,601	737,625	739,828	737,847	736,239			

Source. Data from Alaska Permanent Fund Corporation (2019), Alaska Department of Revenue (2020)
-) No data

The annual earnings from the fund are used for both current generations and future generations. The sources of the earnings come from three different cash flows: royalties, appropriations, and inflation proofing. From the inception of the fund in 1978 to 2019, 41.5% of the fund's principal came from the oil and gas portion, 41.6% of the fund came from appropriations, and 16.9% came from inflation proofing transfers (Alaska Permanent Fund Corportation, 2019, p. 7). When it comes to the use of the fund's earnings, 42.5% of the fund earning is paid out to current generations either by dividend (37.3%) and the general fund (dividend distribution to fund various agency activities, 5.2%), and the rest, 57.5%, is saved for future generations by inflation proofing (26.4%), special appropriations (6.6%), and undistributed realized income since the inception of the fund (Alaska Permanent Fund Corportation, 2019, p. 1).

5.3.2 The Oil and Gas Industry and Produced Capitals

Alaska is the sixth-largest producer of crude oil among all US states. In 2017, about 80% of the crude oil produced in Alaska was transported to refineries in Washington and

California (U.S. Energy Information Administration, 2018a). Another 15% of the crude oil was refined in refineries in Alaska, and 5% of the crude oil was shipped to Hawaii or other countries (U.S. Energy Information Administration, 2018a). Most of Alaska's crude oil production occurs on the North Slope of Alaska. In 2019, the oil fields on North Slope produced nearly 451 thousand barrels per day and the oil fields on South Alaska coast produced only 14 thousand barrels per day (U.S. Energy Information Administration, 2020a). The oil produced on the North Slope was transported through the Trans Alaska Pipeline System (TAPS). Shortly after the discovery of Prudhoe Bay oil field, the Pipeline field study team from Atlantic Richfield Company-Humble North Slope Coordinating Committee arrived in Alaska in 1968 and made an agreement for "a planning study and for engineering design and construction of the Trans Alaska Pipeline Project"(Alyeska Pipeline Service Company, 2013, p. 81). The operation of the pipeline started in 1977, and it can carry more than 2 million barrels of oil per day (Alyeska Pipeline Service Company, 2013; U.S. Energy Information Administration, 2018b).

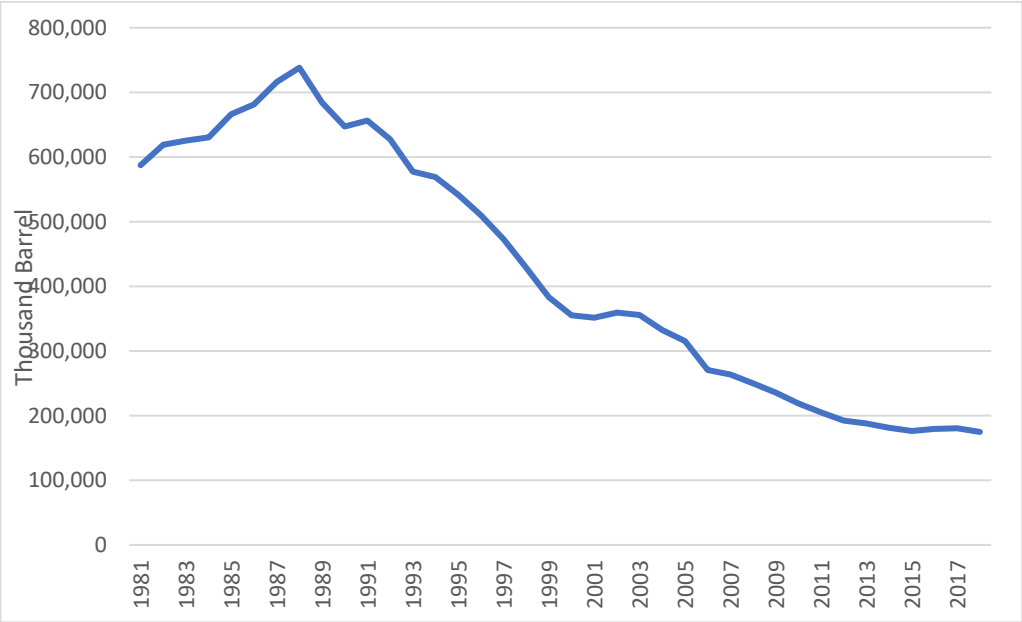

Figure 5. Crude Oil Production in Alaska

Sources. Data from U.S. Energy Information Administration (2019)

The annual crude oil production in Alaska peaked in 1988, and steadily has declined since that peak (see Figure 5). The improved drilling efficiency increased oil production slightly in 2002, however, annual oil production declined again since 2003 as the oil fields matured (U.S. Energy Information Administration, 2018a). Daily crude oil production in Alaska in 2018 was about 518,400 barrels which is significantly lower than its peak of 2 million barrels in 1988 (U.S. Energy Information Administration, 2018a).

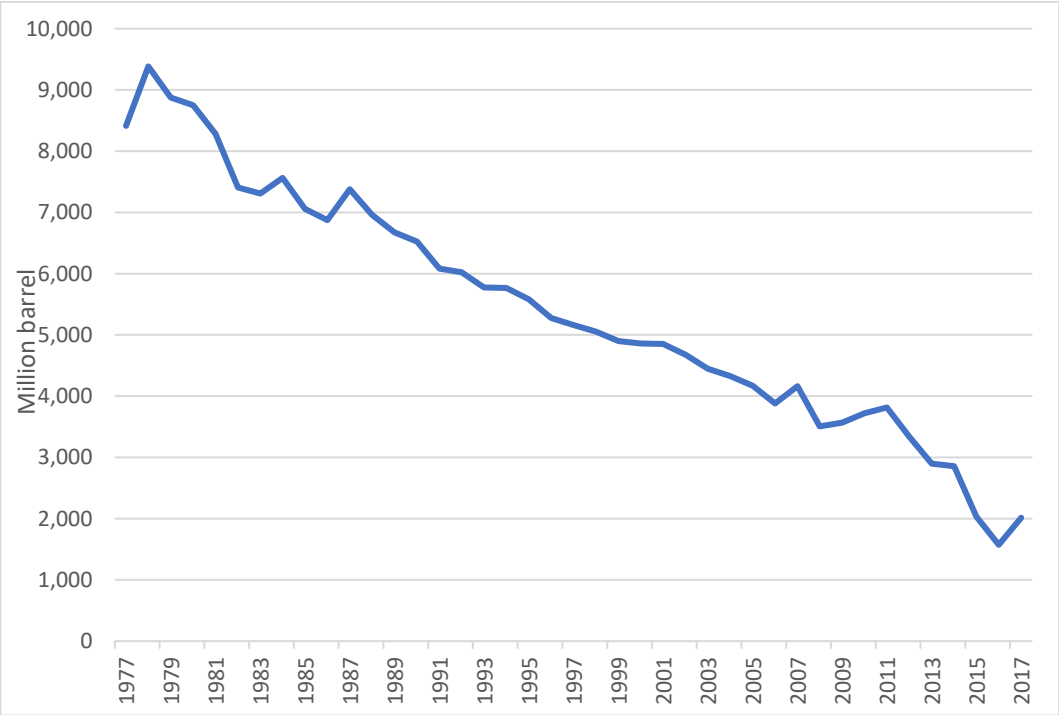

Figure 6. Alaska Crude Oil Proven Reserve

Sources. Data from U.S. Energy Information Administration (2019)

Although the proven crude oil reserve in Alaska is steadily falling (see Figure 6), the state still has an estimated 50 to 60 BBbls of oil undeveloped yet on the North Slope and in the Alaskan Arctic (Clemente, 2019). However, these reserves consist of heavy oil, light oil from small and remote fields, and natural gas liquids which are more challenging to develop and are mostly located where access has been hindered either by federal policy or environmental regulations (Clemente, 2019; Resource Development Council, n.d.). Despite the cost, Alaska has invested billions of dollars in new oil reserve explorations and discoveries and drilled the most actively in more than 20 years in 2019, based on the

forecast that global crude oil price will rise in the mid-/long-term (Clemente, 2019; Resource Development Council, n.d.). Alaska also has natural gas reserves totaled at 3.3 trillion cubic feet, however, there is no pipeline to transport the natural gas to consumers and most of the gas is reinjected into oil fields to increase the efficiency of oil production (U.S. Energy Information Administration, 2018a).

5.3.3 The Oil and Gas Industry and Natural Capitals

Oil spills have been the worst manmade disasters for the environment in Alaska (Sylves & Comfort, 2012), which is well known for its unique wilderness (30% of US wilderness area). On March 24, 1989, an oil tanker vessel called Exxon Valdez crashed into the Bligh Reef in Prince William Sound in Alaska. It is estimated that about 257,000 barrels of crude oil had been spilled out of its total 53 million barrels cargo, and 1,300 miles of shoreline were contaminated by the crude oil (Sylves & Comfort, 2012). This was the worst oil spill accident in U.S history before the BP Deepwater Horizon oil spill accident in coastal Louisiana in 2010.

This accident caused significant damage to the marine ecosystem. The actual damages are hard to know, as the environment has not recovered yet, and there were not enough studies about the correlation between oil exposure and mortality of fishes (Barley, 2012; Ferreira,

2015; Incardona et al., 2015). According to the Exxon Valdez Oil Spill Trustees Council, the best estimation is that 250,000 seabirds, 2,800 sea otters, 300 harbor seals, 250 bald eagles, 22 killer whales, and billions of salmon and herring eggs were killed by the accident (Trustee Council, 2010).

Correspondingly, the fishery and fishing industry in Alaska has suffered considerably. Fisheries for some major species, such as salmon, herring, shrimp, and rockfish, were closed for a considerable period, and herring and salmon never fully recovered (Leahy, 2019; Sylves & Comfort, 2012). The collapse of the herring population, especially, has induced bankruptcy for fishermen (Leahy, 2019). Incardona et al. (2015) have found out that embryos of herring and salmons can be damaged irreversibly even with low level of oil exposure, and the damages on nearshore spawning fish from the Exxon Valdez oil spill have been underestimated in terms of the geographic extent of affected habitats and the level of toxicity (Incardona et al., 2015). Therefore, the actual damage of the Exxon Valdez oil spill is likely to be greater than what it is known.

Alaska's oil and gas industry also contributes significantly to increasing the state's carbon emission. The industrial activities of the oil and gas industry have represented over 50% of the sources of greenhouse gas emissions in Alaska (see Table 5). The oil and gas industry is not only the major source of carbon dioxide but also a major source of methane, which has 104 times the global warming potential compared to CO_2. Fugitive methane, mostly

generated from oil production, contributed over 19% of the greenhouse gas emitted by the oil and gas industry in 2015 (Alaska Department of Environmental Conservation, 2018).

Table 5. Greenhouse gas emissions to air in Alaska 1990 - 2015 (unit: MMT CO2e)

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Total	44.93	46.55	47.09	46.25	46.07	49.67	51.13	50.43	51.21	50.83
Oil and Gas	24.85	26.53	27.83	27.43	26.59	29.43	30.08	28.27	28.32	26.73
O&G/Total	55.3%	57.0%	59.1%	59.3%	57.7%	59.3%	58.8%	56.1%	55.3%	52.6%
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Total	51.16	50.07	50.98	51.21	52.66	54.64	50.92	49.45	44.81	41.88
Oil and Gas	26.30	26.36	26.88	26.52	25.61	26.99	23.19	23.34	21.30	21.00
O&G/Total	51.4%	52.6%	52.7%	51.8%	48.6%	49.4%	45.5%	47.2%	47.5%	50.1%
	2010	**2011**	**2012**	**2013**	**2014**	**2015**				
Total	43.04	43.34	42.63	40.88	39.01	41.3				
Oil and Gas	20.22	22.63	22.33	22.10	20.96	22.33				
O&G/Total	47.0%	52.2%	52.4%	54.1%	53.7%	54.1%				

Source. Data from (Alaska Department of Environmental Conservation, 2018)

Greenhouse gas emissions cause climate change, and climate change causes actual damages to the sustainability of society through changes in agricultural productivity, human health risk, increased flood risk, energy system cost (heating and cooling systems cost), or other

environmental damages (United States Environmental Protection Agency, 2017). The value of the long-term damage caused by climate change in a given year is called social cost of carbon (SCC). The estimated values of SCC can vary depending on various factors such as income level, geographic location, economic sectors, or estimation methods (Pindyck, 2019). The US government's Interagency Working Group (IWG) on the Social Cost of Greenhouse Gases estimated that the SCC of CO_2 emissions in US is about $50 /metric tonne of CO_2/year (in 2017 dollars) (Paul et al., 2017). Based on this estimation of the SCC, the oil and gas industry in Alaska is responsible for the $1,115.5 million SCC for the greenhouse gas emissions in 2015 ($50 per metric ton × 22.33 million metric ton of emissions in 2015 (see Table 5)). This is a smaller amount than the total dividend paid in 2015 which is about $1,329.3 million ($2,072 per person × 641,561 application paid in 2015 (Table 4)). On the other hand, Pindyck (2019) asserts that the SCC estimation done by the IWG is too low and proposed a much higher estimation, in the range of $80 to $200. Then the total SCC that the oil and gas industry is responsible for would be in a range from $1,786.4 million to $4,466 million, which is much higher than the total dividends paid in 2015. Therefore, the SCC can be a reason why the oil and gas industry in Alaska should contribute to the sustainability of Alaska.

Also, there is another issue related to the SCC. The climate change damage from the greenhouse gas emissions from the oil and gas industry in Alaska is not limited to Alaska, as climate change has a global impact. Different countries have different SCC, and the SCC is generally larger in low-income countries with large populations, as they are more

vulnerable to climate change (Paul et al., 2017; Tol, 2019). For this reason, the national SCC can be much smaller than the global SCC in many countries (Tol, 2019). Therefore, the impact of Alaska's oil and gas industry on the natural capital should be calculated considering that it has global impacts rather than regional ones.

5.3.4 The Oil and Gas Industry and Human Capital

There are a few ways in which Alaska's oil and gas industry contributes to human capital formation. The first one is by creating jobs in oil and gas companies. In 2016, 4,275 Alaskans worked for companies in oil and gas production, transportation, and refining of oil and gas (McDowell Group, 2017). Also, 6,095 Alaskans worked in oil and gas support service companies, and 35,205 Alaskans worked in other indirect and induced companies (McDowell Group, 2017). Total employment in the oil and gas industry is 45,575, and it accounts for 14% of the total employment in Alaska, considering that there were 323,500 jobs in Alaska in 2016 (Bureau of Labor Statistics, 2016). However, the number of those employed in the oil and gas industry in 2016 was stagnant compared to the number of employed in the past (see Table 6).

Table 6. Alaska Oil and Gas Industry Employment

	2010	2013	2016
Primary Companies	3,997	4,700	4,275
Oil and Gas Support Services	7,670	8,400	6,095
Indirect and Induced Employment	34,133	37,900	35,205
Total	44,800	51,000	45,575

Source. Data for 2010 from MCDowell Group (2011), Data for 2013 from McDowell Group (2014), Data for 2016 from McDowell Group (2017)

Note, Primary companies include companies in oil and gas production, transportation, and refining of oil and gas

The oil and gas industry also contributes to preserving human capital in Alaska through several statewide government programs for the oil and gas industry. According to the analysis of the McDowell Group (2017), 90% of the budget for the Alaska Department of Education and Early Development, spent for students in public schools, which is about $1.1billion, originated from oil and gas revenue, and $575 million out of a total of $1.7 billion of the budget for the federally administered health insurance program has originated from oil and gas revenue in 2016.

On the other hand, there have been concerns that direct cash transfers from the APF may discourage employment (Guettabi, 2019). The studies on the relationship between APF and

employment supply/demand, however, affirm that there is no need to worry about the effects. Bibler, Guettabi, and Reimer (2019) have found out that a $1,000 increase of the PFD per person induces a decrease in the size of the labor market by 0.7% in the following month of the PFD disbursement. However, the annual labor market size decreases only by 0.2%, that is to say, the effect is driven by transitory reductions (Bibler et al., 2019). Feinberg and Kuehn (2018) also investigated how the PFD impacted the number of hours worked. They have also found out a decline in the number of hours worked, especially in the married-women group, but overall the effects were modest and the decrease in income from the decline in hours worked were smaller than the increased income from the PFD (Feinberg & Kuehn, 2018). Jones and Marinescu (2018) also examined the long-run effect of PFD on the Alaska labor market and found out no significant effect on employment, except that the proportion of part-time employees in the overall labor market has increased by 1.8%. Meanwhile, Kurland (2017) asserted that the PFD encourages people in rural areas to move to a bigger city and find a job. The author claimed that this was because the PFD alleviated the constraint of costs of migration and stimulated the creation of new jobs due to the increase in the aggregate demand for goods and services (Kurland, 2017). This argument can be supported by the findings of Feinberg and Kuehn (2019) that the amount of the PFD had significant positive impacts on entrepreneurship and small-firm entry. Putting these studies together, it appears that there seems to not exist enough empirical evidence for the concerns that the direct cash transfer from the APF may discourage the labor market.

5.3.5 The Oil and Gas Industry and Social Capital

Alaska became a territory of the US in 1867. Most of the inhabitants in the area were Native people. Northern Alaska, which accounts for most of Alaska's oil and gas production, had been used for hunting areas for the Native peoples for a thousand years (Mikkelsen et al., 2008). When the US began developing oil and gas resources on Alaska's North Slope, the Native people were awarded rights to a portion of the land and granted about 1billion USD to benefit Native stakeholders, based on the rights guaranteed by the Alaska Native Claims Settlement Act of 1971 (ANCSA) (Mikkelsen et al., 2008). The Native communities have received royalties and land rents through the Native associations in their area, such as the NANA Regional Corporation, the Arctic Slope Regional Corporation, the Bering Straits Association, or the Association of Village Council Presidents. There is a total of 13 Native associations created by the ANCSA.

5.4 SWOT Analysis

1) Strengths

The first strength of the APF is its high transparency in both the administration of the APF and in its investments (Hartzok, 2012). The public can easily navigate the information on the APF and the annual dividend and ask questions to the Alaska Permanent Fund

Corporation (APFC). Also, they can access annual reports on fund earnings, portfolios, investment details, and the financial statements of the APF.

Another strength of the APF is the unique framework for revenue distribution. Alaskan residents who are qualified for the dividends are entitled to the same payment regardless of their income. This means that the APF grants an equal share of the natural capitals in Alaska to the public (Cummine, 2013). The PFD contributes significantly to income distribution. Thanks to this mechanism, the PFD has contributed to lessening poverty in Alaska. Alaska ranks 4th in Poverty Rate in the USA at 10.2%, which is significantly lower than the national average of 14.6% (Welfareinfo, 2017). According to Berman and Reamey (2016), the APF has saved 15,000 to 25,000 Alaskans from poverty annually, which means it has reduced the poverty rate of Alaska by an average of 2.3% between 2010 and 2015. The PFD is especially important in reducing poverty, especially for rural, Native, and senior Alaskans (Berman & Reamey, 2016).

2) Weaknesses

The first weakness of the APF is the current dependency of funding source on non-sustainable resources. Without diversifying its source, the oil and gas production in Alaska has to be continued to maintain the APF; however, the annual oil production amount has gradually declined since the peak in 1988. Although Alaska still has an estimated reserve of 50 to 60 BBbls of oil undeveloped, and has drilled actively to develop its oil reserves,

there are several restrictions for the development, such as high development costs on remote fields, and federal policy regulations, such as the Resource Conservation and Recovery Act and the Clean Water Act, to protect ocean environment from waste generated at the oil well site and water pollutants (Clemente, 2019; Resource Development Council, n.d.).

The second weakness of the APF is that its accumulation is based on the revenue from fossil fuel production which destroys natural capitals and the danger of oil spills that brings mortal damages to the Alaska Ocean. As such, in Norway, oil production has been a major source of greenhouse gas emissions and deterioration of the ocean ecosystem. While Norway has tried to compensate for the environmental damage with investments in reducing carbon footprints, Alaska lacks such movement. The lack of a green tax paradigm shift is the major weakness of the APF, which is frequently criticized by environmentalists (Hartzok, 2012).

The third weakness is environmental injustice arising from its revenue-generating process. Like in the case of Norway, oil and gas development in Alaska contribute to different levels of SCC between different countries, and it is higher in less-developed countries even though the benefits of the development are mostly taken by Alaska (Tol, 2019). Also, the climate change is more damaging to Alaska's wilderness and to the Native communities, while the most reserves of oil and gas in Alaska are on the North Slope, the homeland of

Native communities. Most Native communities are located along coastlines and rivers, which makes them more susceptible to flood and erosion (Talberth & Wysham, 2017). In addition, rural Alaskan Natives rely on hunting and fishing economically and nutritionally, there is a decrease in the amount of wildlife due to climate change (Talberth & Wysham, 2017). Hence, they are more vulnerable to the climate change than the other Alaskan people or US citizens.

3) Opportunities

Recently, the Alaska Permanent Fund Corporation (APFC) began to expand the investment in the private market to boost the returns of the APF and launch an in-state investment program, the Alaska Investment Program, in September 2019. The Alaska statutes 37.13.120. specifies the rule of investment for the APF, which is:

> "The board shall invest the assets of the fund in in-state investments to the extent that in-state investments are available and if the in-state investments have a risk level and expected return comparable to alternate investment opportunities"
>
> (Alaska Statutes, 2018, 37.13.120. (a))

With this requirement, the Alaska Investment Program is managed by two external fund managers and targets a rate of return and expected risk comparable to investments outside of Alaska with an initial allocation of $200 million (Alaska Statutes, 2018). About 73% of the fund is invested in real estate and infrastructure investments in the US as of June 2018.

4) Threats

With the high dependency on annual oil and gas revenue, without income tax and sales tax, the big external threat to the APF is the crude oil price fluctuations. For instance, the PFD in 2016 was slashed almost 50% with the plunge of crude oil price and reduced state revenues by more than 80% (Walker, 2018). The PFD in 2009 also was slashed by nearly 60% in 2008, due to the plunge in crude oil price with the US economic crisis from 2008 to 2009. Meanwhile, Alaska has tried to develop new oil and gas resources to boost their oil and gas production; however, opening new oil fields in Alaska requires more investment than developing onshore shale resources in other states in the U.S (Paraskova, 2017). The oil company BP decided to exit Alaska in August 2019 due to the recent low productivity of the oil and gas in Alaska, and plans to focus on crude oil production from other US shale fields (Cunningham, 2019). While its short-term effect is not critical, as the operation is going to be continued by the Hilcorp Energy Co and a number of BP workers have been hired by other local firms (Anchorage Economic Development Corporation, 2020), the future of the oil and gas industry in Alaska seems to be gloomy. The main reasons why BP left Alaska were the falling oil production in Alaska and the higher profitability of US tight oil assets (Cunningham, 2019). Alaskan oil production on North Slope will be expected to decline, according to the State Department of Revenue, and the Trump administration's plans to drill more onshore oil fields on federal lands (Rosen, 2019).

Table 7. The SWOT Matrix for the Case Study of Alaska

Strengths	Weakness
- Income distribution - Lower poverty rate - Transparency	- High dependency on annual oil and gas revenue - Non-sustainable sources of the fund - Environmental damage and injustice
Opportunities	Threats
- In-state investments	- Low crude oil price and its volatility

Table 7 summarizes the strengths, weaknesses, opportunities, and threats of the APF identified on this chapter.

5.5 Conclusion

Alaska's SWF gives the public the right to the natural capital's wealth in Alaska by granting annual dividends to the public. The revenue distribution framework has helped alleviate the danger of the "resource curse" in Alaska. This dividend has become an important share of population's income especially for low-income households and has had positive impacts on small business entry in Alaska (Feinberg & Kuehn, 2018; Kurland, 2017). Similar to Norway's SWF, the APF is funded by non-renewable resources, which raises issues on sustainability and environmental injustice, as the process of oil and gas production deteriorates the ocean environment and emits greenhouse gases. While Norway is trying to

diversify its portfolio by including global assets and assets related to clean technologies, Alaska invests more in domestic assets so they can have a more competitive economy. Because Alaska's SWF has invested more to current generation than Norway's GPFG, the Fund has been greatly affected by the recent decline in oil prices and decreases in oil production. Alaska's SWF framework constitutes an interesting case study of basic income as well. The APF shows how income distribution to the public from oil revenues, which could have been owned by oil companies, has a positive effect on the local economy provided that distributed income stays in the local economy as investments.

5.6 Summary of the Norwegian Model and the Alaskan Model

The sustainability issue of the natural resource funds boils down to a trade-off between the welfare of current generations and of future generations (A Bauer et al., 2016; Eckardt et al., 2012) Both the Norwegian GPFG and the Alaskan APF originally aimed to prevent the "resource curse" and ensure the sustainability of the society based on oil revenue distribution. However, they have differences in the approach concerning the ways to distribute the revenue to the current generations and the future generations in their societies.

The Norway government collects a 27% corporate income tax and an additional 51% special tax from oil and gas companies (as of 2018). The government accumulates the special tax in the GPFG fund, and invests in equities, fixed income, and real estate, and

spends it under the expected investment return formula which is generally 3% to 4% of the fund (Norges Bank Investment Management, 2019a; Poelzer, 2015). The government in Alaska collects at least 25% every year from oil and gas companies' revenues, and about 50% of the fund earnings (42.5% as of 2019) is paid out as an annual dividend to the current generations in Alaska (Alaska Permanent Fund Corporation, 2019, p. 1). The rest is saved as a non-spendable fund for future generations. As to the revenue distribution between the current generation and future generations, Norway saves more financial capital from the current generation and leaves more share in the form of pensions for future generations. Also, The GPFG helps Norway deal with economic shocks because of its strong accumulation and stable composition. Alaska spends more on current generations in the form of a type of basic income than Norway. Consequently, Norway's GPFG has a more stable and considerable amount compared to Alaska's APF. Alaska's APF, however, contributes directly to lessening the poverty in Alaska as it provides a current basic income.

Both the GPFG and the APF are sourced from non-sustainable sources which are oil and gas, therefore, they need to prepare a post-petroleum plan to sustain their economies to escape from the extrnal threat regarding non-sustainability of current sources. This is more problematic in Alaska due to the APF's high dependency on annual oil and gas revenue. To sustain their development with their SWF, the income from the GPFG and the APF is invested in various assets, not only in equities and real estate but also in social infrastructure. The main difference in investment strategies between the two funds is that the GPFG has invested in global companies, real estates, and equities, including in sectors to offset the

harm from environmental degradation from the production and use of oil and gas, while the APF has invested more in domestic sectors, such as liquid stocks, bonds, and infrastructures across industries with particular emphasis on software, healthcare, and financial services sectors (Alaska Permanent Fund Corporation, 2019a). Regarding the threats to the SWFs, the threats to Norway's GPFG are mostly from macroeconomic trends, while the threats to Alaska's APF are especially from crude oil prices' volatility due to its high dependence on oil and gas revenue.

Table 8. Summary of the SWOT Analysis

	Strengths	Weakness
Norway	- Strong accumulation from stable composition – Low spending rate - Transparency - Capacity to deal with economic shocks	- Non-sustainable sources of the fund - Environmental injustice
Alaska	- More equitable distribution of income - Ability to lessen current poverty rate - Transparency	- Non-sustainable sources of the fund - Environmental injustice - High dependency on annual oil and gas revenue
	Opportunities	Threats
Norway	- Investment opportunities to recover sustainability	- Risks embedded in equity investments - Escalating pensions payments
Alaska	- In-state/local investments	- Low crude oil price and its volatility

6. Addressing Sustainability Challenges in Newfoundland and Labrador and Its Oil and Gas Industry

6.1 Introduction

The province of Newfoundland and Labrador is located on the east coast of Canada, and is composed of the island of Newfoundland and a mainland sector, Labrador. The population of the province of Newfoundland and Labrador was a total of 521,542 in 2019, but is steadily falling from the highest population in 1992, which was 580,109 inhabitants (Newfoundland & Labrador Statistics Agency, 2019). One of the major reasons for the declining population is the loss of youth to other provinces, as the unemployment rate in the province (13.8% in 2018) is much higher than the national unemployment rate of 5.8% in 2018 (Government of Canada, 2020). The unemployment rate has been higher than most provinces in Canada since the Cod moratorium in 1992, which resulting in about 34,000 job lost (Gien, 2000). The oil and gas industry is the backbone of the Newfoundland and Labrador economy, as it is the biggest sector amongst all industries in terms of industrial gross output. In 2016, the gross output of the oil and gas industry, including the oil and gas extraction sector, support activities for oil and gas extraction sector, and oil and gas engineering construction sector, was $11,557.8 million, which is about 21% of the total industrial gross output of all industries in NL, which was $54,644.8 million (Statistics Canada, 2020). Considering that the industrial gross output of the total manufacturing

industry was $5,185.3 million (Statistics Canada, 2020), the economy of Newfoundland and Labrador is highly dependent on the oil and gas industry. Because of this dependency, Newfoundland and Labrador is the most affected Canadian province when there is a negative trend in the oil and gas industry market with large welfare losses and is vulnerable to the "resource curse" (Carbone & McKenzie, 2016; Reid & Collins, 2012). In this chapter, how the province of Newfoundland and Labrador should use its oil revenues to contribute to its sustainable growth by using a SWF framework is discussed, based on the case studies of Norway and the US state of Alaska.

6.2 Oil and Gas Industry and Capitals in Newfoundland and Labrador

6.2.1 The Oil and Gas Industry and Financial Capital

As of 2020, there are four oil projects offshore Newfoundland and Labrador, which are the Hibernia project, operated by Hibernia Management and Development Company Ltd, the Terra Nova project, operated by Suncor Energy, the White Rose project, operated by Husky Energy, and the Hebron project, operated by ExxonMobil Canada which is a wholly owned subsidiary of Exxon Mobil Corporation in US The oil and gas companies operating the projects are charged a 15% corporate income tax, a rent-based tax and a royalty. The rent-based tax and royalty are determined based on an R factor which is calculated as: R= (cumulative gross sales revenue and incidental revenue, less cumulative transportation

costs, less cumulative basic and net royalty paid to prior month) ÷ (cumulative pre-development, capital & operating costs). The oil royalty regime is a bit more complicated because it has multiple tiers. The oil royalty is defined by the Generic Offshore Oil Royalty Regime of Newfoundland and Labrador, which was promulgated on November 1, 2017. It consists of a basic royalty and a net royalty as in the following formulas:

$$Basic\ royalty = (gross\ sales\ revenue - transportation\ costs) \times Basic\ royalty\ rate)$$

$$Net\ royalty = (gross\ sales\ revenue + incidental\ revenue - transportation\ costs - project\ capital\ \&\ operating\ costs)\ x\ Net\ royalty\ rate$$

Here, the basic royalty rate and the net royalty rate are determined based on the R factors. The royalty created by this regulation can be in a range from minimum 10% to maximum 50% depending on the recovery factor. Also, this royalty regime is supplemented by a specific royalty agreement for each offshore project that allows negotiations between project operators and the province regarding royalties, employment, and industrial benefits.

The industrial activities of the oil and gas industry in Newfoundland and Labrador have generated significant benefits to the GDP of Newfoundland and Labrador (Table 9). With the slumping oil prices since the late 2014, however, the industry's contribution to the GDP has significantly fallen compared to before 2015. The contribution of the oil and gas

industry to the provincial GDP in 2014 was $8.1 billion, down to $4.7 billion in 2015 (Government of Newfoundland and Labrador, 2016, 2017).

Table 9. The Oil and Gas Industry's Contribution to the GDP in Newfoundland and Labrador

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
GDP contribution	$9.6 billion	$11.7 billion	$6.4 billion	$8.0 billion	$10.3 billion	$9.0 billion	$9.6 billion	$8.1 billion	$4.7 billion	$4.3 billion	$4.7 billion
Share of total GDP	34.6%	39.6%	27.5%	30.4%	32.7%	28.2%	28.4%	25.7%	16.7%	15.1%	15.6%

Source. Data from (Government of Newfoundland and Labrador, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019)

The downturn of the oil and gas industry in Newfoundland and Labrador, starting in 2015, brought a financial crisis to the provincial government of Newfoundland and Labrador. The oil royalties in Newfoundland and Labrador are a significant revenue source for the provincial government (Auditor General of Newfoundland and Labrador, 2018). As the industrial activity in the oil and gas industry had declined, oil royalties paid to the government had also declined significantly, leading to a major reduction in government revenues (see table 10). Oil royalties paid to the provincial government in 2015 were only about 32% of the oil royalties paid to the provincial government in 2014 (Auditor General of Newfoundland and Labrador, 2015, 2016a). Due to decreased oil royalties, the Newfoundland and Labrador's fiscal deficit in 2019 was $15.4 billion (see Table 11). The

fiscal deficit mostly affects the seniors and low-income people, as the deficit means less home care, dental coverage and other services (Bailey, 2017).

Table 10. Oil and Gas Royalties and the Newfoundland and Labrador Government's Revenue

(Years ended 31 March)

	08-09	**09-10**	**10-11**	**11-12**	**12-13**	**13-14**	**14-15**	**15-16**	**16-17**	**17-18**	**18-19**
Oil Royalties	$2.2 billion	$2.1 billion	$2.4 billion	$2.8 billion	$1.8 billion	$2.1 billion	$1.6 billion	$515 million	$983 million	$943 million	$1.1 billion
Total Revenue of Govt	$8.6 billion	$7.3 billion	$8.1 billion	$8.7 billion	$7.5 billion	$7.5 billion	$6.9 billion	$6.0 billion	$7.2 billion	$7.2 billion	$7.8 billion
Oil / Total	25.9%	29.1%	29.5%	32.2%	24.4%	28.4%	22.6%	8.6%	13.7%	13.0%	13.8%

Source. Data from Auditor General of Newfoundland and Labrador (2011a, 2011b, 2013, 2014, 2015, 2016a, 2016b, 2017, 2018)

Table 11. Net Debt of the provincial government of Newfoundland and Labrador

(Years ended 31 March)

	08-09	**09-10**	**10-11**	**11-12**	**12-13**	**13-14**	**14-15**	**15-16**	**16-17**	**17-18**	**18-19**
Net Debt	$7.9 billion	$8.2 billion	$8.1 billion	$7.8 billion	$8.3 billion	$9.1 billion	$10.3 billion	$12.7 billion	$13.6 billion	$14.7 billion	$15.4 billion

Source. Data from (Auditor General of Newfoundland and Labrador, 2011, 2012, 2013, 2014, 2015, 2016b, 2016a, 2017, 2018, 2019)

The provincial government of Newfoundland and Labrador and the federal government agreed on a renewed Atlantic Accord in 2019 that will bring new revenue streams to the

province from their oil and gas resources. Based on this agreement, the province will receive revenue from the Hibernia Dividend Backed Annuity and a $3.3 billion guaranteed cash from the Federal Government by 2056 with $1.9 billion of cash installments by 2030, and will make eight annual payments of $100 million to the provincial government of NL since 2045 (see table 12) (Government of Newfoundland and Labrador, 2019a). A total of $2.5 billion will be provided to the provincial government of NL without restrictions on the use of funds until 2056 (Government of Newfoundland and Labrador, 2019a).

Table 12. Benefits and Payments of the Provincial Government of Newfoundland and Labrador under Atlantic Accord Amended in 2019

	Amount to			Amount to	
Year	Receive ($)	Pay ($)	Year	Receive ($)	Pay ($)
2019	134,860,000	-	2039	63,575,000	-
2020	109,888,000	-	2040	63,099,000	-
2021	111,704,000	-	2041	57,974,000	-
2022	100,960,000	-	2042	58,816,000	-
2023	156,850,000	-	2043	39,922,286	-
2024	196,860,000	-	2044	39,922,286	-
2025	232,872,000	-	2045	39,922,286	100,000,000
2026	218,414,000	-	2046	39,922,286	100,000,000
2027	188,701,000	-	2047	39,922,286	100,000,000
2028	182,812,000	-	2048	39,922,286	100,000,000
2029	154,739,000	-	2049	39,922,286	100,000,000
2030	127,745,000	-	2050	39,922,286	100,000,000
2031	118,592,000	-	2051	39,922,286	100,000,000
2032	107,776,000	-	2052	39,922,286	100,000,000
2033	93,471,000	-	2053	39,922,286	-
2034	95,806,000	-	2054	39,922,286	-

2035	88,909,000	-	2055	39,922,286	-
2036	78,244,000	-	2056	39,922,286	-
2037	77,404,000	-	Total	3,301,239,000	800,000,000
2038	72,276,000	-	Net benefit	2,504,239,000	

Sources. Government of Newfoundland and Labrador (2019b)

Thanks to the new revenue stream, the net debt of Newfoundland and Labrador was expected to decrease to $13.95 billion in 2020 (Auditor General of Newfoundland and Labrador, 2019, p. 12), however, the province still has the second-highest debt-to-GDP ratio after the Ontario government in 2019 (Muthukumaran, 2019). The hopes for debt reduction were dashed in March 2020 when the economic downturn due to the COVID-19 pandemic started, as the province of Newfoundland and Labrador's revenues have decreased and its expenses have increased (Cowan, 2020). The pandemic shut down the West White Rose construction project, and about 52% of the local businesses related to oil and gas supply and service have laid off a part or all of their staff (Mercer, 2020).

The Auditor General of Newfoundland and Labrador has warned consistently in the Newfoundland and Labrador House of Assembly about the volatility and the finite nature of the oil royalties which have been a significant revenue source for the Newfoundland and Labrador government. On the audit of the financial statement for the year ending 31 March 2010, the Auditor General noted that:

> "Much of the Province's fiscal performance relates to offshore oil royalties which are volatile by their nature and depend on fluctuations in three main factors: world oil prices, production, and foreign currency fluctuations - none of which can be directly impacted by the Government. Furthermore, oil is a non-renewable resource and offshore royalties will not always be available to fund Government programs". (Auditor General of Newfoundland and Labrador, 2011, p. 1).

Subsequent annual reports on the audit of the financial statement also reported volatility in oil royalties as a financial risk for the province and reiterated the need for medium/long-term planning to lower the government's dependence on oil royalties. (Auditor General of Newfoundland and Labrador, 2012, 2013, 2014, 2015, 2016a, 2016b, 2017, 2018). The government's dependency on oil royalties has posed different challenges to budget development by the government. For instance, the province's economic forecast in 2016 was based on an assumption of steadily increasing oil prices up to 2022-2023; however, the price of Brent crude oil in 2019, a benchmark for Newfoundland and Labrador's crude oil, averaged US $63.37/barrel in September 2019, down 16.5% from an average of US$71.19/barrel in 2018, and it is forecasted to be lower again due to the rise of global oil inventories (U.S. Energy Information Administration, 2019b). In addition, in 2018, there was an oil spill accident at Husky Energy's Sea Rose floating production storage and offloading vessel that caused the temporary shutdown of all offshore production facilities, which affected the oil royalty income (Auditor General of Newfoundland and Labrador, 2018). Also, the annual average price of Brent crude oil in 2020 is expected to be $34.14/barrel and $47.81/barrel in 2021 due to decreased economic activities from the

effect of the COVID-19 pandemic (U.S. Energy Information Administration, 2020b), which has already brought a deep crisis to NL (Mercer, 2020).

In addition to the risk from the volatility of oil royalties, some studies are pointing out that the tax system in Newfoundland and Labrador does not bring in enough share of revenues from oil and gas exploitation. Bazel and Mintz (2019) evaluated the level of the resource rent of the provincial governments in Canada and some of the states in the United States. In this study, resource rent is defined as "the excess of revenues over the opportunity costs of using labour, capital, and other inputs in production" (Bazel & Mintz, 2019). The authors measured the level of rent as the Marginal Effective Tax and Royalty Rate (METRR) on conventional oil and gas investments at the time of investment. The METRR is estimated by summing up the corporate income taxes, sales taxes on capital purchases, capital taxes, transfer taxes, stamp duties, profit-based resource levies, and royalties on the new oil and gas investment (Bazel & Mintz, 2019). And the METRR shows that the oil and gas companies operating in Newfoundland and Labrador will share below average resource rents with the government for their investment (see table 13). Crisan and Mintz (2017) stated that the oil and gas companies in Newfoundland and Labrador have a lower tax burden than other provinces in Canada because of the generous allowances for exploration and development under the rent-based royalty systems. This raise concerns about whether the residents in Newfoundland and Labrador are receiving enough benefit share.

Table 13. The METRRs on Conventional Oil and Gas Investments in Selected Jurisdictions as of 2018

	Canada (Average)	NL	BC	AB	SK	The US (Average)	Alaska
Oil	22.7%	7.4%	23.9%	23.0%	35.9%	28.6%	32.9%
Natural Gas	27.0%	7.4%	31.9%	25.3%	36.6%	28.5%	-

Notes. NL: Newfoundland and Labrador, BC: British Columbia, AB: Alberta, SK: Saskatchewan

Sources. Data from Bazel and Mintz (2019)

6.2.2 The Oil and Gas Industry and Produced Capital

Newfoundland and Labrador is the 3rd largest crude oil producer in Canada, after Alberta and Saskatchewan (Government of Canada, 2019). In 2017, the total oil production in Newfoundland and Labrador, which is all offshore, was 80,574,064 barrels. The annual oil production decreased until 2015 after it peaked in 2007 (see Figure 7), but has increased since 2016 mainly because of the high production at the Hibernia oil platform (Government of Canada, 2019). Oil production in 2018 was estimated to have increased to 84.0 million barrels due to the increased production at the Hebron platform (Government of Newfoundland and Labrador, 2019c). The Hibernia field's life is projected to finish by 2041 (Canada-Newfoundland and Labrador Offshore Petroleum Board, 2010, p. 34). The total natural gas production in Newfoundland and Labrador was 523 million cubic feet per day (MMcf/d) in 2017. However, all-natural gas produced in Newfoundland and Labrador

was consumed at the offshore facilities, was reinjected into the ground to maintain reservoir pressure, or was flared (Government of Canada, 2019).

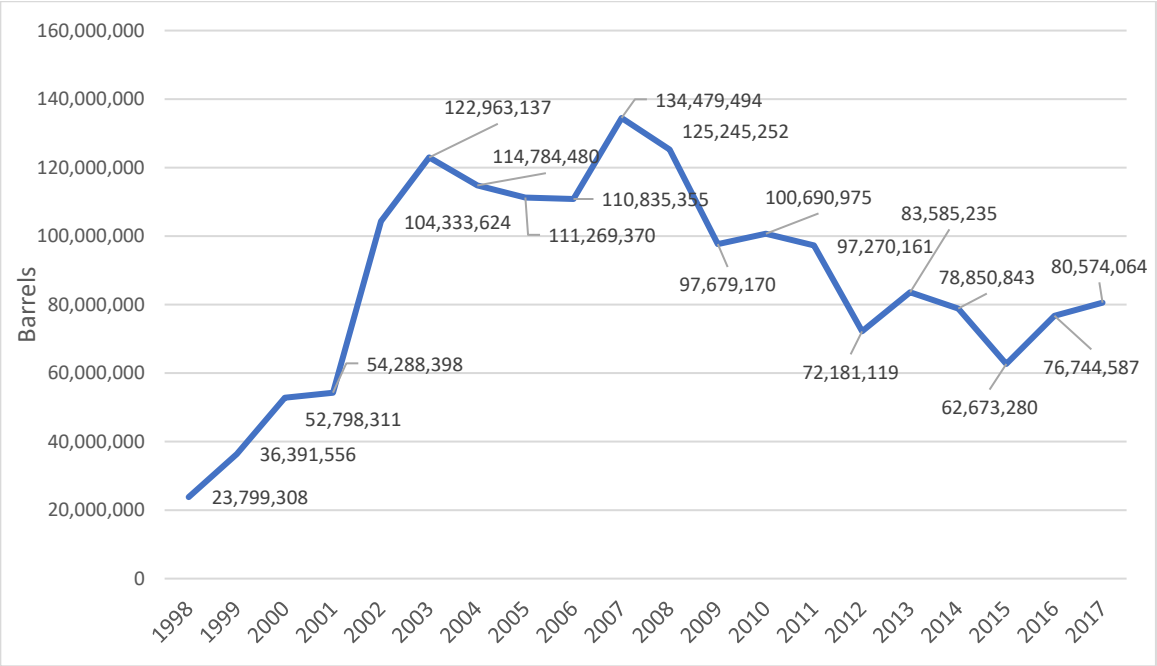

Figure 7. Crude Oil Production in Newfoundland and Labrador

Source. Data from Newfoundland & Labrador Statistics Agency (2018)

According to the Canadian Energy Research Institute's (CERI) forecasting, total crude oil production in Newfoundland and Labrador will increase until 2020, mainly because of the increasing production at the Hebron field, and then will decline again steadily (CERI, 2019). The Bay Du Nord development project, located 450 km offshore, east-northeast of St. John's, developed by Equinor and Husky, is expected to boost crude oil production again

in 2025, however, the production amount will decline steadily after 2026 unless other oil fields are on-stream (CERI, 2019).

In 2016, the Resource Management Department of the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) estimated the oil reserves of Newfoundland and Labrador to be at 1,644 Million barrels (MMbbls) at the Hibernia field, 506 MMbbls at the Terra Nova filed, 404 MMbbls at the White Rose field, 75 MMbbls at the North Amethyst field, and 707 MMbbls at the Hebron field, for a total of 3,336 MMbbls (C-NLOPB, 2016). However, the Oil and Gas Resource Assessment conducted by the Government of Newfoundland and Labrador, Nalcor Energy-Oil and Gas, and Beicip-Franlab identified 11.7 Billion barrels (BBbls) of oil and 60.2 trillion cubic feet of gas potential in offshore Newfoundland in 2018, and identified an additional 3 BBbls of oil and 5.8 trillion cubic feet of gas potential in offshore Newfoundland in 2019 (Nalcor Energy, 2018; World Oil, 2019). This resource assessment has provided the early stage information for the decision to open the future oil and gas development projects planned in "the Way Forward" plan.

6.2.3 The Oil and Gas Industry and Natural Capital

As in other jurisdictions, the ocean environment is one of the major concerns associated with the development of oil and gas resources in Newfoundland and Labrador. The oil and

gas operations impact on ecosystems by modifying biodiversity, biomass, and productivity (Cordes et al., 2016). The oil and gas reserves in Newfoundland and Labrador are located mostly on the Grand Banks, which is home to seabird colonies, marine mammals, and fish stocks valued at $1.4 billion in 2016 (Higgins, 2018; G. Mercer, 2019). Therefore, professionals in the environment and the public have expressed their fears that the offshore industrial activities of the oil and gas industry will deteriorate the health of the marine ecosystem (Higgins, 2018).

Newfoundland and Labrador already has experienced several environmental disasters caused by oil and gas activities. One of the biggest catastrophic accidents ever to affect the marine ecosystem in Newfoundland and Labrador was the oil spill from Husky's SeaRose floating production storage and offloading vessel at the White Rose field on November 16, 2018 (Mckenzie-Sutter, 2018). The accident caused a total of 250,000 litres of crude oil to be spilled into the ocean, and it was the largest oil spill accident that happened on the coast of Newfoundland and Labrador ("CBC News", 2018). The White Rose field encompasses the areas with high-density marine life off the edges of the Grand Banks and also fish spawning areas (Canadian Science Advisory Secretariat, 2013). Biologists estimated that about 100,000 seabirds were killed or poisoned and there will be a serious long-term effect due to low reproduction rates, although the damage is difficult to calculate accurately (Oiledwildlife.eu, 2018). After only about 8 months, there was another oil spill at the Hibernia oil platform off the coast of St. John's on July 17, 2019. It is estimated that about 12,000 litres of crude oil spilled into the ocean, and the oil production was temporarily shut

down ("The Canadian Press," 2019). The platform re-started its operation on August 16, 2019, and shortly after that, there was a second oil spill of about 2,184 litres on August 17, 2019 (McKenzie-Sutter, 2019). These oil spills deteriorate commercial fisheries not only because they damage the fish in their egg, larval, and juvenile stages but also because they hurt the value of fish products on the market (Higgins, 2018).

Besides oil spills, there are several other environmental concerns raised by the public, scientists, and fishers with regard to the oil and gas exploration and exploitation in Newfoundland and Labrador. The first issue is the effects of seismic testing from the oil and gas industry on the marine environment. The Fish, Food and Allied Workers Union (FFAW) asserted that the seismic testing would interfere with the snow crab fishery when the Canada-Newfoundland and Labrador Petroleum Board (C-NLOPB) approved the offshore seismic testing on the Grand Banks in 2017 (Dhillon, 2017a).

Also, in the public discussions on the future of Newfoundland and Labrador's Inshore Fishery, the fishers have questioned the effects of seismic testing on the marine environment (Fisheries and Oceans Canada, 2019). In fact, the possibility of harmful effects from seismic testing on the marine environment has been raised for some time (Fisheries and Oceans Canada, 2007). In the National Advisory Process meeting on the Seismic Impact Evaluation Framework in May 2004, Fisheries and Oceans Canada (2004) discussed the uncertainty of the effects of seismic sounds on the marine environment and

concluded that there was a need for studies to fill in knowledge gaps with regard to marine mammals' reaction to seismic sound. With regard to these concerns, there has been little agreement on the significant level of seismic sounds' effects on the marine environment. An Environmental Assessment (EA) of the Compagnie Générale de Géophysique Services Canada Inc.'s marine seismic program in the Newfoundland offshore area within the 2016-2025 timeframe has stated that "It is predicted that the seismic surveys will not cause any mortality to the valued marine species, thus there will be negligible cumulative mortality effect." (LGL Limited Environmental Research Associates, 2016, p. 178). On the other hand, Lindy Weilgart, adjunct Research Associate in the Department of Biology, Dalhousie University, asserted that seismic air guns used for oil and gas exploration have wiped out planktons, which is not only the primary producers of biomass in the oceans, but absorbers of the province's greenhouse gases as well ("CBC News," 2019). This assertion was also supported by Mccauley et al. (2017), which presented a significant potential impact on the ocean ecosystem function from seismic technology. This study found out that the air gun used for seismic surveys causes a two-to threefold increase in the mortality of adult and larval zooplankton.

Another environmental issue related to the oil and gas industry in Newfoundland and Labrador is greenhouse gas (GHG) emissions. Ever since the first full year of production of the oil and gas industry in 1998, the offshore Newfoundland and Labrador area has been the main source of GHG emissions in Newfoundland and Labrador. The industrial activities

of the oil and gas industry emitted the equivalent of 2,858 kilotonnes of carbon dioxide, accounting for 27.1% of the total provincial GHG emissions in 2017 (see table 14).

Table 14. Greenhouse Gas Emissions to Air in Newfoundland and Labrador 1998 - 2017 (unit: kilotonnes)

	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total	42,211	42,962	42,515	43,867	42,984	44,323	44,646	43,951	44,496	46,239
Oil and Gas	3,195	2,628	1,847	1,744	3,387	2,961	2,735	2,640	2,975	3,122
O&G/Total	31.2%	28.2%	20.8%	18.3%	29.6%	26.6%	25.9%	26.8%	31.2%	29.3%
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total	45,382	43,891	46,229	45,512	45,022	44,947	44,890	45,304	44,462	43,760
Oil and Gas	2,651	2,721	2,628	2,362	2,398	2,594	2,712	2,668	2,940	2,858
O&G/Total	26.6%	28.1%	27.0%	24.0%	25.5%	27.5%	26.0%	25.0%	27.1%	27.1%

Source. Data from Environment and Climate Change Canada (2019)

However, the climate policy commitments of Newfoundland and Labrador had been modest, despite the large contribution of the oil and gas industry to GHG emissions (Mertins-Kirkwood, 2017). The Muskrat Falls hydroelectric project has been a big part of the Newfoundland and Labrador's climate policy efforts, however, it has faced significant cost escalation and lengthy delays (Mertins-Kirkwood, 2017). The province announced a new carbon tax plan on October 23, 2018, which came into effect on January 1, 2019. Under the carbon tax system, oil and gas production facilities have had to reduce their carbon emissions to 6% below their 2016 to 2017 historical average emissions-to-output ratio for

2019, and gradually reduce an additional 2% every year until they reach a target of 12% below 2016 levels (Executive Council, 2018). If they fail to meet the targets, they are required to either pay the money into an emissions reduction fund or buy credits ("CBC News," 2018b). Climate Watch NL (2018), however, commented that the carbon tax favors the oil and gas industry, especially due to the several exemptions of the oil and gas industry's activities. Fuels used for offshore exploration activities and methane GHGs in the oil and gas industry will be exempted under the regulation (Executive Council, 2018). Furthermore, oil and gas companies will double their production under the "Way forward" plan, which can possibly add significant carbon emissions. Regarding this point, Tom Cooper, an associate professor at MUN's faculty of business administration said that "I am not sure the current carbon tax really reflects the true cost of pollution on the environment" ("CBC News," 2018b).

6.2.4 The Oil and Gas Industry and Human Capital

In 2017, direct employment resulting from the oil and gas companies was 5,359 persons, and the total employment, which includes indirect employment resulting from companies providing goods and services to the oil and gas companies, was 19,200 persons (see table 15). Considering the total employment in Newfoundland and Labrador, the total employment resulting from oil and gas activities accounted for 8.6% of the total employment in Newfoundland and Labrador. The employment peaked at 33,000 persons

in 2014 which accounted for 13.8% of the total employment in Newfoundland and Labrador. Based on these numbers, the oil and gas companies are important sources of employment in Newfoundland and Labrador. Considering that the share of GDP generated by the oil and gas industry in 2014 was 25.7% in 2014 and 15.6% in 2017, however, the employment resulting from the oil and gas companies seems to be improved.

Table 15. Employment Impact of the Oil and Gas Industry in Newfoundland and Labrador

(Unit: persons)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Direct employment of O&G	1,957	2,671	2,259	2,136	3,269	3,872	3,358	2,939	2,652	2,979
Direct and indirect employment of O&G	4,100	6,200	4,900	3,500	5,900	7,300	12,600	15,600	10,600	12,900
Total Employment in NL	201,900	198,800	174,300	206,500	210,700	213,200	212,300	214,400	217,000	221,100
Direct employment /Total in NL	0.97%	1.34%	1.30%	1.03%	1.55%	1.82%	1.58%	1.37%	1.22%	1.35%
Indirect employment /Total in NL	2.03%	3.12%	2.81%	1.69%	2.80%	3.42%	5.93%	7.28%	4.88%	5.83%
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	
Direct employment	3,229	3,191	3,858	5,179	7,810	10,158	8,922	7,093	5,359	
Direct and indirect employment	14,000	15,100	16,300	21,300	28,800	33,000	31,700	26,300	19,200	
Total Employment in NL	215,100	222,800	231,900	240,800	242,700	238,600	236,200	232,600	224,100	
Direct employment /Total in NL	1.50%	1.43%	1.66%	2.15%	3.22%	4.26%	3.78%	3.05%	2.39%	
Indirect employment /Total in NL	6.51%	6.78%	7.03%	8.85%	11.87 %	13.83 %	13.42 %	11.31 %	8.57%	

Sources. Data from Stantec Consulting Ltd (2009, 2012, 2014, 2019) and Government of Newfoundland and Labrador (2018a)

The oil and gas industry in Newfoundland and Labrador has also made contributions to the infrastructure for human capital development in Newfoundland and Labrador. For example, the Hibernia Management and Development Company Ltd. (HMDC) donated $4.4 million to the Hibernia Offshore Operations Simulator Facility at Memorial University's Marine Institute in 2014 and $16 million for a new helicopter training and R&D centre in 2015 (Osborne, 2014; Stantec Consulting Ltd, 2019). The Canada-Newfoundland and Labrador Offshore Petroleum Board spent approximately $43 million for research & development, education, and training in 2017 (C-NLOPB, 2018). The oil and gas industry also provides co-op opportunities for approximately 340 students at Memorial University of Newfoundland (MUN) every year (Stantec Consulting Ltd, 2019).

However, several concerns have been raised about the labor force concerning the oil and gas industry in Newfoundland and Labrador. The reports from Stantec Consulting pointed out several distribution issues of the oil income and benefits for employees. In their reports on the socio-economic benefits of the oil and gas industry in Newfoundland and Labrador, they stated that "much of the income earned in Newfoundland and Labrador's offshore oil and gas industry accrues to non-resident companies" (Stantec Consulting Ltd, 2012, 2019). Because of this, the impact on personal income growth generated by the oil and gas industry is less significant than that of the provincial GDP growth (Stantec Consulting Ltd, 2012, 2019). The Conference Board of Canada has assessed that human capital in Newfoundland and Labrador needs to be improved the most, compared to other provinces in Canada

because of the low labour productivity, unemployment rate, and aging of the population in the province for sustainability (the Conference Board of Canada, 2017). In another report, it is also claimed that Newfoundland and Labrador needs to increase education levels for development of the human capital for sustainable economic prosperity for future generations (Palladini, 2015). The report concluded by emphasizing the need to diversify the growth engine of Newfoundland and Labrador, as the oil and gas industry is not sustainable (Palladini, 2015). Palladini (2015) also proposed to create a SWF which will help the province to rely less on oil prices and more on the interest generated by the SWF, to attract new businesses, and to ensure that the future generations also benefit from the oil wealth. The Common Front Newfoundland and Labrador, the community coalition of Newfoundland and Labrador, also suggested investing in human capital to build a sustainable economy (Common Front NL, 2016). They found out that approximately 10,000 Newfoundlanders used to work in the Alberta oil patch but lived in rural areas of Newfoundland and Labrador and came back to Newfoundland and Labrador with the economic downturn (Common Front NL, 2016). Residents living in remote communities in Newfoundland and Labrador are more closely related to the oil and gas industry than residents in urban areas, and the employment opportunities from oil and gas industries are crucial to the young workers living in small rural regions where job opportunities are limited, therefore, their employment chances are more dependent on oil and gas industry (Canadian Rural Revitalization Foundation, 2015). In 2016, Common Front NL recommended that the province provide job training and education for the transition of the workforce from the oil and gas industry and establish policies to support a diversified economy (Common Front NL, 2016). Mertins-Kirkwood (2017) also asserted that

Newfoundland and Labrador needs to support the transition of oil workers in Newfoundland and Labrador since the province has one of the highest concentrations of fossil fuel workers. The study pointed out the lack of transition planning from the fossil fuel economy, while job growth in clean technologies, energy efficiency, and in other low carbon industries is a key opportunity (Mertins-Kirkwood, 2017).

6.2.5 The Oil and Gas Industry and Social Capital

The fishing communities in Newfoundland and Labrador have expressed their disappointment and the sense of deprivation from the sprawling oil field and industry. In the public discussions on the future of the province's inshore fishery with Fisheries and Oceans Canada (DFO) and fishers in November 2017, the fishers brought up the contradictory nature of oil development policies that allowed drilling for oil and gas development in the areas which prohibited fishing activities for the protection of corals and sponges (Fisheries and Oceans Canada, 2019). For example, in July 2017, The Fish, Food and Allied Workers Union (FFAW), the province's largest fishers' union, issued a press release asserting that seismic testing on the Grand Banks must stop until after the fishery is done because the seismic blasting interferes with the crab fishery (Dhillon, 2017b). This was only three months after the DFO slashed the crab quota by 22% in April 2017. In January 2019, the Federation of Independent Sea Harvesters of Newfoundland and Labrador (FISH-NL) also demanded that an end be put to seismic testing off Newfoundland

and Labrador's coasts and expressed their concerns on the relationship between plunging plankton productivity off Newfoundland and Labrador's coasts and seismic activity (The Telegram, 2019). In September 2019, Newfoundland and Labrador's fishers' union, Fish, Food and Allied Workers (FFAW), asserted that oil and gas companies shouldn't be allowed to explore in crab fishing areas and the oil and gas exploration on the fishing grounds needed to be stopped (Cowan, 2019).

The oil fields off the coast of Newfoundland and Labrador are owned by different groups of Canadian and international companies. Although it is hard to find data about how much of the benefits generated from the oil and gas resources of the Newfoundland and Labrador's province are transferred outside of Newfoundland and Labrador, it can be assumed that the benefits from natural resources in Newfoundland and Labrador can be leaked out of the province through the ownership structure of the oil fields in Newfoundland and Labrador. The Hibernia oil field is operated by Hibernia Management and Development Company Ltd, and the interest owners are ExxonMobil (33.125%), Chevron (26.875%), Suncor Energy (20%), Canada Hibernia Holding Corporation (8.5%), Murphy Oil (6.5%) and Equinor (5%) (Canadian Association of Petroleum Producers, 2017). The Terra Nova oil field is operated by Suncor Energy, and the interest owners are Suncor Energy (37.675%), ExxonMobil (19%), Equinor (15%), Husky Energy (13%), Murphy Oil (10.475%), Mosbacher Operating (3.85%), Chevron (1%) (Suncor Energy, 2020). The White Rose oil filed is operated by Husky Energy, and the interest owners are Husky Energy (72.5%) and Suncor (27.5%) (Canadian Association of Petroleum Producers,

2017). The Hebron oil field is operated by ExxonMobil, and the interest owners are ExxonMobil (35.5%), Chevron (29.6%), Suncor Energy (21%), Equinor (9%), Nalcor Energy (4.9%) (Canadian Association of Petroleum Producers, 2017). Among these companies, the companies based in Newfoundland and Labrador are Hibernia Management and Development Company and Nalcor Energy in St. Johns while the other companies have their headquarters outside of Canada, in countries such as the US (ExxonMobil, Chevron, Murphy Oil), Norway (Equinor), or in other provinces such as Alberta in Canada (Husky Energy, Mosbacher Operating, Suncor Energy). Therefore, the reform of the ownership and royalty structure in the NL oil and gas industry is stringently needed. Considering that Norway established a state-controlled joint-stock company "Statoil" to have control over their oil and gas revenue, a similar reform will allow more wealth to be owned by the Newfoundland and Labrador residents who are the owners of the property rights to resources in their subsoil and subsea areas.

To sum up, the current arrangements for the oil and gas industrial processes in NL take away the fraction of benefits that should have been enjoyed by the NL people and other local industry players. One cause of this is that the activities of other industries (e.g. fisheries) can be hindered and crowded out by the activities of oil and gas industry, and the oil and gas companies take more benefits from natural resources than other industries that also have the property rights to the natural resources of the ocean. The second reason is that too many foreign oil and gas companies are involved in the development of resources in Newfoundland and Labrador and they are benefiting unjustly from the resources of

Newfoundland and Labrador to the detriment of the provincial residents. Norway and Alaska have created and used the SWF mechanisms to collect more royalties and taxes from oil and gas companies, and have invested the funds to benefit the domestic economy. These are good examples for reforming the Newfoundland and Labrador's oil and gas industry operation.

6.3. Discussion on the Potential of a SWF for Newfoundland and Labrador

6.3.1. Lessons from the Norwegian and Alaskan Experiences

This section discusses how a SWF should be created and used to ensure the sustainable development of Newfoundland and Labrador's province. The discussion is based on the foundation of the results of the analysis in Chapter 4 and Chapter 5. The capital approach to sustainability assumes that financial capital is a liquid asset with the potential to be invested in the process of capital conversion (Goodwin, 2003; Maack & Davidsdottir, 2015). From this point of view, the main function of an oil fund should be to boost the sustainability of Newfoundland and Labrador through investment in produced capital, natural capital, human capital, and social capital. As the main source of the fund's earnings is the oil revenue, the "resource curse" theory and the environmental justice theory are worthy of consideration here, since they provide the theoretical frameworks explaining why economic growth driven by the non-renewable resource revenue is not sustainable.

1) The "Resource Curse" and the SWFs

The lessons from the debates on the "resource curse" phenomenon explain why the resource-abundant countries fall into the trap of the "resource curse" and how to avoid it. Firstly, generating natural resource wealth can have a weak linkage with the production activities of the other domestic industries when they operate by joint enterprises with non-domestic companies (Heinrich, 2011; Humphreys et al., 2007). Norway has been skeptical toward foreign capital and tried to bring the benefits from resource development to its society. Alaska had gone through several experiences of exploitation from non-domestic interests for Alaska's fur, fisheries, and mineral resources and hence they have been aware of their property rights for the resources. The Norwegian SWF and the Alaskan SWF have delivered more benefits to society than a hypothetical scenario without the SWFs. The income has been saved or reinvested for the current and future generations. The cases of Norway and Alaska show that a well-managed SWF prioritizing the interests of the local residents over the interests of foreign companies can be a good instrument to avoid the "resource curse", to prevent the leakage of domestic wealth and to promote the sustainability of the entire society.

The volatility of resource revenue from fossil fuels is another potential reason for the "resource curse". Saving the resource revenues can be an effective way to avoid the "resource curse", as it provides "bureaucracy time to plan and invest effectively in infrastructures as well as financial resources" (Bauer, 2013, p. 9). While both aim to avoid the "resource curse" and to maintain the long-term sustainability of the domestic society, the Norwegian Government Pension Fund Global (GPFG) and the Alaska Permanent Fund

(APF) have different strategies in terms of the savings amount for future generations. The GPFG has focused more to establish solid savings for Norway's future generations, while the APF has contributed more to provide income to the current generations in Alaska. As a result, Norway has a solid fund size which is large enough to offset the impact of volatility in the global oil market. Alaska's APF is more dependent on the annual oil income, compared to the GPFG, but that can be offset by adjusting the amount of the dividend. For example, the Permanent Fund Dividend (PFD) in 2016 was about 50% of the PFD in 2015 due to the plunged oil income. Thus, Norway's SWF framework is financially more sustainable than Alaska's SWF framework. On the other hand, Alaska's SWF framework has the advantage of contributing to the economic revitalization of the current generation, because it increases the disposable income of the current generation. For example, the APF contributes to lessening poverty in Alaska, especially for rural, Native, and senior Alaskans (Berman & Reamey, 2016). Also, as Kurland (2017) and Feinberg and Kuehn (2019) claimed, the amount of the dividend (PFD) has had positive impacts on small business entry in Alaska. Therefore, it seems that Alaska's SWF has the capability to increase the human capital and the produced capital for Alaska's future sustainability.

Another potential cause of the "resource curse" is the discrepancy between the property rights to the natural resources, which belong to the public, and the right to sell the mined resources, which is generally acquired by the oil and gas companies (Wenar, 2008). This discrepancy brings inefficiency in building the wealth of the society because the oil and gas companies which were given access to the resources in exchange for royalties and taxes

collected by the government do not invest enough locally to increase the wealth of the people who should be the main beneficiaries of the resource wealth (Wenar, 2008). Therefore, the government should take the share that arguably belongs to the public from the companies and return it to the public. The GPFG and the APF government are one of the ways the government of Norway and Alaska return the benefits to the public. Lack of public participation in decision-making processes concerning oil and gas resources also restricts the chance to promote the domestic economy (Humphreys et al., 2007). The GPFG and the APF reallocate the resource revenue collected from those with the right to sell the resources to those with the property rights to own the natural resources. Also, Norway and Alaska have made publicly available information related to the earnings and use of their SWFs to the public, to ensure transparency of the fund's management. Thus, the people living in Norway or Alaska are guaranteed more rights as people with the property rights to the resources in comparison to a hypothetical scenario where the SWFs did not exist.

Based on these differences, what needs to be decided first is how to take more control over the oil and gas resources in Newfoundland and Labrador from foreign companies. From the case of Norway, a government owned or managed company that has control over the oil and gas resource in the country could help. Also, how to distribute the wealth between current and future generations if NL were to create a new oil fund needs to be determined. In other words, how much should oil companies be taxed or pay in royalties, how much of this government revenue should be saved in order to build the fund, and how much fund income should be used and invested for the current generations and how much should be

left for future generations? The criteria for answering these questions is the long-term sustainability of society. In order to create a long-term sustainable society, it is important to sustain all capitals that are the sources of the wealth, and they can be sustained by using the income (interest) from a sustainable oil fund. This is because, according to the theory of "weak" sustainability, the fund will eventually provide the financial capital to be converted to other forms of capital.

2) Environmental Justice and the SWFs

Non-renewable resources exploitation come with environmental degradation. Every stage of the exploration and exploitation of oil and gas resources can deteriorate the environment, especially by causing climate change and polluting the marine environments. In the case studies, the issues of the environmental damages caused by oil and gas development are related to the issues of environmental justice in several ways. In keeping with Kuehn's (2000) categorization of environmental justice issues, the environmental justice issues related to oil and gas operations can be categorized as follows: distributive justice, procedural justice, corrective justice, and social justice. Norway, Alaska, and Newfoundland and Labrador have all suffered from environmental degradation resulted from the oil and gas exploration and exploitation. Examples of environmental degradation are changes in and decline of fishery resources caused by oil spill accidents, exploration and production activities of oil and gas companies in the ocean, and climate change caused by greenhouse gas emissions from oil production activities and fossil fuel combustion. Also, as an oil exporting province, Newfoundland and Labrador has raised other (oil importing)

countries' SCC (social cost of carbon), like the cases of Alaska and Norway show. These environmental damages negatively affect the wealth of the society; however, oil and gas companies do not pay the proper cost of exploitation when there are no well-designed policy instruments to make them pay the whole cost. Therefore, the burden of damages from resource exploration and exploitation is borne by everyone else, including the public locally and outside of Canada, while the benefits are mostly taken by oil and gas companies. This discrepancy between the burdens and the benefits can be related to the case of environmental distributive injustice caused by oil and gas developments. Meanwhile, the fishers in Newfoundland and Labrador not only have suffered from the deteriorating marine environment of their fishing grounds but also have been disappointed about the government's decisions to expand oil fields in areas where their fishing activities have been limited due to environmental concerns (Fisheries and Oceans Canada, 2019) This issue seems to show that the fishers in Newfoundland and Labrador had experienced environmental procedural injustices related to the oil and gas exploitations.

These environmental injustices explain why the oil and gas companies should pay more for access to the resources and invest more of their revenues for the sake of public welfare. The redistribution of the oil and gas revenue through SWFs can alleviate the distributive injustice arising from the oil and gas developments with policy and laws that allocate a larger share of the benefits of natural resources to the people (Olawuyi & Onifade, 2018). In the same way that Norway did, Newfoundland and Labrador also can consider investing the rents earned from the oil and gas industry in new sustainable energy infrastructure

which can compensate for the environmental degradation from oil and gas exploration and exploitation, as a way to recover environmental justice. For example, Newfoundland and Labrador can reduce the carbon emissions footprint in the province by investing in a clean energy system based on wind (Mercer et al., 2017) for remote communities that are currently utilizing diesel power systems. These are the areas that need more studies in the future, yet, ultimately, Newfoundland and Labrador needs to diversify its industries to make their economy less oil-dependent and less carbon-intensive to compensate for environmental degradation.

6.3.2. How Big Should the Fund Be to Follow the Norwegian/Alaskan SWF Models?

This section roughly estimates the size of the oil fund needed to be adopted as a sustainable SWF framework for Newfoundland and Labrador. The estimation starts from the following two assumptions: first, the oil and gas industry will continue in Newfoundland and Labrador once the current downturn, due to the COVID-19 outbreak and to the oil price slump, is over; second, there is political will at the level of the federal and provincial governments for reforming the oil and gas industry in the province, to set it on a sustainable path. The Norwegian SWF model will bring sustainable annual returns even after the depletion of the oil resources in the future, while the Alaskan SWF model currently brings higher oil revenue shares to the public. In order to estimate the oil royalties rate required to

follow the Norwegian or Alaskan SWF model, the current oil royalty rate of a Newfoundland and Labrador oil fund needs to be identified; however, it is difficult to estimate the current tax rates on oil and gas production in Newfoundland and Labrador. The first reason is that the current royalty regime for oil and gas resources in Newfoundland and Labrador is being applied differently across the project fields. The second reason is that the consolidated results of the operations of the government reporting entity which include the data on the amount of oil revenue are reported for the period from the first day of March to the last date of February every year, while the industrial production data of the oil and gas industry is reported for the period from the first day of January to the last day of December every year. Thus, it is impossible to calculate the annual oil royalties levied on the oil and gas exploitation in Newfoundland and Labrador.

Alternatively, this section estimates the size of the fund required to keep it sustainable even after the oil and gas revenue will have dropped significantly, while also allowing the government to spend enough for the current generation. It is assumed that the annual rate of return of the new fund for Newfoundland and Labrador is equal to the investment of the province of Newfoundland and Labrador in the Pooled Pension Fund (NLPPF)'s annual rate of return as a close reference. The annual rate of return of the NLPPF in recent years, however, has been fluctuating due to global market volatility (Office of the Auditor General, 2018). For example, the annual rate of return of the NLPPF in 2018 was -1.4% while it was 12.9% in 2017. For this reason, it is assumed that Newfoundland and Labrador can yield a 7.1% annual rate of return, which is the average rate of return over the past 20 years of the

NLPPF (Office of the Auditor General, 2018, p. 7). The annual fund spending required for the provincial government is assumed based on the previous oil royalties that have been paid. As this amount is based on the previous annual spending, without considering the potential use of the fund for future sustainability, the resulting amount of the fund is the minimum requirement, not the recommended amount. Compared to the early 2010s, the oil royalties have declined significantly, and government debt has increased accordingly (Table 14). The annual fund spending required for the provincial government should be at least large enough to not increase the provincial debt. Thus, it is assumed that the annual fund spending is equal to the oil revenue for the government in 2012 as it is the most recent year NL's debt has not increased. The oil revenue in 2012 was $2,795 million (Auditor General of Newfoundland and Labrador, 2013, p. 20). This is equal to $3,027 million when the amount is converted with the GDP deflator to the real price in 2018.

Taking into account the aforementioned factors, the total amount of the fund recommended is $42,633 million, if the Newfoundland and Labrador government can yield a 7.1% rate of return annually using the new oil fund and will plan to spend less than the annual returns. Considering the projected field life of the Hibernia field, which produces the largest amount of oil and gas revenue in Newfoundland and Labrador, the fund should reach this amount by 2041. If Newfoundland and Labrador introduces an oil fund based on the Norwegian SWF model from next year, the provincial government needs to deposit an average of $2,132 million (in 2018 prices) yearly for the next 20 years, in addition to the annual government revenue. According to this calculation, the province of Newfoundland and

Labrador can establish a sustainable amount of the fund by separately collecting the same amount of royalty as before the oil price crash in 2015.

There are more variables and uncertainties on the result, however. First of all, a percentage of 7.1% spending of the fund is relatively generous, compared to the spending limits of the Norwegian SWF. If Newfoundland and Labrador decided to have a strict 4% spending rule, like Norway, in order to make the fund more sustainable, the total amount of saving has to be $ 75,673 million and the annual deposit has to be an average of $ 3,784 million yearly for the next 20 years. The province of Newfoundland and Labrador has estimated that Newfoundland and Labrador's offshore area has 2.2 BBbls of discovered oil reserves left to exploit and another 37.5 BBbls of undiscovered oil (Oil and Gas Industry Development Council, 2018). If the oil and gas can be produced for longer, as new oil wells are under development, the annual burden could be much lessened. How much more oil and gas will be produced depends on a number of variables besides the reserve amount of oil and gas. The actual production volume of oil and gas depends on the commercial reserve, which means economically meaningful reserve, not discovered reserves. The volume of commercial reserves is affected by oil and gas price, but also by the development of production technology. In addition, the discovered reserve can vary with the scope of exploration and technological advances. Therefore, more research is needed to determine how much more oil and gas resources in NL can sustain oil and gas production and receive royalties.

6.3.3. What Are the Challenges and Considerations?

Despite having enjoyed the abundance of oil resources in recent years, Newfoundland and Labrador is among the most financially-challenged provinces in Canada, with a highly oil-dependent economy, a high GDP-debt ratio, a high unemployment rate, and a rapidly aging population. Learning from the cases of Norway and Alaska, building a SWF can help provide the resources to solve these problems, if the oil income and expenditure are managed properly. However, the first challenge for the province is to redesign their oil and gas royalty system, to reflect the stringent criteria of the Norwegian and Alaskan SWFs. Another challenge is the high costs of the oil and gas development projects. According to the Wood Mackenzie's (2018) study, which compared oil development costs in Brazil, the United States, Mexico, Norway, Australia, the United Kingdom, Iceland, Nova Scotia, and Newfoundland and Labrador, Newfoundland and Labrador is amongst the most expensive areas for the future oil and gas activities. When considering the summation of capital expenditures and operating expenditures, the cost of oil and gas development in shallow water is cheaper (18.6 United States Dollar [USD] / Barrel of oil equivalent [BOE]) than the average of other regions (22.4 USD /BOE); however, the cost increases to about USD 24/BOE when the Hibernia project is removed from the estimation. Also, the average cost of oil and gas developments in deep water, where the recent exploration activities have taken place, is about USD14/BOE higher than the average of the other regions (Wood Mackenzie, 2018, p. 30). Thus, the impact on the economic viability of projects in the oil industry will be greater than in other regions, due to the higher breakeven prices of the oil

and gas from Newfoundland and Labrador, if oil royalty rates in Newfoundland and Labrador are increased to help create the new SWF.

Another challenge for Newfoundland and Labrador is formulating a consensus on the need for a SWF. The Norwegian government could have control over the oil and gas industry based on the public belief in a strong state power and the idea that the resources in Norway belong to the nation. Based on these backgrounds, the government has begun to collect a sizable amount of royalties in the early history of oil and gas development. Alaska also has a public consensus on the need to protect domestic resources from foreign investors, especially among Native residents. Consequently, the Alaska government started a discussion to create the fund when they discovered the first oil field on their ocean shelf and then spent 4 years to have the fund established. Newfoundland and Labrador also will need governmental and public consensus on the need for a SWF. The consensus includes answering difficult questions such as whether the SWF is needed or not in NL, what will be the wealth distribution formula between the future generations and the current generation, and where to invest the fund earnings.

6.3.4. Feasibility of Introducing the SWF Framework under the Recently Low Oil Price Trend

Due to the price war between Saudi Arabia and Russia, which are the biggest players in the global oil market, and the decreasing oil demand from the COVID-19 pandemic, the monthly oil prices in the second quarter of 2020 were at a record low in 18 years. The U.S. Energy Information Administration (EIA) has forecasted that the annual average price of Brent crude oil will be United States Dollar (USD) 34.14/barrel in 2020 and USD 47.81/barrel in 2021 (U.S. Energy Information Administration, 2020b). This low oil price trend and the COVID-19 pandemic is bringing a deep crisis in the province of Newfoundland and Labrador's oil and gas industry. As a consequence, drillings to discover new oil wells have been stopped and up to 200 workers could be laid off on the Hibernia field (T. Roberts, 2020). Meanwhile, the province of Newfoundland and Labrador works to keep on track with the "Way Forward" plan (Abraham, 2020). Planning for introduction of a SWF, designed with the features of the successful SWFs of Norway and Alaska in mind, should be the first priority of the government, as the economy rebounds from the current crises.

Studies have shown that during crises, a SWF can help to maintain the stability of the domestic economy as well as guarantee a sustainable source of future income, hence, it brings positively impacts on economic growth (Al-sasi et al., 2017; Reiche, 2010; Sun et al., 2014; Tehranchian & Seyyedkolaee, 2017). The case of Norway also shows that creating a SWF helps to overcome macroeconomic crises, such as oil price shocks, as is gives capacity to absorb the shocks and balance the government budget, and it can provide additional funds for provincial budgets in an emergency. The current oil price trend will be

a burden on introducing a SWF framework in NL, considering the low oil price trend in the short-term, although the long-term impact is unknown. As aforementioned, the forecasted annual average price of Brent crude oil is USD 34.14/barrel in 2020 and USD 47.81/barrel in 2021 (U.S. Energy Information Administration, 2020b). These prices are at a similar level to the 2015 and 2016 levels, when the oil price was USD 52.32 and USD 43.74 respectively (U.S. Energy Information Administration, 2020c).

Another possible option is diversification of income sources for the fund. In the case of Alaska, the mining industry as well as the oil and gas industry are both subject to royalties for the SWF. The US state of Alaska received about 26% of the total tax revenue from the oil and gas and 4.5% of the total tax revenue received from mining industry in 2016 (McDowell Group, 2017). Newfoundland and Labrador also has a mining industry which is another basic industry in the province. Newfoundland and Labrador has been ranked among the top three mining jurisdictions in Canada, and the mining industry accounted for 6.3% of the provincial GDP in 2017 (Government of Newfoundland and Labrador, 2019c). The mining industry, like the oil and gas industry, is an industry exploiting non-renewable resources, accordingly the impact on the sustainability of Newfoundland and Labrador from the industry is likely significant too, although not included in the scope of this study.

6.4 Conclusion

This chapter has investigated how the province of NL can ensure its sustainable growth using their oil and gas resources, based on the case studies of Norway and Alaska. In recent decades, Newfoundland and Labrador's economy has been dependent on the rise and fall of the oil and gas industry. The province of Newfoundland and Labrador is currently owing the largest debt ever and has a high unemployment rate of 13.8% (as of 2018) since the low oil prices started in the mid-2010s. The oil and gas industry is also a major contributor to GHG emissions in Newfoundland and Labrador; however, the industry is levied a smaller carbon tax burden than they should be responsible for. In addition, companies operating the oil fields off the coasts of Newfoundland and Labrador are global companies with headquarters outside Newfoundland and Labrador. So, they need to take proper responsibility for consuming Newfoundland and Labrador's natural resources.

If Newfoundland and Labrador can create a SWF, it can provide a capacity to avoid the "resource curse" phenomenon and to solve the problem of environmental injustice which will bring sustainable development in Newfoundland and Labrador. On the other hand, in the short-term, the royalty rate rise to provide funds for establishing a SWF can be a huge burden for oil and gas companies, especially given the high cost of production in the offshore of Newfoundland and Labrador and the recent low oil price trend. However, in the long run, a SWF helps economic growth in Newfoundland and Labrador, so the government needs to look for more funding options (such as from the mining industry). In addition, as more oil wells are being developed under the "Way Forward" plan, the fund will be able to find funding options from a longer-term perspective.

7. Conclusion

7.1 Summary and Conclusion

The future that Newfoundland and Labrador should prepare for is not bright when considering the structural changes in the economy caused by the COVID-19 pandemic and the era of low oil prices. Newfoundland and Labrador's economy is already in a bad position compared to other Canadian provinces due to its loss of young population and record-high debt amount. The "Way Forward" plan that has been eagerly pursued by the provincial government should bring quantitative growth in terms of a traditional economic index, such as GDP, but growth will not be sustainable, as the socio-economic state of the province is showing. To sustain the development based on the oil and gas industry, this study suggests that it is necessary to accumulate financial capital using oil and gas revenue and invest it to build other capitals and minimize the negative impact of the development, especially due to the "resource curse" and "environmental injustice" phenomena. There are two successful cases that convert oil wealth into more sustainable streams utilizing a financial vehicle called SWF and boost their sustainability, which are Norway and Alaska. This study examines whether Newfoundland and Labrador can also adopt a SWF like Norway and Alaska and grow more sustainable. At the introduction, the following research questions were introduced for this study.

1) An examination of how the Norwegian SWF contributes to the sustainability of Norway: What impacts did the Norwegian SWF have on the sustainability of Norway?

Norway has secured ownership for government of for the oil and gas development on the Norwegian shelf and created a Norwegian SWF, the GPFG, at the early stage of oil and gas development, based on the social values of equality and integrity. The GPFG is the largest SWF in the world 10,088 billion NOK (1,148 billion USD) in 2019 with its strong accumulation, responsible and diversified investment portfolio (Norges Bank Investment Management, 2019a), and restricted spending limit. Thanks to the size of the fund, Norway has the capacity to maintain their wealth under global economic volatility. Norway has ethical guidelines for responsible investment which is designed to ensure the benefits for the entire society. The guidelines contribute to reducing the negative impact of oil and gas development on the natural capital and social capital of Norway, although it still brings environmental injustice issues from fossil fuel utilization.

The Norwegian case gives some good implications for a SWF operation using non-renewable resource revenue. From the case of Norway, the lessons that Newfoundland and Labrador should take are the importance of saving part of the oil and gas revenue and the imperative of investing with a long-term social perspective in mind. Norway has established the fund with high savings and conservative spending limits. However, in addition to the successful size of the SWF, Norway's GPFG is also characterized by its long-term perspective and environmentally responsible operation. Newfoundland and Labrador must increase its oil royalties and tax rates in order to support a SWF, but

considering the high oil production costs in the province, it is hard to imagine that Newfoundland and Labrador will be able to tax as high as 78% of the revenue of the oil and gas companies like Norway does. However, creating government savings for the future is beneficial for long-term sustainability and Newfoundland and Labrador need to make efforts to accomplish this. Also, the Norwegian SWF are also considered to be good examples of operating SWFs using non-renewable resources, in that Norway cares not only for economically sustainable returns but also for environmental and social sustainability through responsible investment. The fact that there is responsible investment, particularly in non-oil and gas sectors, has reduced the shocks caused by the oil price crash in recent years shows that responsible investment can bring benefits not only from an ethical point of view, but also from an economic one. Therefore, the case of Norway is considered to be a case that enhanced sustainability including from the perspectives of avoiding the "resource curse" and environmental injustice. In addition, Norway is a good example of preventing the leakage of benefits from natural resource development by foreign capital and enhancing the government's control over domestic oil and gas resources.

2) An examination of how the Alaskan SWF contributes to the sustainability of Alaska: What impacts did the Alaskan SWF have on the sustainability of Alaska?

Alaska created their SWF, the APF, at the early stage of their oil and gas development to secure the public's right to natural capitals in Alaska, especially because its developments take place in the area where most Native people live. The APF is the largest SWF among SWFs in any territorial entity, worth about 66 billion USD in 2019. The APF provides

annual dividends to Alaskan residents who are qualified to receive the dividend. These residents are entitled to the same dividend called a PFD. The dividend contributes to lower poverty in Alaska and boosts small businesses. Compared to Norway's GPFG, Alaska's APF has a relatively low long-term stability but it is effective in building infrastructure which can be the basis for the development of future generations.

Alaska's experience with the SWF is a good SWF benchmark. The case of Alaska shows that sharing benefits from oil and gas resources with the public is important to ensure sustainability of society. Given the current high unemployment rate in Newfoundland and Labrador and the problem of the young people leaving the province, Alaska's case teaches NL how to use benefits from oil and gas resources. Whether Newfoundland and Labrador should share benefits in the form of direct dividends, like Alaska, is beyond the scope of this study, but Alaska's case suggests that benefit sharing with the public can be helpful to overcome the current bad economic situation and increase economic sustainability. This has allocated the benefits of consuming oil and gas resources in Alaska to those who have the property right of the resource, as well as lowered the poverty rate and activating the business. The discrepancy between who owns the property rights to the natural resources and who benefits from the resource wealth is one of the potential causes of the "resource curse" (Wenar, 2008). Therefore, Alaska's SWF can be referred to as an example of avoiding the "curse" of owning resources by returning fair benefits to the people with lawful property rights to the resources.

3) An examination of the impact of the oil and gas industry on the sustainability of Newfoundland and Labrador: How does the oil and gas industry affect Newfoundland and Labrador's sustainability and what improvements should be made?

Although Newfoundland and Labrador's economic development has been dependent on the oil and gas industry in the recent decades, it has been pointed out that the province of Newfoundland and Labrador is not receiving a sufficient share from exploitation of its oil and gas resources in its own territory (Bazel & Mintz, 2019; Crisan & Mintz, 2017). Considering that the many companies operating offshore Newfoundland and Labrador are international companies that have their headquarters outside of Newfoundland and Labrador, this raises more property rights issues with the low resource rent. Their industrial activities are also exempted from carbon taxes, leaving them unaccountable for the environmental and social harm they produce for the local residents. In particular, the debt of the provincial government of Newfoundland and Labrador, which is currently at its highest level, shows that Newfoundland's economy is not only unsustainable but also in a dangerous situation. Thus, in its current state, the provincial government of Newfoundland and Labrador should make some policy decisions concerning the extraction and use of their oil and gas resources to move Newfoundland and Labrador onto a sustainable path.

4) A review of the feasibility of the introduction of a SWF in Newfoundland and Labrador and identifying its challenges based on the case study results of Norway and Alaska: Will Newfoundland and Labrador be able to ensure sustainability like Norway and Alaska with their oil and gas revenue?

Should the province of Newfoundland and Labrador want to create a SWF, the government needs to deposit an average of $2,132 million (in 2018 prices) yearly for the next 20 years, which would require a royalty rate as high as that received from oil and gas extraction before the oil price crash in 2014. Considering the relatively high production cost of oil and gas in Newfoundland and Labrador, introducing the SWF may hinder new investments as scheduled under the "Way Forward" plan. The recent oil price volatility, however, also shows that Newfoundland and Labrador needs a financial vehicle that can absorb the economic shocks of oil price volatility.

There are possible ways to secure enough funds for a sustainable SWF. Firstly, if the oil production doubles under the "Way Forward" plan, oil and gas companies will make more revenue. Second, royalties on natural gas production will be an alternative source of funding for the SWF as the province is preparing for the commercial production of natural gas. Third, the annual benefits from the federal government that will be given under the Atlantic Accord amended in 2019 could be another source for the Fund. And lastly, the NL mining industry that also consumes non-renewable resources may need to share the burden in the Alaska case, because the industry is also impacted by considerable sustainability concerns. However, the current provincial government has a considerable debt, so more research is needed on how much of this additional revenue should be used to establish the Fund and how much should be used to pay off the debt of the provincial government.

The findings of this study show that Newfoundland and Labrador residents have not received enough benefits from their own oil and gas resources, and a new royalty rate is needed to correct this situation and ensure the sustainability of development for Newfoundland and Labrador. Overall, Newfoundland and Labrador needs to introduce a SWF, but it needs to address some additional policy challenges. The first one is an effort to secure additional financial resources in addition to the oil revenue to support the proposed Fund. The second one is the need to reach social consensus on the introduction of the SWF. The third one is to work on a sustainable design and regulation of the Fund to compensate for the environmental degradation caused by the exploitation of non-renewable resources.

Given the current low oil price and the relatively high production cost of oil and gas operations on the offshore Newfoundland and Labrador, it is a challenging time to introduce a SWF. However, the introduction of a SWF is recommended for the sustainability of Newfoundland and Labrador. Increasing the royalties may reduce the oil and gas industry's industrial activities or hinder new investments in oil and gas resources in the offshore Newfoundland and Labrador in the short-term. However, the lessons from the recent crises arising from the COVID-19 pandemic are that the era of small government is over and governments must have the capacity to actively respond to crises. A SWF is a way to achieve such capacity by using oil and gas revenue and acquire long-term sustainability for a society rich in natural resources.

The idea of the need for a SWF in Newfoundland and Labrador is not totally new. Palladini's study (2015), which identified areas where NL should improve to foster a competitive business environment and sustainable prosperity, also proposed to create a SWF to rely less on oil, and recommended a few lessons worth sharing within this study. Firstly, NL needs fiscal policies to "reduce reliance on annual oil revenue, such as SWF" (Palladini, 2015, p.8). Second, NL needs to "increase investment in public infrastructure and provide skills training" (Palladini, 2015, p.108). Last but not least, the government is responsible for "ensuring that future generations benefit from oil and gas resources in NL" (Palladini, 2015, p.108). These lessons confirm the validity of this study, and give guidelines on where NL should invest for sustainability. A report from the Atlantic Institute for Market Studies, which also asserted the need of SWFs in the Atlantic provinces of Canada, commented that

> "There is always an argument about why saving is not a viable option. When revenue falls, the excuse is poverty. When revenue rises, the excuse is the need to make up for past shortfalls or to "invest" in the future by increasing spending in the present" (Roach et al., 2015, p.7).

Despite such arguments, proper saving from oil and gas revenue, like in the GPFP or APF, has brought success in building more sustainable societies. Newfoundland and Labrador's economy has been dominated by the rise and fall of the oil and gas industry. The history of the economic recessions in Newfoundland and Labrador already gave lessons concerning the provincial government's huge debt. Even if the economy is boosted in the short term due to the "Way Forward" plan, the productivity of resources will fall again in the long run,

and without proper policies, Newfoundland and Labrador will again face a cycle of collapse. It is time to build a new framework for oil and gas royalties especially because the economy is in a crisis and the provincial government is trying to ramp up the oil and gas production.

7.2 Policy Recommendations

Findings from this study have shown the expected benefits and challenges of introducing a SWF in Newfoundland and Labrador. These findings are under the hypothetical scenario that the province of Newfoundland and Labrador will introduce a SWF. However, the results of this study include general implications on how Newfoundland and Labrador can operate and manage its resource rent from oil and gas operations. The following policy recommendations are provided:

1. **Timing is important for oil and gas royalty reform.** Both Norway and Alaska have designed policies to take proper royalty shares from the early stages of their resource development. Newfoundland and Labrador is no longer in an early stage of the development of their oil and gas resources, but this is a good time to introduce a SWF, now that the "Way Forward" plan is trying to significantly expand the oil and gas industry.
2. Despite the urgency of the issue, **there must be public consensus to establish a SWF**. The Norwegian people have valued highly the equality and integrity of the

individual and this has inspired a range of legal provisions. Even in Norway, however, public dissatisfaction with the politics was observed when the GPFG was created, as the people wanted to see more changes and improvement in their current well-being, although the level of dissatisfaction was not significantly high (Listhaug, 2005). Also, Alaskans had spent 4 years to discuss and vote on what they wanted to do with the benefits of oil and gas resources before creating the APF. Therefore, it is necessary to take time to build a social consensus about the need for a SWF.

3. While greater savings is essential to continue making more annual returns and make the Fund sustainable, **how to operate and regulate a SWF is crucial to maintain the fund sustainable.** Considering that the provincial government of Newfoundland and Labrador is having financial difficulties and the oil industry alone is not enough to fund SWF, diversified sources of revenue saved and strict regulation of spending of the Fund are needed to create and maintain a SWF for Newfoundland and Labrador.
4. **Transparency** is essential to manage SWFs. Both Norway and Alaska openly provide information about their SWFs, such as where the fund is being used, where it is being invested, and how much return was made. Regarding the third point, the public needs to know why they have to be patient.
5. **Build an economic structure that can benefit local people with property rights over their natural resources**. It is important to save oil and gas revenues, but it is also important to keep the oil benefits from leaking out of the Newfoundland and Labrador economy. The current arrangements for managing the offshore oil and gas resources through C-NLOPB need to be revisited to better apply the provisions of

the Atlantic Accord, which ensure the Newfoundland and Labrador's right to receive benefits from resource revenues.

6. **Invest in local human capital development**. Human capital development is a way to avoid the "resource curse" as a result of revitalizing local industries and positively affecting regional economic development (Shao & Yang, 2014). Higher education and skills training are important for NL's sustainable prosperity (Palladini, 2015).

7.3 Recommendations for Future Research

The following areas are in need of additional research in addition to the results of this study to make the recommendations of this study feasible.

1) Studies on the natural gas industry

The "Way Forward" plan includes a plan to initiate a framework for natural gas exploration and development as well as a plan to double its oil production by 2030. When natural gas production in Newfoundland and Labrador increases, this will be a potential good funding source for the SWF. Also, it is a relatively cleaner source of energy than other fossil fuel

products. Therefore, the utilization of natural gas will further enhance the feasibility of introducing a SWF, and further research will be needed on this area.

2) Potential negative impacts of introducing a SWF in the oil and gas industry

With the introduction of a SWF, the increase in oil royalties will increase production costs in the oil and gas industry, thus reducing industrial activity in the short term. This can be of significant concern to the oil and gas industry and the provincial government of Newfoundland and Labrador especially because the provincial government is interested in boosting the economy through doubling oil and gas production in the province. In the long term, a SWF introduction is required, but further research is needed on the short-term negative effects that may occur in Newfoundland and Labrador to be prepared for such effects.

3) Research on an effective royalty rate

One of the most important steps in designing a SWF would be to set an effective royalty rate for the province of Newfoundland and Labrador. The royalty rate should be designed to minimize the negative effects mentioned above and to maximize the sustainability of the Newfoundland and Labrador economy and society.

4) How to achieve consensus about the establishment of a SWF

Although the introduction of a SWF is intended to maximize the benefit of society in the long term, there may be people who want immediate benefits to the current generation from the oil and gas production, especially due to the recent economic contraction caused by Covid-19 and low oil prices. Thus, research is needed on how to make these people aware of the need for a SWF and how to achieve social consensus.

References

Abraham, K. (2020). Newfoundland works to stay on track with projects. *World Oil*. https://www.worldoil.com/magazine/2020/april-2020/features/newfoundland-works-to-stay-on-track-with-projects

Al-sasi, B. O., Taylan, O., & Demirbas, A. (2017). The impact of oil price volatility on economic growth. *Energy Sources, Part B: Economics, Planning and Policy*, *12*(10), 847–852. https://doi.org/10.1080/15567249.2017.1312641

Alaska Department of Environmental Conservation. (2018). *Alaska Greenhouse Gas Emissions Inventory 1990 – 2015*. https://dec.alaska.gov/media/7622/ghg-inventory-report-013018.pdf

Alaska Department of Revenue. (2020). *Summary of dividend applications & payment*. https://pfd.alaska.gov/Division-Info/Summary-of-Applications-and-Payments

Alaska Permanent Fund Corporation. (2019a). *Balance Annual report 2019*.

Alaska Permanent Fund Corporation. (2019b). *Fund Value*. OUR PERFORMANCE. https://apfc.org/our-performance/

Alaska Statutes, Pub. L. No. 37.05.920 (2018). http://www.akleg.gov/basis/statutes.asp#37.05.920

Alhashel, B. (2015). Sovereign Wealth Funds : A literature review. *Journal of Economics and Business*, *78*, 1–13. https://doi.org/10.1016/j.jeconbus.2014.10.001

Alshuwaikhat, H. M., & Mohammed, I. (2017). Sustainability matters in national development visions-Evidence from Saudi Arabia's vision for 2030. *Sustainability*, *9*(3), 18–20. https://doi.org/10.3390/su9030408

Alyeska Pipeline Service Company. (2013). *Trans-Alaska pipeline system*. https://doi.org/10.1061/40792(173)292

Amuzegar, J. (1982). Oil wealth: A very mixed blessing. *Council on Foreign Relations*, *60*(4), 814–835.

Anchorage Economic Development Corporation. (2020). *Economic 2020 Forecast Anchorage*. http://aedcweb.com/wp-content/uploads/2020/01/AEDC_Economic-Forecast-Report-2020_fnl.pdf

Anderson, J. (2002). The Alaska permanent fund: Politics and trust. *Public Budgeting and Finance*, *22*(2), 57–68. https://doi.org/10.1111/1540-5850.00073

Ang, A. (2010a). The Four Benchmarks of Sovereign Wealth Funds. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1680485

Ang, A. (2010b). *The Four Benchmarks of Sovereign Wealth Funds*.

Arbo, P., & Thuy, P. T. T. (2016). Use conflicts in marine ecosystem-based management - The case of oil versus fisheries. *Ocean and Coastal Management*, *122*, 77–86. https://doi.org/10.1016/j.ocecoaman.2016.01.008

Arne, K. (2012). *Oil and fish in Norwegian waters – conflict or coexistence?*

Arrow, K. J., Dasgupta, P., Goulder, L. H., Mumford, K. J., & Oleson, K. (2010).

Sustainability and the measurement of wealth (NBER Working Paper No. 16599). http://www.nber.org/papers/w16599

Atkinson, G., & Atkinson, G. (2008). Sustainability , the capital approach and the built environment. *Building Research & Information*, *3218*(May), 241–247. https://doi.org/10.1080/09613210801900734

Atkinson, G. D., & Pearce, D. W. (1993). Capital theory and the measurement of sustainable development: an indicator of "weak" sustainability. *Ecological Economics*, *8*(2), 103–108.

Atlantic Business. (2019). Will oil from N.L.'s offshore be needed in a low-carbon world? This U.K. researcher says no. *Atlantic Business Magazine*. https://www.atlanticbusinessmagazine.net/will-oil-from-n-l-s-offshore-be-needed-in-a-low-carbon-world-this-u-k-researcher-says-no/

Auditor General of Newfoundland and Labrador. (2011). *Report of the Audit General to the House of Assembly on the Audit of the Financial Statements of the Province of Newfoundland and Labrador*.

Auditor General of Newfoundland and Labrador. (2012). *Report of the Auditor General to the House of Assembly on Reviews of Departments and Crown Agencies*.

Auditor General of Newfoundland and Labrador. (2013). *Report of the Audit General to the House of Assembly on the Audit of the Financial Statements of the Province of Newfoundland and Labrador*.

Auditor General of Newfoundland and Labrador. (2014). *Report to the House of*

Assembly on the Audit of the Financial Statements of the Province of Newfoundland and Labrador.

Auditor General of Newfoundland and Labrador. (2015). *Report of the Audit General to the House of Assembly on the Audit of the Financial Statements of the Province of Newfoundland and Labrador*. http://www.oag-bvg.gc.ca/internet/English/parl_oag_201004_07_e_33720.html

Auditor General of Newfoundland and Labrador. (2016a). *Report of the Audit General to the House of Assembly on the Audit of the Financial Statements of the Province of Newfoundland and Labrador*.

Auditor General of Newfoundland and Labrador. (2016b). *Report to the House of Assembly on the Audit of the Financial Statements of the Province of Newfoundland and Labrador for the year*.

Auditor General of Newfoundland and Labrador. (2017). *Report to the House of Assembly on the Audit of the Financial Statements of the Province of Newfoundland and Labrador for the year ended March 31, 2013*.

Auditor General of Newfoundland and Labrador. (2018). *Report to the House of Assembly on the Audit of the Financial Statements of the Province of Newfoundland and Labrador*. https://www.ag.gov.nl.ca/ag/finStatements/2018FinancialStatements/FinancialStatementReport2018.pdf

Auditor General of Newfoundland and Labrador. (2019). *Report to the House of*

Assembly on the Audit of The Financial Statements of the Province of Newfoundland and Labrador. https://doi.org/10.1080/00029890.1972.11992978

Auty, R. M. (1990). *Resource-based industrialization: Sowing the oil in eight developing countries*. Oxford: Clarendon Press.

Auty, R. M. (2014). The resource curse and sustainable development. In *Handbook of Sustainable Development* (pp. 267–278).

Badeeb, R. A., Lean, H. H., & Clark, J. (2017a). The evolution of the natural resource curse thesis: A critical literature survey. *Resources Policy*, *51*(December 2016), 123–134. https://doi.org/10.1016/j.resourpol.2016.10.015

Badeeb, R. A., Lean, H. H., & Clark, J. (2017b). The evolution of the natural resource curse thesis: A critical literature survey. *Resources Policy*, *51*(December 2016), 123–134. https://doi.org/10.1016/j.resourpol.2016.10.015

Badeeb, R. A., Lean, H. H., & Clark, J. (2017c). The evolution of the natural resource curse thesis: A critical literature survey. *Resources Policy*, *51*(June 2016), 123–134. https://doi.org/10.1016/j.resourpol.2016.10.015

Baer, P., Harte, J., Haya, B., Herzog, A. V., Holdren, J., Hultman, N. E., Kammen, D. M., Norgaard, R. B., & Raymond, L. (2000). Equity and greenhouse gas responsibility. *Science*, *289*(5488), 2287. https://doi.org/10.1126/science.289.5488.2287

Bagattini, G. Y. (2011). The Political Economy of Stabilisation Funds: Measuring their Success in Resource-Dependent Countries. *IDS Working Papers*, *2011*(356), 01–60. https://doi.org/10.1111/j.2040-0209.2011.00356_2.x

Bailey, S. (2017). Newfoundland and Labrador's deficit grows amid lower offshore oil royalties. *The Canadian Press*. https://www.theglobeandmail.com/news/national/newfoundland-and-labradors-deficit-grows-amid-lower-offshore-oil-royalties/article36971329/

Barber, C. L. (1968). *Theory of Fiscal Policy as applied to a province*.

Barkhordar, Z. A., & Saboohi, Y. (2013). Assessing alternative options for allocating oil revenue in Iran. *Energy Policy*, *63*, 1207–1216. https://doi.org/10.1016/j.enpol.2013.08.099

Barley, S. (2012). *Exxon Valdez laid to rest*. Nature. https://www.nature.com/news/exxon-valdez-laid-to-rest-1.11141

Barnett, S., & Ossowski, R. (2002). Operational Aspects of Fiscal Policy in Oil-Producing Countries. In *IMF Working Papers* (pp. 1–33). https://www.imf.org/en/Publications/WP/Issues/2016/12/30/Operational-Aspects-of-Fiscal-Policy-in-Oil-Producing-Countries-16121

Bauer, A, Shortell, P., & Delesgues, L. (2016). *Sharing the Wealth: A Roadmap for Distributing Myanmar's Natural Resource Revenues*. *February*, 64. http://www.resourcegovernance.org/sites/default/files/nrgi_sharing_Myanmar_Revenue-Sharing.pdf

Bauer, Andrew. (2013). *Subnational Oil , Gas and Mineral Revenue Management* (Issue July). https://resourcegovernance.org/sites/default/files/documents/sub_oil_gas_mgmt_201

60809.pdf

Bazel, P., & Mintz, M. (2019). *Effective Tax and Royalty Rates on New Investment in Oil and Gas after Canadian and American Tax Reform*.

Bazoobandi, S. (2011). *Political Economy of the Gulf Sovereign Wealth Funds: A case study of Iran, Kuwait, Saudi Arabia and United Arab Emirates* (Issue April) [University of Exeter]. https://doi.org/10.4324/9780203080887

BBC. (2007). *Oil spill in North Sea off Norway*. BBC News. http://news.bbc.co.uk/2/hi/europe/7140645.stm

Beck, R., & Fidora, M. (2008). The impact of sovereign wealth funds on global financial markets. *Intereconomics*, *43*(6), 349–358. https://doi.org/10.1007/s10272-008-0268-5

Berman, M., & Reamey, R. (2016). *Permanent Fund Dividends and Poverty in Alaska* (Issue November). https://iseralaska.org/static/legacy_publication_links/2016_12-PFDandPoverty.pdf

Bernstein, S., Lerner, J., & Schoar, A. (2013). The investment strategies of sovereign wealth funds. *Journal of Economic Perspectives*, *27*(2), 219–238. https://doi.org/10.1257/jep.27.2.219

Bibler, A., Guettabi, M., & Reimer, M. N. (2019). Short-Term Labor Responses to Unconditional Cash Transfers. *SSRN Electronic Journal*, *March*. https://doi.org/10.2139/ssrn.3357230

Blake, J. (2011). Achieving Justice in Global Environmental Protection. *Environmental Sciences*, *8*(2), 11–28.

Bloomberg. (2020a). COVID-19: The world's biggest wealth fund in Norway reaps an ethical bonus. *Gulf News*. https://gulfnews.com/business/markets/covid-19-the-worlds-biggest-wealth-fund-in-norway-reaps-an-ethical-bonus-1.1585548687903

Bloomberg. (2020b). Covid-19 crisis : Biggest wealth fund faces record $ 37-bn withdrawal. *Business Standard*. https://www.business-standard.com/article/markets/covid-19-crisis-biggest-wealth-fund-faces-record-37-bn-withdrawal-120051300047_1.html

Blundell-wignall, A., Hu, Y., & Yermo, J. (2008). Sovereign Wealth and Pension Fund Issues. *OECD Journal. Financial Market Trends*, *1*, 117–133.

Bott, R. D. (2004). Evolution of Canada's oil and gas industry - a historical companion to Our Petroleum Challenge 7th edition. In *Canadian Centre for Energy Information*. The Canadian Centre for Energy Information. http://www.energybc.ca/cache/oil/www.centreforenergy.com/shopping/uploads/122.pdf

BP. (2018). *BP Statistical Review of World Energy 2018*.

Brasch, T. Von, Hungnes, H., & Strøm, B. (2018). Ringvirkninger av petroleumsnæringen i norsk økonomi. Basert på endelige nasjonalregnskapstall for 2015. In *Statistics Norway Reports* (Issue 18).

Bullard, R. D. (1990). *Dumping In Dixie: Race, Class, And Environmental Quality*.

Westview Press.

Bureau of Labor Statistics. (2016). *Occupational Employment Statistics*. https://www.bls.gov/oes/2016/may/oes_ak.htm

C-NLOPB. (2016). *C-NLOPB 2015-16 Annual Report*.

C-NLOPB. (2018). *C-NLOPB 2017-18 Annual Report*.

Canada-Newfoundland and Labrador Offshore Petroleum Board. (2010). *STAFF ANALYSIS HIBERNIA DEVELOPMENT PLAN AMENDMENT September 2, 2010*.

Canadian Association of Petroleum Producers. (2017). NL Oil and Gas Overview. *Newfoundland & Labrador Workshop on Deepwater Exploration and Production*. http://atlanticcanadaoffshore.ca/wp-content/uploads/2017/04/CAPP_EDMS-300320-v1-C-CORE_Deepwater_Exploration_and_Production_workshop_April_2017.pdf

Canadian Rural Revitalization Foundation. (2015). *State of Rural Canada 2015* (Issue April).

Canadian Science Advisory Secretariat. (2013). *Review of white rose extension project* (Issue June).

Carbone, J. C., & McKenzie, K. J. (2016). Going Dutch? The Impact of Oil Price Shocks on the Canadian Economy. *Canadian Public Policy*, *42*(2), 168–180. https://doi.org/10.3138/cpp.2015-045

Carter, I. (2012). Left-libertarianism and the Resource Dividend. In *Alaska's Permanent Fund Dividend: Examining its Suitability as a Model*. Palgrave Macmillan.

Casassas, D., & Wispelaere, J. De. (2012). The Alaska Model: A Republican Perspective. In *Alaska's Permanent Fund Dividend*. Palgrave Macmillan.

"CBC News." (2018a). *Faulty valve blamed for massive oil spill off Newfoundland*. https://www.cbc.ca/news/canada/newfoundland-labrador/hebron-back-online-1.4912582

"CBC News." (2018b). *Why the lax tax? Finance minister says Muskrat burden played role in carbon pricing*. https://www.cbc.ca/news/canada/newfoundland-labrador/carbon-tax-newfoundland-labrador-1.4874616

"CBC News." (2019). *Is seismic testing to blame for disappearing plankton? This scientist says it's possible*. https://www.cbc.ca/news/canada/newfoundland-labrador/seismic-testing-effects-1.5234249

Center for the Governance of Change. (2020). *Sovereign Wealth Funds 2019*. https://doi.org/10.1002/9781118266298.ch14

CERI. (2019). *Canadian crude oil and natural gas production, supply costs, economic impacts and emissions outlook (2019-2039)*. https://ceri.ca/assets/files/Study_182_Full_Report.pdf

Chang, C. (2012). Reviewing fiscal difficulties of local governments in Taiwan. *INTERNATIONAL JOURNAL OF ECONOMICS AND FINANCE STUDIES*, *4*(1), 61–70.

Chang, H. H., & Huang, W. C. (2006). Application of a quantification SWOT analytical method. *Mathematical and Computer Modelling*, *43*(1–2), 158–169.

https://doi.org/10.1016/j.mcm.2005.08.016

Chen, W. M., Kim, H., & Yamaguchi, H. (2014). Renewable energy in eastern Asia: Renewable energy policy review and comparative SWOT analysis for promoting renewable energy in Japan, South Korea, and Taiwan. *Energy Policy*, *74*(C), 319–329. https://doi.org/10.1016/j.enpol.2014.08.019

Clark, G. L., Monk, A., & Visiting, L. M. (2010). The Norwegian Government Pension Fund : Ethics over Efficiency. *Rotman International Journal of Pension Management*, *3*(1), 14–20.

Clemente, J. (2019). LNG Could be a Lifeline for Alaska's Struggling Oil Industry. *Rigzon*. https://www.rigzone.com/news/lng_could_be_a_lifeline_for_alaskas_struggling_oil_industry-29-jul-2019-159420-article/

Cliff Groh, & Erickson, G. (2012). The Improbable but True Story of How the Alaska Permanent Fund and the Alaska Permanent Fund Dividend Came to Be. In K. Widerquist & M. W. Howard (Eds.), *Alaska's Permanent Fund Dividend: Examining its Suitability as a Model*. Palgrave Macmillan.

Climate Watch NL. (2018). *Climate Watch NL Responds to Newfoundland and Labrador Carbon Pricing* (Issue December). http://www.climatewatchnl.ca/resources/Climate_Watch_NL-Response_to_NL_Carbon_Pricing_Dec_3_2018.pdf

Cohen, F., Hepburn, C., & Teytelboym, A. (2018). *Is Natural Capital Really*

Substitutable? (No. 2018–12; INET Oxford Working Paper).

Common Front NL. (2016). *A Better Future: Building a jobs-rich, fair, and sustainable economy for Newfoundland and Labrador* (Issue December). https://doi.org/10.4159/9780674969520-011

Corden, W. Max, & Neary, J. P. (1982). Booming Sector and De-Industrialisation in a Small Open Economy. *The Economic Journal*, *92*(368), 825–848.

Corden, W.M. (1984). Booming Sector and Dutch Disease Economics : Survey and Consolidation Author. *Oxford Economic Papers*, *36*(3), 359–380.

Cordes, E. E., Jones, D. O. B., Schlacher, T. A., Amon, D. J., Bernardino, A. F., Brooke, S., Carney, R., DeLeo, D. M., Dunlop, K. M., Escobar-Briones, E. G., Gates, A. R., Génio, L., Gobin, J., Henry, L. A., Herrera, S., Hoyt, S., Joye, M., Kark, S., Mestre, N. C., … Witte, U. (2016). Environmental impacts of the deep-water oil and gas industry: A review to guide management strategies. *Frontiers in Environmental Science*, *4*. https://doi.org/10.3389/fenvs.2016.00058

Coulombe, S. (2012). Lagging Behind: Productivity and the Good Fortune of Canadian Provinces. *C.D. Howe Institute Commentary*, *331*. https://doi.org/10.2139/ssrn.1889307

Covert, T., Greenstone, M., & Knittel, C. R. (2016). Will we ever stop using fossil fuels? *Journal of Economic Perspectives*, *30*(1), 117–138. https://doi.org/10.1257/jep.30.1.117

Cowan, P. (2019). FFAW vows to stop oil and gas exploration in crab fishing area. *CBC*

News. https://www.cbc.ca/news/canada/newfoundland-labrador/ffaw-oil-crab-fishing-1.5271389

Cowan, P. (2020). COVID-19, dropping oil prices have “severe” impact on N.L., says premier. *CBC NEws*. https://www.cbc.ca/news/canada/newfoundland-labrador/covid-oil-newfoundland-labrador-economy-1.5505161

Cowell, S. J., Wehrmeyer, W., Argust, P. W., & Robertson, J. G. S. (2000). *Sustainability and the primary extraction industries : theories and practice*. *25*(1999), 277–286.

Crisan, D., & Mintz, J. (2017). *A 2017 update of taxation of oil investments in Canada and the united states: how U.S. tax reform could affect competitiveness* (Vol. 10, Issue September).

Cummine, A. (2013). *A Citizen’s stake in Sovereign Wealth Funds: The Management, Investment and Distribution of Sovereign Wealth*. The University of Oxford.

Cunningham, N. (2019). BP Exits Alaska To Double Down On Shale. *Oilprice.Com*. https://oilprice.com/Energy/Energy-General/BP-Exits-Alaska-To-Double-Down-On-Shale.html

Das, U. S., & Lu, Y. (2009). *Setting up a Sovereign Wealth Fund : Some Policy and Operational Considerations*.

Dasgupta, P., & Mäler, K.-G. (2000). Net national product , wealth , and social. *Environment and Development Economics*, *5*, 69–93.

Davis, G. A., & Tilton, J. E. (2005). The resource curse. *Natural Resources Forum*, *29*,

233–242.

Dhillon, A. (2017a). Fisheries groups upset over seismic testing approval, find common ground in disapproval. *CBC*. https://www.cbc.ca/news/canada/newfoundland-labrador/seismic-testing-concerns-1.4198288

Dhillon, A. (2017b). Fisheries groups upset over seismic testing approval, find common ground in disapproval. *CBC News*. https://www.cbc.ca/news/canada/newfoundland-labrador/seismic-testing-concerns-1.4198288

Didier, T. (2011). *Timing and Institutions : Determinants of the Ownership Structure in the Oil and Gas Industry in Canada and Norway* (Issue March). McGill University.

Digges, C. (2019a). Norway's huge oil fund makes major shift to renewable energy. *Bellona*. https://bellona.org/news/climate-change/2019-04-norways-huge-oil-fund-makes-major-shift-to-renewable-energy

Digges, C. (2019b). Norway partially dumps petroleum stocks, spotlighting Oslo's push-pull coziness with big oil. *Bellona*. https://bellona.org/news/climate-change/2019-03-norway-partially-dumps-petroleum-stocks-spotlighting-oslos-push-pull-friendship-with-big-oil

Drezner, D. W. (2008). Sovereign Wealth Funds and the (In)security of Global Finance. *Journal of International Affairs*, *62*(1), 115–130.

Dworkin, R. (1977). *Taking Right Seriously*. Harvard University Press.

Dyson, R. G. (2004). Strategic development and SWOT analysis at the University of

Warwick. *European Journal of Operational Research*, *152*(3), 631–640. https://doi.org/10.1016/S0377-2217(03)00062-6

Eckardt, S., Sarsenov, I., & Thomas, M. R. (2012). *The Fiscal Management of Natural Resource Revenues in a Developing Country Setting (or How to Design a Fiscal Rule If You Are Not Norway)*. https://www.openknowledge.worldbank.org/bitstream/handle/10986/16178/732450BRI0PN0100disclosed0100160120.pdf?sequence=1&isAllowed=y

Edwards, M. (1987). Public choice theory and petroleum policies in Canada , Britain and Norway. *European Journal of Political Research*, *380*(15), 363–380.

Eifert, B., Gelb, A., & Tallroth, N. B. (2002). *The political economy of fiscal policy and economic management in oil exporting countries*.

Ekins, P., Dresner, S., & Dahlström, K. (2008). The four-capital method of sustainable development evaluation. *European Environment*, *18*(2), 63–80. https://doi.org/10.1002/eet.471

Ekins, P., Simon, S., Deutsch, L., Folke, C., & De Groot, R. (2003). A framework for the practical application of the concepts of critical natural capital and strong sustainability. *Ecological Economics*, *44*(2–3), 165–185. https://doi.org/10.1016/S0921-8009(02)00272-0

Elder, J., & Serletis, A. (2009). Oil price uncertainty in Canada. *Energy Economics*, *31*(6), 852–856. https://doi.org/10.1016/j.eneco.2009.05.014

Eldredge, C. D. (2016). *The Political Determinants of Sovereign Wealth Funds*.

University of Colorado.

Elliott, S. R. (2005). Sustainability: An economic perspective. *Resources, Conservation and Recycling*, *44*, 263–277. https://doi.org/10.1016/j.resconrec.2005.01.004

Elwerfelli, A., & Benhin, J. (2018). Oil a Blessing or Curse : A Comparative Assessment of Nigeria , Norway and the United Arab Emirates. *Theoretical Economics Letters*, *8*, 1136–1160. https://doi.org/10.4236/tel.2018.85076

Enderwick, P. (2017). International investment by state-controlled enterprises: A source for concern? *Strategic Change*, *26*(3), 261–271. https://doi.org/10.1002/jsc.2127

Environment and Climate Change Canada. (2019). *Canada's Official Greenhouse Gas Inventory*. https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html

Erickson, G., & Barker, M. (2015). *The Great Alaska Recession*. https://www.alaskapublic.org/wp-content/uploads/2015/06/Erickson150412-The-Great-Alaska-Recession.pdf

Eriksen, T. H. (1993). Being Norwegian in a shrinking world. In *Continuity and change: aspects of contemporary Norway*. Scandinavian University Press.

Erwin, A. (2020). *The Resource Curse: An Introduction to the Literature on its Economic and Political Components*. https://www.internationalaffairshouse.org/the-resource-curse-an-introduction-to-the-literature-on-its-economic-and-political-components/

Esearch, E. U. I. N. R. (2019). Overview of The New Legal Eraf Development Projects in

the Newfoundland and Labrador Offshore. *Alberta Law Review*, 361–388.

Executive Council. (2018). *Made-in-Newfoundland and Labrador Carbon Pricing Plan*. https://www.exec.gov.nl.ca/exec/occ/publications/NL_Carbon_Pricing_Plan.pdf

Feinberg, R. M., & Kuehn, D. (2018). Guaranteed Nonlabor Income and Labor Supply: The Effect of the Alaska Permanent Fund Dividend. *B.E. Journal of Economic Analysis and Policy*, *18*(3), 1–13. https://doi.org/10.1515/bejeap-2018-0042

Feinberg, R. M., & Kuehn, D. (2019). *Does a Guaranteed Basic Income Encourage Entrepreneurship? Evidence from Alaska*.

Ferreira, B. (2015). *The Exxon Valdez Spill Is Still Making Fish Suffer 26 Years Later*. VICE. https://www.vice.com/en_us/article/wnjvjy/the-exxon-valdez-spill-is-still-making-fish-suffer-26-years-later

Fiedorczuk, J. (2015). Sustainable Development in Norway on the example of Government Pension Fund Global. *Copernican Journal of Finance & Accounting*, *4*(1), 45–54. https://doi.org/http://dx.doi. org/10.12775/CJFA.2015.003

Fischer, C. (2007). *International experience with benefit-sharing instruments for extractive resources* (Issue May).

Fisheries and Oceans Canada. (2004). *Review of scientific information on impacts of seismic sound on fish, invertebrates, marine turtles and marine mammals*. *September*, 15.

Fisheries and Oceans Canada. (2007). *Statement of Canadian practice with respect to the*

mitigation of seismic sound in the marine environment. Department of Fisheries and Ocean Canada. https://waves-vagues.dfo-mpo.gc.ca/Library/363838.pdf

Fisheries and Oceans Canada. (2019). *Discussion on the Newfoundland and Labrador Inshore Fishery*. https://waves-vagues.dfo-mpo.gc.ca/Library/40757468.pdf

Fitzgerald, E. (1991). The Newfoundland Offshore Reference: Federal-Provincial Conflict over Offshore Energy Resources. *Case Western Journal of International Law*, *23*(1), 64.

Friedson, B. M., Bolden, L.-A., & Corradi, J. E. (2013). Before the Natural Resource Boon: State-Civil Society Relations and Democracy in Resource Rich Societies. *Journal of Third World Studies*, *30*(2).

Fusco, L. (2007). *Offshore Oil: An Overview of Development in Newfoundland and Labrador* (No. 2; Occasional Paper of the Project, Oil, Power and Dependency: Global and Local Realities of the Offshore Oil Industry in Newfoundland and Labrador). https://research.library.mun.ca/10519/1/Fusco_Leah.pdf

Gelb, A. (1988). *Oil windfalls: Blessing or Curse*. Oxford University Press.

Gharawi, M. A., Pardo, T. A., & Guerrero, S. (2009). Issues and strategies for conducting cross-national e-Government comparative research. *ACM International Conference Proceeding Series*, 163–170. https://doi.org/10.1145/1693042.1693076

Ghazinoory, S., Abdi, M., & Azadegan-Mehr, M. (2011). Swot Methodology: A State-of-the-Art Review for the Past, A Framework for the Future. *Journal of Business Economics and Management*, *12*(1), 24–48.

https://doi.org/10.3846/16111699.2011.555358

Gien, L. T. (2000). Land and sea connection: The east coast fishery closure, unemployment and health. *Canadian Journal of Public Health*, *91*(2), 121–124. https://doi.org/10.1007/bf03404926

Giles, C. (2014). Winners and losers of oil price plunge. *Financial Times*. http://www.ft.com/cms/s/2/3f5e4914-8490-11e4-ba4f-00144feabdc0.html#axzz41xRmZ3Fi

Goldsmith, S. (2012). The Economic and Social Impacts of the Permanent Fund Dividend on Alaska. In *Alaska's Permanent Fund Dividend: Examining its Suitability as a Model*. Palgrave Macmillan.

Gonzalez, C. G. (2015). Environmental Justice, Human Rights, and the Global South Recommended Citation. *Santa Clara Journal of International Law*, *13*, 151–195. http://digitalcommons.law.seattleu.edu/faculty%0Ahttp://digitalcommons.law.seattleu.edu/faculty/631

Gonzalez, C. G., & Atapattu, S. (2017). International Environmental Law , Environmental Justice , and the Global South. *Transnational Law & Contemporary Problems*, *26*(2), 229–242.

Goodrick, D. (2014). *Comparative Case Studies* (Issue 9).

Goodwin, N. R. (2003). Five Kinds of Capital : Useful Concepts for Sustainable Development. In *Global Development And Environment Institute Working Paper* (NO. 03-07). https://doi.org/10.1016/j.jcrysgro.2005.12.011

Government of Canada. (2019). *Provincial and Territorial Energy Profiles – Newfoundland and Labrador*. Canada Energy Regulator. https://www.cer-rec.gc.ca/nrg/ntgrtd/mrkt/nrgsstmprfls/nl-eng.html?=undefined&wbdisable=true

Government of Canada. (2020). *The Labour Market in Atlantic Canada*. https://www.canada.ca/en/atlantic-canada-opportunities/services/researchstudies10.html

Government of Newfoundland and Labrador. (2009). *The Economy 2009*. https://economics.gov.nl.ca/E2009/TheEconomy2009.pdf

Government of Newfoundland and Labrador. (2010). *The Economy 2010*. https://economics.gov.nl.ca/E2010/TheEconomy2010.pdf

Government of Newfoundland and Labrador. (2011). *The Economy 2011*. https://economics.gov.nl.ca/E2011/TheEconomy2011.pdf

Government of Newfoundland and Labrador. (2012). *The Economy 2012*. https://economics.gov.nl.ca/E2012/TheEconomy2012.pdf

The Atlantic Accord: Memorandum of Agreement Between the Government of Canada and the Government of Newfoundland and Labrador on Offshore Oil and Gas Resource Management and Revenue Sharing, (2013).

Government of Newfoundland and Labrador. (2013). *The Economy 2013*. https://economics.gov.nl.ca/E2013/TheEconomy2013.pdf

Government of Newfoundland and Labrador. (2014). *The Economy 2014* (Issue 709).

https://economics.gov.nl.ca/E2014/TheEconomy2014.pdf

Government of Newfoundland and Labrador. (2015). *The Economy 2015*. https://economics.gov.nl.ca/E2015/TheEconomy2015.pdf

Government of Newfoundland and Labrador. (2016). *The Economy 2016*. https://economics.gov.nl.ca/E2016/TheEconomy2016.pdf

Government of Newfoundland and Labrador. (2017). *The Economy 2017*. https://economics.gov.nl.ca/E2017/OilAndGas.pdf

Government of Newfoundland and Labrador. (2018a). *Employment by Detailed Industry and Gender, 1987-2017*. https://www.stats.gov.nl.ca/Statistics/Labour/PDF/Emp_Industry_NL_Annual_BS.pdf

Government of Newfoundland and Labrador. (2018b). *The Economy 2018*. https://economics.gov.nl.ca/E2018/TheEconomy2018.pdf

Government of Newfoundland and Labrador. (2019a). *Atlantic Accord Review*. https://www.gov.nl.ca/wp-content/uploads/Atlantic-Accord-Review-Presentation.pdf

Government of Newfoundland and Labrador. (2019b). *Landmark Atlantic Accord Agreement Achieved*. https://www.gov.nl.ca/releases/2019/exec/0401n07/

Government of Newfoundland and Labrador. (2019c). *The Economy 2019*. https://economics.gov.nl.ca/E2019/TheEconomy2019.pdf

Graney, E. (2020). Newfoundland and Labrador warns of oil exodus if Ottawa doesn't

'step up' with aid. *Globe and Mail*. https://www.theglobeandmail.com/business/article-newfoundland-and-labrador-warns-of-oil-exodus-if-ottawa-doesnt-step/

Guettabi, M. (2019). *What do we know about the effects of the Alaska Permanent Fund Dividend ?* https://pubs.iseralaska.org/media/a25fa4fc-7264-4643-ba46-1280f329f33a/2019_05_20-EffectsOfAKPFD.pdf

Gylfason, T. (2001). Natural Resources and Economic Growth: What Is the Connection? *CESifo Working Paper*, *530*.

Halonen, A. (2014). *Avoiding the Curse by Transparency and Ethics ?* University of Agder.

Halvorssen, A. M. (2009). *The Norwegian Sovereign Wealth Fund Addresses the Interrelated Challenges of Climate Change and Sustainable Development – A Model for Regulating Other Sovereign Wealth Funds (SWF)*.

Hamilton, K. (1994). Green adjustments to GDP. *Resources Policy*, *20*(3), 155–168. https://doi.org/10.1016/0301-4207(94)90048-5

Hamilton, K. (1995). Sustainable development, the Hartwick rule and optimal growth. *Environmental & Resource Economics*, *5*(4), 393–411. https://doi.org/10.1007/BF00691576

Hamilton, K., & Bolt, K. (2007). Genuine Saving as an Indicator of Sustainability. In *Handbook of Sustainable Development*. Edward Elgar Publishing. https://doi.org/10.4337/9781847205223

Hamilton, K., & Clemens, M. (1999). Genuine Savings Rates in Developing Countries. *The World Bank Economic Review*, *13*(2), 333–356.

Hamilton, K., & Hartwick, J. (2014). Wealth and sustainability. *Oxford Review of Economic Policy*, *30*(1), 170–187. https://doi.org/10.1093/oxrep/gru006

Hamilton, K., Markandya, A., Pedroso-Galinato, S., Silva, P., Ordoubadi, M. S., Lange, G.-M., Zhou, L., & Martin-Hurtado, R. (2006). Where is the Wealth of Nations? In *Annual report*. https://doi.org/10.1596/978-0-8213-6354-6

Hansen, O. H., & Midtgard, M. R. (2008). Going North: The new petroleum province of Norway. In *Arctic Oil and Gas: Sustainability at risk?* (pp. 200–239). Routledge.

Hantrais, L. (2000). Contextualization in cross-national comparative. *Social Research Methodology*, *2*(2), 93–108.

Harball, E. (2019). *BP's Alaska exit no surprise, say experts and industry insiders*. https://www.alaskapublic.org/2019/08/27/bps-alaska-exit-no-surprise-say-experts-and-industry-insiders/

Hartwick, J. M. (1977). Intergenerational Equity and the Investing of Rents from Exhaustible Resources. *The American Econnomic Review*, *67*(5), 972–974.

Hartzok, A. (2012). Room for Improvement? Assessing the Strengths and Shortcomings of the Alaska Model in Advance of Export. In *Exporting the Alaska Model: Adapting the Permanent Fund Dividend for Reform around the World*. Palgrave Macmillan.

Hediger, W. (1997). Towards an ecological economics of sustainable development. *Sustainable Development*, *5*, 101–109.

Heinrich, A. (2011). *Challenges of a Resource Boom : Review of the Literature* (No. 114; Working Papers of the Research Centre for East European Studies).

Herreros, F., & Criado, H. (2008). The state and the development of social trust. *International Political Science Review*, *29*(1), 53–71. https://doi.org/10.1177/0192512107083447

Higgins, J. (2018). *Oil and the Environment*. Newfoundland and Labrador Heritage. https://www.heritage.nf.ca/articles/economy/oil-environment.php

Hite, K. (2015). *Benefit Sharing and Redd + : Considerations and Options for Effective Design and Operation* (Issue April).

Hjermann, D., Melsom, A., Dingsør, G. E., Durant, J. M., Eikeset, A. M., Røed, L. P., Ottersen, G., Storvik, G., & Stenseth, N. C. (2007). Fish and oil in the Lofoten-Barents Sea system: Synoptic review of the effect of oil spills on fish populations. *Marine Ecology Progress Series*, *339*, 283–299. https://doi.org/10.3354/meps339283

Holden, S. (2013). Avoiding the resource curse the case Norway. *Energy Policy*, *63*, 870–876. https://doi.org/10.1016/j.enpol.2013.09.010

Houben, G., Lenie, K., & Vanhoof, K. (1999). A knowledge-based SWOT-analysis system as an instrument for strategic planning in small and medium sized enterprises. *Decision Support Systems*, *26*(2), 125–135. https://doi.org/10.1016/S0167-9236(99)00024-X

Hudson, M. (1977). Ekofisk Oil Spill. *Marine Pollution Bulletin*, *8*(6), 123.

Humphreys, M., Sachs, J. D., & Stiglitz, J. E. (2007). What Is the Problem with Natural Resource Wealth? In *Escaping the Resource Curse* (pp. 1–20). Columbia University Press.

Ikeda, S., Tamaki, T., Nakamura, H., & Managi, S. (2017). Inclusive wealth of regions: the case of Japan. *Sustainability Science*, *12*(6), 991–1006. https://doi.org/10.1007/s11625-017-0450-4

Incardona, J. P., Carls, M. G., Holland, L., Linbo, T. L., Baldwin, D. H., Myers, M. S., Peck, K. A., Tagal, M., Rice, S. D., & Scholz, N. L. (2015). Very low embryonic crude oil exposures cause lasting cardiac defects in salmon and herring. *Scientific Reports*, *5*, 1–13. https://doi.org/10.1038/srep13499

International Energy Agency. (2017). *Energy policies of IEA countries - Norway*. https://doi.org/10.1109/MAES.2006.284381

International Monetary Fund. (2008). *Sovereign Wealth Funds—A Work Agenda*.

Jamieson, D. (1994). Global Environmental Justice. *Royal Institute of Philosophy Supplement*, *36*, 199–210. https://doi.org/10.1017/s135824610000655x

Jennifer, R. (2000). Using Case Studies in Research. *Management Research News*, 16–27.

Jones, D., & Marinescu, I. (2018). *The Labor Market Impacts of Universal And Permanent Cash Transfers: Evidence From The Alaska Permanent Fund* (NBER

Working Paper Series).

Jørgensen, C. R. (2015). Three advantages of cross-national comparative ethnography – methodological reflections from a study of migrants and minority ethnic youth in English and Spanish schools. *Ethnography and Education*, *10*(1), 1–16. https://doi.org/10.1080/17457823.2014.922891

Karl Widerquist, & Howard, M. W. (2012). Introduction: Success in Alaska. In *Alaska's Permanent Fund Dividend* (pp. 3–11).

Kartha, S., Holz, C., & Athanasiou, T. (2018). *Norway's fair share of meeting the Paris agreement*. https://www.kirkensnodhjelp.no/globalassets/lanserte-rapporter/2018/norways-fair-share-2018_web.pdf

Kasson, J. (1997). The Creation of the Alaska Permanent Fund: A Short History. In *The Early History of the Alaska Permanent Fund: Perspectives on the Origins of Alaska's Oil Savings Account Public Investment in Alaska*.

Kaye, L. (2017). Oil-Rich Norway Simply Exports its Carbon Emissions. *Triple Pundit*. https://www.triplepundit.com/story/2017/oil-rich-norway-simply-exports-its-carbon-emissions/16631

Kelly, D. (2007). Norway Starts Probe of Offshore Oil Spill. *Oil Daily*.

Kolstad, I., & Wiig, A. (2009). Is Transparency the Key to Reducing Corruption in Resource-Rich Countries? *World Development*, *37*(3), 521–532. https://doi.org/10.1016/j.worlddev.2008.07.002

Kuehn, R. R. (2000). A Taxonomy of Environmental Justice. *Environmental Law Reporter*, *30*.

Kurland, S. (2017). Effects of Transfer Income on Migration and Rural Unemployment: Evidence from the Alaska Permanent Fund Dividend. *IOP Conference Series: Earth and Environmental Science*.

Lamorgese, L. (2014). *Addressing Equity in Sustainability Assessment: A Theoretical Framework with Applications in the Oil & Gas Sector*. University of Trento.

Lampert, A. (2019). Over-exploitation of natural resources is followed by inevitable declines in economic growth and discount rate. *Nature Communications*, *10*(1), 1–10. https://doi.org/10.1038/s41467-019-09246-2

Le, T. K., & Munthe-Dahl, O. (2014). *NATURAL RESOURCE FUNDS AS MECHANISMS FOR AVOIDING THE RESOURCE CURSE A COMPARATIVE STUDY OF KAZAKHSTAN , AZERBAIJAN*. University of Agder.

Leahy, S. (2019). *Exxon Valdez changed the oil industry forever—but new threats emerge*. National Geographic.

LGL Limited Environmental Research Associates. (2016). *Environmental Assessment of CGG's Newfoundland Offshore Seismic Program, 2016-2025* (Issue February).

Li, M. (2013). Corruption, Transparency and the Resource Curse. *International Journal of Social Science and Humanity*, *3*(6), 572–575. https://doi.org/10.7763/ijssh.2013.v3.305

Lie, E. (2018). Learning by Failing. The Origins of the Norwegian Oil Fund. *Scandinavian Journal of History*, *43*(2), 284–299. https://doi.org/https://doi.org/10.1080/03468755.2018.1430657

Listhaug, O. (2005). Oil wealth dissatisfaction and political trust in Norway: A resource curse? *West European Politics*, *28*(4), 834–851. https://doi.org/10.1080/01402380500216955

Maack, M., & Davidsdottir, B. (2015). Five capital impact assessment: Appraisal framework based on theory of sustainable well-being. *Renewable and Sustainable Energy Reviews*, *50*, 1338–1351. https://doi.org/10.1016/j.rser.2015.04.132

Manderscheid, K. (2012). Planning Sustainability: Intergenerational and Intragenerational Justice in Spatial Planning Strategies. *Antipode*, *44*(1), 197–216. https://doi.org/10.1111/j.1467-8330.2011.00854.x

Marex. (2017). Norway Opens Arctic Lease Sale. *The Marinetime Executive*. https://maritime-executive.com/article/norway-opens-arctic-lease-sale

Marks, R. (2017). The Opportunity Costs of the Alaska Permanent Fund Dividend. *Journal of Economics and Public Finance*, *3*(3), 430. https://doi.org/10.22158/jepf.v3n3p430

Mccauley, R. D., Day, R. D., Swadling, K. M., Fitzgibbon, Q. P., Watson, R. A., & Semmens, J. M. (2017). *Widely used marine seismic survey air gun operations negatively impact zooplankton*. *February 2018*. https://doi.org/10.1038/s41559-017-0195

McDowell Group. (2014). *The Role of the Oil and Gas Industry in Alaska' s Economy* (Issue May).

McDowell Group. (2017). *The Role of the Oil and Gas Industry in Alaska ' s Economy* (Issue May).

MCDowell Group. (2011). *The Role of the Oil and Gas Industry in Alaska' s Economy*.

McFarlane, C., & Robinson, J. (2012). Introduction-experiments in comparative urbanism. *Urban Geography*, *33*(6), 765–773. https://doi.org/10.2747/0272-3638.33.6.765

Mckenzie-Sutter, H. (2018). Largest oil spill in N.L. history raises new questions about province's fast-growing oil industry. *Global News*. https://globalnews.ca/news/4767775/newfoundland-questions-oil-spill/

McKenzie-Sutter, H. (2019). Oil spills leave regulator unhappy with performance of N.L.'s offshore industry. *The Canadian Press*. https://atlantic.ctvnews.ca/oil-spills-leave-regulator-unhappy-with-performance-of-n-l-s-offshore-industry-1.4556079

McKinnon, H., Muttitt, G., & Trout, K. (2017). *The Sky 's Limit Norway: Why Norway Should Lead the Way in a Managed Decline of Oil and Gas Extraction*. http://priceofoil.org/content/uploads/2017/08/The-Skys-Limit-Norway-1.pdf

Meadows, D. H., Meadows, D. L., Randers, J., & Ill, W. W. B. (1972). The limits to growth: a report to the club of Rome. In *Universe Books*. http://matematicas.udea.edu.co/~actubiol/actualidadesbiologicas/raba1973v2n3art4.pdf

Mercer, G. (2019). *Newfoundland's offshore oil gamble*. The Narwhal. https://thenarwhal.ca/newfoundlands-offshore-oil-gamble/

Mercer, J. (2020). Noia, CAPP seek federal incentives for offshore amid plummeting oil prices, pandemic. *The Telegram*. https://www.thetelegram.com/news/local/newfoundland-and-labrador-offshore-industry-in-crisis-mode-442338/

Mercer, N., Sabau, G., & Klinke, A. (2017). "Wind energy is not an issue for government": Barriers to wind energy development in Newfoundland and Labrador, Canada. *Energy Policy*, *108*(May), 673–683. https://doi.org/10.1016/j.enpol.2017.06.022

Mertins-Kirkwood, H. (2017). *Tracking progress: Evaluating government plans and actions to reduce greenhouse gas emissions in Canada* (Issue May). https://www.policyalternatives.ca/sites/default/files/uploads/publications/National Office/2017/05/Tracking_Progress_ACW.pdf

Meyer, C. B. (2001). A Case in Case Study Methodology. *Field Methods*, *13*(4), 329–352. https://doi.org/10.1177/1525822X0101300402

Mikkelsen, A., Haley, S., & Øygarden, O. (2008). Expanding oil and gas activities on the North slope of Alaska. In O. langhelle Aslaug mikkelsen (Ed.), *Artic Oil and Gas: Sustainability at Risk?* Routledge.

Miller, K. F. (2007). The Implications of UNCLOS for Canada's Regulatory Jurisdiction in the Offshore-The 200-Mile Limit and the Continental Shelf. *Dalhousie Law*

Journal, *30*(2), 341–382. http://sfx.scholarsportal.info/guelph/docview/763181848?accountid=11233%0Ahttp://sfx.scholarsportal.info/guelph?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=unknown&sid=ProQ:ProQ%3Acbcacomplete&atitle=The+Implications+of+UNCLOS+for+C

Ministry of Finance. (2008). *National budget 2009*. https://www.regjeringen.no/en/topics/the-economy/the-government-pension-fund/national-budget-2009---chapter-5/id531216/

Mobaraki, O. (2014). Strategic Planning and Urban Development By Using the Swot Analysis. the Case of Urmia City. *Romanian Review of Regional Studies*, *X*(2), 47–54. http://rrrs.reviste.ubbcluj.ro/arhive/Artpdf/v10n22014/RRRS10220145.pdf

Moe, T., Alfsen, K. H., & Greaker, M. (2013). Sustaining Welfare for Future Generations : A Review Note on the Capital Approach to the Measurement of Sustainable Development. *Challenges in Sustainability*, *1*(1), 16–26. https://doi.org/10.12924/cis2013.01010016

Murphy, R. P., & Clemens, J. (2013). *Reforming Alberta's Heritage Fund: Lessons from Alaska and Norway*.

Muthukumaran, R. (2019). *Newfoundland & Labrador Budget 2019*.

Nalcor Energy. (2018). *Independent Resource Assessment reveals oil and gas potential offshore Newfoundland and Labrador continues to grow*. http://exploration.nalcorenergy.com/press-release/independent-resource-assessment-

reveals-oil-and-gas-potential-offshore-newfoundland-and-labrador-continues-to-grow/

National Oceanic and Atmospheric Administration. (2016). *Raw Incident Data*. Incident News. https://incidentnews.noaa.gov/raw/index

Neill, M. O. (2016). Creating a More Equal Future. In A. H. and E. Wallis (Ed.), *Future Left: Can the left respond to a changing society* (pp. 91–103). A Fabian Book.

Newfoundland & Labrador Statistics Agency. (2018). *Total Oil Production*. https://www.stats.gov.nl.ca/Statistics/Industry/PDF/Oil_Production.pdf

Newfoundland & Labrador Statistics Agency. (2019). *Annual Estimates of Population for Canada, Provinces and Territories, from July 1, 1971 to July 1, 2019*. https://stats.gov.nl.ca/Statistics/Topics/population/PDF/Annual_Pop_Prov.PDF

Norgaard, K. M. (2006). "we don't really want to know." *Organization & Environment*, *19*(3), 347–370. https://doi.org/10.1177/1086026606292571

Norges Bank Investment Management. (2018). *Government Pension Fund - Global Annual Report* (Issue 21). http://www.norges-bank.no/Upload/73979/NBIM_AnnualReport08_rev.pdf

Norges Bank Investment Management. (2019a). *About the fund*. The Fund. https://www.nbim.no/en/the-fund/about-the-fund/

Norges Bank Investment Management. (2019b). *Market value*. https://www.nbim.no/en/the-fund/market-value/

Norwegian Ministry of Petroleum and Energy. (2011). *Meld. St. 28 (2010–2011) Report to the Storting (white paper) An industry for the future – Norway´s petroleum activities*.

Norwegian Petroleum. (2019a). *Employment in the Petroleum Industry*. https://www.norskpetroleum.no/en/economy/employment/#regional-employment

Norwegian Petroleum. (2019b). *Exports of Oil and Gas*. https://www.norskpetroleum.no/en/production-and-exports/exports-of-oil-and-gas/

Norwegian Petroleum. (2019c). *The Government's Revenues*. https://www.norskpetroleum.no/en/economy/governments-revenues/

Norwegian Petroleum Directorate. (2018). *The Shelf 2017*. http://www.npd.no/Global/Engelsk/1-Whats-new/News/The-Shelf-2017/Sokkelaret2017-samlet-E.pdf

Nyambi, G. N. (2012). *A comparative swot analysis of the national agricultural extension program organization to determine best-fit program model : a case study of the north west and south west regions of cameroon* (Issue May). Texas A&M University.

OECD. (2004). *Measuring Sustainable Development Integrated Economic, Environmental and Social Frameworks*. http://www.oecd.org/site/worldforum/33703829.pdf

OECD. (2020a). *How's Life? 2020*. OECD Publishing.

OECD. (2020b). *How ' s Life in Norway?* (Issue May).

Office of the Auditor General. (2018). *Pension Investment Committee Province of Newfoundland and Labrador Pooled Pension Fund 2018 Annual Report*.

Oil and Gas Industry Development Council. (2018). *The Way forward on Oil and Gas: ADVANCE 2030 Newfoundland and Labrador Oil and Gas Industry*. https://www.gov.nl.ca/nr/files/advance30-pdf-oil-gas-sector-final-online.pdf

Oiledwildlife.eu. (2018). *Unknown number of birds affected by Newfoundland oil spill*. http://www.oiledwildlife.eu/news/unknown-number-birds-affected-newfoundland-oil-spill

Olawuyi, D. S., & Onifade, T. T. (2018). Promoting Functional Distributive Justice in the Nigerian Sovereign Wealth Fund System: Lessons from Alaska and Norway. In C. Eboe-Osuji & E. Emeseh (Eds.), *Nigerian Yearbook of International Law 2017* (pp. 317–354). Springer International Publishing. https://doi.org/10.1007/978-3-319-71476-9_14

Olsen, W. H. (2002). Petroleum Revenue Management–an Industry Perspective. *Oil, Gas, Mining and Chemicals Department of the WBG and ESMAP Workshop on Petroleum Revenue Management*.

Onditi, F. (2019). From resource curse to institutional incompatibility: a comparative study of Nigeria and Norway oil resource governance. *Africa Review*, *11*(2), 152–171. https://doi.org/10.1080/09744053.2019.1631658

Onifade, T. T. (2015). Peoples-Based Permanent Sovereignty over Natural Resources:

Toward Functional Distributive Justice? *Human Rights Review*, *16*(4), 343–368. https://doi.org/10.1007/s12142-015-0375-1

Osborne, N. (2014). *Hibernia Offshore Operations Simulator Facility under Construction at Marine Institute*. Memorial University. https://www.mun.ca/research/news.php?id=3013&type=news

Øterud, Ø. (2005). Introduction: The peculiarities of Norway. *West European Politics*, *28*(4), 705–720. https://doi.org/10.1080/01402380500216591

Paliwal, R. (2006). EIA practice in India and its evaluation using SWOT analysis. *Environmental Impact Assessment Review*, *26*(5), 492–510. https://doi.org/10.1016/j.eiar.2006.01.004

Palladini, J. (2015). *Achieving Sustainable Prosperity: Benchmarking the Competitiveness of Newfoundland and Labrador* (Issue April).

Paraskova, T. (2017). Alaska Needs Much Higher Oil Prices To Reverse Its Oil Fortunes. *Oilprice.Com*. https://oilprice.com/Energy/Oil-Prices/Alaska-Needs-Much-Higher-Oil-Prices-To-Reverse-Its-Oil-Fortunes.html

Patton, J. R. (2012). Sovereign wealth funds in a globalized world. *The Journal of the AIB-SE*, *6*(1), 1–26.

Paul, I., Howard, P., & Schwartz, J. A. (2017). *The Social Cost of Greenhouse Gases and State Policy: A Frequently Asked Questions Guide* (Issue October). http://policyintegrity.org/files/publications/SCC_State_Guidance.pdf

Peters, G. P., & Hertwich, E. G. (2006). Pollution embodied in trade : The Norwegian case. *Global Environmental Change*, *16*, 379–387. https://doi.org/10.1016/j.gloenvcha.2006.03.001

Pillarisetti, J. R. (2005). The World Bank's genuine savings T measure and sustainability. *Ecological Economics*, *55*, 599–609. https://doi.org/10.1016/j.ecolecon.2005.01.018

Pindyck, R. S. (2019). The social cost of carbon revisited. *Journal of Environmental Economics and Management*, *94*, 140–160. https://doi.org/10.1016/j.jeem.2019.02.003

Poelzer, G. (2015). *What Crisis ? Global Lessons from Norway for Managing Energy-Based Economies* (Issue February).

Polus, A., & Tycholiz, W. J. (2017). The norwegian model of oil extraction and revenues management in uganda. *African Studies Review*, *60*(3), 181–201. https://doi.org/10.1017/asr.2017.88

Pretes, M. (2005). *Renewing the Wealth of Nations*. The Australian National University.

Quilgars, D., Elsinga, M., Jones, A., Toussaint, J., Ruonavaara, H., & Naumanen, P. (2009). Inside qualitative, cross-national research: Making methods transparent in a EU housing study. *International Journal of Social Research Methodology*, *12*(1), 19–31. https://doi.org/10.1080/13645570701804292

Rachid, G., & El Fadel, M. (2013). Comparative SWOT analysis of strategic environmental assessment systems intheMiddle East and North Africa region. *Journal of Environmental Management*, *125*, 85–93.

https://doi.org/10.1016/j.jenvman.2013.03.053

Rainforest Foundation Norway. (2019). *Press release: Norway's Government Pension Fund acts against deforestation: divests major agricultural companies*. https://www.regnskog.no/en/news/norways-government-pension-fund-acts-against-deforestation-divests-major-agricultural-companies

Ramsey, D. (2014). Building a High North Growth Pole : The Northern Norwegian City of Hammerfest in the Wake of. *Journal of Rural and Community Development*, *9*(1), 57–71.

Reiche, D. (2010). Sovereign wealth funds as a new instrument of climate protection policy? A case study of Norway as a pioneer of ethical guidelines for investment policy. *Energy*, *35*(9), 3569–3577. https://doi.org/10.1016/j.energy.2010.04.030

Reid, S., & Collins, J. (2012). *Oil, Politics and Public Policy: A case study of Newfoundland and Labrador*. https://www.cpsa-acsp.ca/papers-2012/Reid-Collins.pdf

Research Council of Norway. (2012). *Long-term effects of discharges to sea from petroleum-related activities. The results of ten year's research*.

Resource Development Council. (n.d.). *ALASKA'S OIL & GAS INDUSTRY*. Our Industries. https://www.akrdc.org/oil-and-gas

Roach, R., Fellow, S., Collins, J., & Navarro-Génie, M. (2015). *A Good Problem to Have Lessons for Atlantic Canada from Alberta's Experience with Natural Resource Revenue Policy Paper* (Issue June). www.AIMS.ca

Roberts, J. T. (2001). Global inequality and climate change. *Society and Natural Resources*, *14*(6), 501–509. https://doi.org/10.1080/08941920118490

Roberts, T. (2020). An N.L. oil industry in “crisis mode” will need more federal help, says lobby group. *CBC News*. https://www.cbc.ca/news/canada/newfoundland-labrador/oil-support-pandemic-1.5536459

Roman, P., & Thiry, G. (2016). The inclusive wealth index. A critical appraisal. *Ecological Economics*, *124*, 185–192. https://doi.org/10.1016/j.ecolecon.2015.12.008

Rosen, Y. (2019). Alaska forecast predicts North Slope oil output to continue slide. *Reuters*. https://www.reuters.com/article/us-usa-oil-alaska/alaska-forecast-predicts-north-slope-oil-output-to-continue-slide-idUSKBN1YD18I

Ross, M. L. (2015). What Have We Learned About the Resource Curse? *The Annual Review of Political Science*, 239–261. https://doi.org/10.1146/annurev-polisci-052213-040359

Ryggvik, H. (2015). A short history of the norwegian oil industry: From protected national champions to internationally competitive multinationals. *Business History Review*, *89*(1), 3–41. https://doi.org/10.1017/S0007680515000045

Sachs, J. D., & Warner, A. M. (1997). Natural Resource Abundance and Natural Growth. *National Bureau of Economic Research*, 1–50. http://www.cid.harvard.edu/ciddata/warner_files/natresf5.pdf

Sachs, J. D., & Warner, A. M. (2001). The curse of natural resources. *European*

Economic Review, *45*(4–6), 827–838. https://doi.org/10.1016/S0014-2921(01)00125-8

Saunders, C. M., Kaye-Blake, W., Campbell, R., Dalziel, P., & Kolandai, K. (2010). The Capital-Based Sustainability Indicators as a Possible Way for Measuring Agricultural Sustainability. In *Agricultural Research Group on sustainability*.

Sauter, M. B. (2019). From insurance to broadcasting: Here's the largest industry in your state. *USA Today*. https://www.usatoday.com/story/money/2019/08/14/oil-and-gas-insurance-hospitals-largest-industry-in-your-state/39936017/

Savin, V. V., & Rovenskaya, E. A. (2011). Remarks on fair wealth accumulation in Russia. *Environment, Development and Sustainability*, *13*(5), 923–937. https://doi.org/10.1007/s10668-011-9298-4

Schlosberg, D. (2013). Theorising environmental justice: The expanding sphere of a discourse. *Environmental Politics*, *22*(1), 37–55. https://doi.org/10.1080/09644016.2013.755387

Sengupta, S. (2017). Both Climate Leader and Oil Giant? A Norwegian Paradox. *The Newyork Times*. https://www.nytimes.com/2017/06/17/world/europe/norway-climate-oil.html

Sequeira, D., & Sarkar, S. (2017). Global Experiences in Benefit Sharing. *Local Shares in Hydropower Workshop*. https://www.ifc.org/wps/wcm/connect/a5374576-0c60-475f-a2a1-46c05ba97607/3++IFC+Global+Examples+of+Benefit+Sharing.pdf?MOD=AJPER

ES

Seth Kwei, E. (2019). Oil prices and Economic Growth: Cases of Canada and USA. In *Major Paper*.

Shao, S., & Yang, L. (2014). Natural resource dependence, human capital accumulation, and economic growth: A combined explanation for the resource curse and the resource blessing. *Energy Policy*, *74*(C), 632–642. https://doi.org/10.1016/j.enpol.2014.07.007

Shields, D. J. (1998). Nonrenewable Resources in Economic , Social , and Environmental Sustainability. *Nonrenewable Resources*, *7*(4), 251–261.

Söderholm, P., & Svahn, N. (2015). Mining, regional development and benefit-sharing in developed countries. *Resources Policy*, *45*, 78–91. https://doi.org/10.1016/j.resourpol.2015.03.003

Sollund, R. (2012). Oil production, climate change and species decline: the case of Norway. In R. White (Ed.), *Climate Change from a Criminological Perspective* (pp. 135–147). Springer. https://doi.org/DOI https://doi.org/10.1007/978-1-4614-3640-9

Solow, R. M. (1974). Intergenerational Equity and Exhaustible Resources. *The Review of Economic Studies*, *41*(1974), 29–45. https://doi.org/10.1377/hlthaff.23.5.142

Sovereign Wealth Fund Institute. (2018). *Sovereign Wealth Fund Institute*. https://www.swfinstitute.org/sovereign-wealth-fund-rankings/

Sovereign Wealth Fund Institute. (2020). *List of 122 Sovereign Wealth Fund Profiles by*

Region. https://www.swfinstitute.org/profiles/sovereign-wealth-fund

Stantec Consulting Ltd. (2009). *Socio-Economic Benefits From Petroleum Industry Activity in Newfoundland and Labrador, 2005-2007*.

Stantec Consulting Ltd. (2012). *Socio-economic Benefits from Petroleum Industry Activity in Newfoundland and Labrador, 2008 - 2010*.

Stantec Consulting Ltd. (2014). *Socio-economic Benefits Petroleum Industry Activity in Newfoundland & Labrador, 2011-2014*.

Stantec Consulting Ltd. (2019). *Socio-economic Benefits from Petroleum Activity in Newfoundland and Labrador, 2015 - 2017*.

Statistics Canada. (2020). *Table 36-10-0488-01 Output, by sector and industry, provincial and territorial (x 1,000,000)*. https://doi.org/https://doi.org/10.25318/3610048801-eng

Statistics Norway. (2019a). *Emissions to air*. https://www.ssb.no/en/statbank/table/09288/

Statistics Norway. (2019b). *External trade in goods*. https://www.ssb.no/en/utenriksokonomi/statistikker/muh/aar

Statistics Norway. (2019c). *Wages and salaries, employment and productivity by industry, contents and year*. https://www.ssb.no/en/statbank/table/09174/tableViewLayout1/

Stiansen, J. E., & Filin, A. A. (2008). *Joint PINRO/IMR report on the state of the barents sea ecosystem in 2007 with expected situation and considerations for management*.

https://www.hi.no/filarkiv/2008/01/Pinro_nr_.1_2008.pdf/en

Sun, X., Li, J., Wang, Y., & Clark, W. W. (2014). China's sovereign wealth fund investments in overseas energy: The energy security perspective. *Energy Policy*, *65*, 654–661. https://doi.org/10.1016/j.enpol.2013.09.056

Suncor Energy. (2020). *Terra Nova*. https://www.suncor.com/en-ca/about-us/exploration-and-production/east-coast-canada/terra-nova

Sustainability Accounting Standards Board. (2018). *Oil & Gas – Exploration & Production*.

Sustainable Prosperity. (2014). *The Importance of Natural Capital to Canada' s Economy: Policy Brief*. *March*, 1–23.

Sylves, R. T., & Comfort, L. K. (2012). The Exxon Valdez and BP Deepwater Horizon oil spills: Reducing risk in socio-technical systems. *American Behavioral Scientist*, *56*(1), 76–103. https://doi.org/10.1177/0002764211413116

Szasz, A., & Meuser, M. (1997). Environmental Inequalities: Literature Review and Proposals for New Directions in Research and Theory. In *Current Sociology* (Vol. 45, Issue 3, pp. 99–120). https://doi.org/10.1177/001139297045003006

Talberth, J., & Wysham, D. (2017). *Beyond Fossil Fuels*. https://doi.org/10.5822/978-1-61091-570-0_15

Tehranchian, A. M., & Seyyedkolaee, M. A. (2017). The impact of oil price volatility on the economic growth in Iran: An application of a threshold regression model.

International Journal of Energy Economics and Policy, *7*(4), 165–171.

Temper, L., Del Bene, D., & Martinez-Alier, J. (2018). Mapping the frontiers and front lines of global environmental justice: the EJAtlas. *Journal of Political Ecology*, *22*(1), 255. https://doi.org/10.2458/v22i1.21108

"The Canadian Press." (2019). *Hibernia suspends oil production after 12,000-litre spill off Newfoundland*.

the Conference Board of Canada. (2017). *Economy*. Provincial and Territorial Ranking. https://www.conferenceboard.ca/hcp/provincial/economy.aspx?pf=true

the Ministry of Petroleum and Energy. (2014). *FACTS 2014 - The norwegian petroleum sector*.

The Norwegian Ministry of Labour and Social Affairs. (2016). *UNECE National Report on Ageing 2016-NORWAY Follow-up to the Regional Implementation Strategy (RIS) of the Madrid International Action Plan on Ageing (MIPAA)* (Issue November). https://www.unece.org/fileadmin/DAM/pau/age/country_rpts/2017/NOR_report.pdf

The Telegram. (2019). *FISH-NL calls for halt to seismic testing off Newfoundland and Labrador's coasts*. https://www.thetelegram.com/business/fish-nl-calls-for-halt-to-seismic-testing-off-newfoundland-and-labradors-coasts-274072/

The World Bank. (1997). *Expanding the measure of wealth: indicators of environmentally sustainable development*. http://documents.worldbank.org/curated/en/555261468765258502/Expanding-the-measure-of-wealth-indicators-of-environmentally-sustainable-development

The World Bank. (2006). *the WEALTH of Nations ? Measuring Capital for the 21st Century*.

The World Bank. (2011). *The Changing Wealth of Nations: Measuring Sustainable Development in the New Millenium*. https://doi.org/10.1596/978-0-8213-8488-6

The World Bank. (2018). *The Changing Wealth of Nations 2018: Building a Sustainable Future*. https://doi.org/10.1596/978-1-4648-1046-6

Tol, R. S. J. (2019). A social cost of carbon for (almost) every country. *Energy Economics*, *83*, 555–566. https://doi.org/10.1016/j.eneco.2019.07.006

Truman, E. M. (2007). Sovereign wealth funds: The need for greater transparency and accountability. In *Peterson Institute- for International Economics* (Vol. 6, Issue 2007). https://doi.org/10.2469/faj.v66.n3.1

Truman, E. M. (2009). A Blueprint for Sovereign Wealth Fund Best Practices. *Revue d'Économie Financière*, *9*(1), 429–451. https://doi.org/10.3406/ecofi.2009.5526

Truman Phillips, J. P. (2008). *Collecting Rent: Political Culture And Oil And Gas Fiscal Policy in Alberta, Canada and Norway* (Issue August). The university of british columbia.

Trustee Council. (2010). *Exxon Valdez Oil Spill*. Questions and Answers.

U.S. Energy Information Administration. (2016). *Country Analysis Brief : Norway*. https://www.eia.gov/beta/international/analysis_includes/countries_long/Norway/norway.pdf

U.S. Energy Information Administration. (2018a). *Profile Analysis*. ALASKA State Profile and Energy Estimates. https://www.eia.gov/state/analysis.php?sid=AK#32

U.S. Energy Information Administration. (2018b). *Profile Analysis*. ALASKA State Profile and Energy Estimates. https://www.eia.gov/state/analysis.php?sid=AK#17

U.S. Energy Information Administration. (2019a). *Crude Oil Production*. Petroleum & Other Liquids. https://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbbl_a.htm

U.S. Energy Information Administration. (2019b). Short-Term Energy Outlook (STEO) Forecast highlights. In *US EIA - Short-Term Energy Outlook* (Issue October). https://doi.org/10.1136/bmjopen-2015-008636

U.S. Energy Information Administration. (2020a). *Crude Oil Production*. Petroleum & Other Liquids. https://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbblpd_a.htm

U.S. Energy Information Administration. (2020b). *Short-Term Energy Outlook*. https://www.eia.gov/outlooks/steo/report/prices.php

U.S. Energy Information Administration. (2020c). *Short-Term Energy Outlook Data Browser*. Short-Term Energy Outlook. https://www.eia.gov/outlooks/steo/data/browser/#/?v=8&f=A&s=0&start=1997&end=2021&linechart=WTIPUUS&maptype=0&ctype=linechart

UN Environment. (2018). Financing the SDGs: the Role of Sovereign Wealth Funds for Green Investment. In *Green Economy*. https://sites.tufts.edu/sovereignet/files/2018/02/Policy-brief-Capapé-SWF-Green-Investments-2018-1.pdf

United States Environmental Protection Agency. (2017). *The Social Cost of Carbon*. https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html

UNU-IHDP and UNEP. (2014). *Inclusive Wealth Report 2014*. 370. https://doi.org/Cambridge: Cambridge University Press

UNU-IHDP, & UNEP. (2012). Inclusive Wealth Report 2012 – Measuring Progress Toward Sustainability. In *International Journal of Sustainability in Higher Education* (Vol. 13, Issue 4). https://doi.org/10.1108/ijshe.2012.24913daa.006

US Environmental Protection Agency. (2017). *Global Greenhouse Gas Emissions Data*. https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data

Uwasu, M., & Yabar, H. (2011). Assessment of sustainable development based on the capital approach. *Ecological Indicators*, *11*(2), 348–352. https://doi.org/https://doi.org/10.1016/j.ecolind.2010.06.002

Van de Kerk, G., & Manuel, A. R. (2008). A comprehensive index for a sustainable society: The SSI - the Sustainable Society Index. *Ecological Economics*, *66*(2–3), 228–242. https://doi.org/10.1016/j.ecolecon.2008.01.029

van Eyden, R., Difeto, M., Gupta, R., & Wohar, M. E. (2019). Oil price volatility and economic growth: Evidence from advanced economies using more than a century's data. *Applied Energy*, *233–234*(February 2018), 612–621. https://doi.org/10.1016/j.apenergy.2018.10.049

Visher, M. G., & Remoe., S. O. (1984). A Case Study of a Cuckoo Nestling : Norwegian Oil Sector. *Politics and Society*, *13*, 295–320.

Vivien, F. (2018). Sustainable development: An overview of economic proposals. *Surveys and Perspectives Integrating Environment and Society*, *1*(November 2008), 2–8.

Voyer, R. (1983). *Offshore Oil: Opportunities for Industrial Development and Job Creation*. James Lorimer & Company Ltd.

Wake, H. (2005). Oil refineries: A review of their ecological impacts on the aquatic environment. *Estuarine, Coastal and Shelf Science*, *62*(1–2), 131–140. https://doi.org/10.1016/j.ecss.2004.08.013

Waldholz, R. (2016). Same but different : how Alaska and Norway are handling low oil prices. *Alaska Public Media*. https://www.alaskapublic.org/2016/05/17/same-but-different-how-alaska-and-norway-are-handling-low-oil-prices/

Walker, B. (2018). *Why I reduced the Permanent Fund dividend*. Anchorage Daily News. https://www.adn.com/opinions/2018/07/16/why-i-reduced-the-permanent-fund-dividend-2/

Wang, Y., Wu, C., & Yang, L. (2013). Oil price shocks and stock market activities: Evidence from oil-importing and oil-exporting countries. *Journal of Comparative Economics*, *41*(4), 1220–1239. https://doi.org/10.1016/j.jce.2012.12.004

Warhurst Alyson. (2002). Sustainability Indicators and Sustainability Performance Management. *Mining, Minerals and Sustainable Development*, *43*, 129. http://pubs.iied.org/pdfs/G01026.pdf

WCED. (1987). *Report of the World Commission on Environment and Development: Our Common Future*.

Weitzman, M. L. (2016). Some Theoretical Connections Among Wealth, Income, Sustainability, and Accounting. *NBER Working Paper Series*, 20. http://www.nber.org/papers/w22060

Welfareinfo. (2017). *Poverty in Alaska*. https://www.welfareinfo.org/poverty-rate/#by-state

Wenar, L. (2008). Property Rights and the Resource Curse. *Philosophy Public Affairs*, *36*(1), 2–32. https://doi.org/https://doi.org/10.1111/j.1088-4963.2008.00122.x

Widerquist, K., & Howard, M. W. (2012a). *Alaska's Permanent Fund Dividend: Examining its Suitability as a Model*. Palgrave Macmillan.

Widerquist, K., & Howard, M. W. (2012b). Introduction: A Model Ready For Adaptation. In *Alaska's Permanent Fund Dividend: Examining its Suitability as a Model*. Palgrave Macmillan.

Wood Mackenzie. (2018). *Newfoundland & Labrador Competitiveness in Oil & Gas Investment*. *February*. https://www.nr.gov.nl.ca/nr/publications/energy/Competitiveness_Oil_Gas_Investment.pdf

World Economic Forum. (2017). The Global Human Capital Report 2017: Preparing for the future of work. In *World Economic Forum* (Vol. 0). https://doi.org/ISBN 978-1-944835-10-1

World Oil. (2019). *Assessment reveals significant oil and gas potential offshore Newfoundland*. https://www.worldoil.com/news/2019/10/3/assessment-reveals-

significant-oil-and-gas-potential-offshore-newfoundland

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks.

Zhao, Y. (2002). Measuring the Social Capital of Laid-off Chinese Workers. *Current Sociology*, *50*(4), 555–571. https://doi.org/10.1177/0011392102050004005