Opportunities for Growth through the Environmental Goals and Sustainable Prosperity Act

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Group 16
Acknowledgments

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<tr>
<td>CFSNS</td>
<td>Canadian Federation of Students Nova Scotia</td>
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<tr>
<td>CIM</td>
<td>Construction, Installation, and Manufacturing</td>
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<td>COMFIT</td>
<td>Community Feed-In Tariff</td>
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<td>DFA</td>
<td>Dalhousie Faculty Association</td>
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<td>EAC</td>
<td>Ecology Action Centre</td>
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<td>ECCC</td>
<td>Environment and Climate Change Canada</td>
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<td>ECDVT</td>
<td>European Centre for the Development of Vocational Training</td>
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<td>ECO Canada</td>
<td>Environmental Careers Organization Canada</td>
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<td>EGSPA</td>
<td>Environmental Goal and Sustainable Prosperity Act</td>
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<td>ENS</td>
<td>Efficiency Nova Scotia</td>
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<td>GTO</td>
<td>Graduate to Opportunity</td>
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<td>IPP</td>
<td>Independent Power Producer</td>
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<td>MDEED</td>
<td>Minnesota Department of Employment and Economic Development</td>
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<td>MW</td>
<td>Megawatt</td>
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<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>NSDLAE</td>
<td>Nova Scotia Department of Labour and Advanced Education</td>
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<td>NSDOE</td>
<td>Nova Scotia Department of Energy</td>
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<td>NSE</td>
<td>Nova Scotia Environment</td>
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<td>NSFTB</td>
<td>Nova Scotia Finance and Treasury Board</td>
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<td>NSGEU</td>
<td>Nova Scotia General Employees Union</td>
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<td>NSPI</td>
<td>Nova Scotia Power Inc.</td>
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<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
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<td>OERA</td>
<td>Offshore Energy Resource Association</td>
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<td>Acronym</td>
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<td>OM</td>
<td>Operation and Maintenance</td>
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<td>UNEP</td>
<td>United Nations Environment Program</td>
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<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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<td>USEIA</td>
<td>United States Energy Information Administration</td>
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<td>USNM</td>
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Executive Summary

Background

The *Environmental Goals and Sustainable Prosperity Act* [*EGSPA*], legislated in 2007, aims to promote sustainable environmental and economic growth for the Province of Nova Scotia. As of 2017, the province has achieved 13 out of 25 goals listed in the *Act*. While significant progress has been made in achieving certain goals established by the *Act*, very little has been done to advance *Goal S*: to develop and implement a strategy to grow the province’s green economy (Nova Scotia Environment [NSE], 2017). However, given that *EGPSA* is currently under its 10-year review process, the time is opportune to pressure policymakers into further embedding the transition to a green economy within the *Act*. Recognizing the present opportunity to amend *EGSPA*, the Ecology Action Centre [EAC] enlisted a group of six students within Dalhousie University’s Management without Borders course with to collect data on Nova Scotia’s green economy.

Project Aim

There is a lack of baseline economic data indicating the contribution of green businesses to the economic development of the Province of Nova Scotia. Additionally, there is a lack of data available to demonstrate the potential for the green economy to grow and to contribute to the sustainable prosperity of Nova Scotia. The aim of this report was to collect baseline data on economic activity of green businesses in Nova Scotia, within the renewable energy sector and sustainable education sector, and to identify their contribution to job creation, revenue generation, and wage bills paid within the province. Furthermore, this study set out to understand the economic costs/benefits of the renewable education sector and sustainable education sector discussed within the literature to further demonstrate their respective contributions to Nova Scotia’s economy. Lastly, the report strove to understand strategic areas for future investments in the renewable energy and sustainable education sectors as well as suggested strategies for the future quantification of Nova Scotia’s green economy.

Methods for Data Collection
A combination of secondary and primary data was used in order to achieve all of the project’s objectives. Within the sustainable education sector, primary data was collected on the number of students graduating from sustainability programs at postsecondary institutions in Nova Scotia from graduation lists that were published online. Using the faculty lists and collective agreements provided online by Dalhousie University, the report determined the number of people employed and the range of wage bills paid by sustainable-related programs at Dalhousie University. In order to quantify baselines estimates of economic activity occurring within the renewable energy, secondary data was collected through a literature review conducted using Google Scholar and Google search engines. Using employment factors found in the literature, employment within the renewable energy sector was calculated. Through a review of annual financial reports provided by Emera – the owner of Nova Scotia’s electricity provider – revenue generation from the sales of renewable electricity was calculated. Lastly, the overall economic impacts of both the renewable energy sector and the sustainable education sector were collected through a literature review carried out within Google Scholar and Google search engines.

Finding and Conclusions

Based on the analysis of available data, this study found that the renewable energy sector supports 848 jobs, equating to about 25% of utilities jobs in the province, and accounts for $349.6 million in revenue generation, contributing around 1% of Nova Scotia’s GDP. Within the sustainable education sector, the report found that 228 jobs were supported by Dalhousie University, with most employees receiving above average incomes ranging between $64,117 to $101,985. The report also found that 368 students graduate annually from the sustainable education programs at Dalhousie University, Cape Breton University, and Acadia University. Should all of these students remain in Nova Scotia upon graduation, they would contribute around $176 million in tax revenues over their wage-earning lifetimes. Through a review of the literature on the economic impacts of renewable energy and sustainable education, the report concluded that the economic, environmental, and social benefits of growing the renewable energy and sustainable education sectors outweigh the costs of taking a business-as-usual approach to economic development.
1. Introduction

1.1 Introduction to the team

The team consists of six members who come from unique backgrounds within the fields of public administration, library and information studies, and resource and environmental studies. While their interests and capabilities vary, the team members all share a common sense of purpose and determination to fulfill the needs of the partner organization and to play a part in influencing policymakers in Nova Scotia to support growth in the green economy. Individually, each of the team members brings a distinct perspective to the project, thus allowing the team as a whole to approach the problem holistically. The unique backgrounds and experience of each team member are as follows:

*Mónica Del Aguila Feijóo, Master of Resource and Environmental Management (MREM)*: A forestry engineer with 8 years of experience developing and implementing Environment, Health and Safety management systems in pulp & paper, oil and mining companies.

*Kathleen Mifflin, Master of Environmental Studies (MES)*: A second year MES student who has ample research experience in the field of environmental studies and a passionate interest to learn more about and mitigate the environmental, socioeconomic and cultural challenges that trouble local, regional and global food systems.

*Yashvi Pathak, Master of Public Administration (MPA)*: A finance professional with 6 years of experience in the field of financial planning, environment, social business and corporate social responsibility.

*Maryam Fazeli, MPA*: A second year MPA student with a background in Biology who has experience in scientific research and a strong interest in policy and environmental issues.

*Lianne Jones, Master of Library and Information Studies (MLIS)*: A second year MLIS student who has a BA in Communication Studies and Sociology and is interested in understanding the role that information plays in decision making process.
Laura Cutmore, MLIS: A second year MLIS student with academic, professional, and activist experience in research, writing, and advocacy on environmental and student issues

1.2 Introduction to the partner

The Ecology Action Centre (EAC) is a non-profit environmental organization based in Halifax, Nova Scotia that advocates for environmental protection and sustainable, equitable development within seven action areas: built environment; coastal and water; energy; food action; marine; transportation; and wilderness (EAC, 2017). Since its foundation in 1971, the EAC has built a large support base of members and volunteers who assist the organization in its mission to achieve a healthy, sustainable economy and environment (EAC, 2017, p.1). Regularly engaging with researchers within fields of natural and social science, the EAC strives to communicate accurate environmental information to the public and policymakers and to promote evidence-based solutions to environmental problems (EAC, 2017, p.1).

1.3 Project overview

The Environmental Goals and Sustainable Prosperity Act (EGSPA) was enacted within the province of Nova Scotia in 2007 to achieve, as the name of the act implies, a set of environmental goals and “sustainable prosperity”, a state wherein the economy, environment, and society can all thrive (EGSPA, 2007, c. 7, s. 2). While some progress has been made on the goals of the act, government initiative to promote the growth of the green economy in Nova Scotia has thus far proved underwhelming and insufficient to achieve a state of “sustainable prosperity” within the province (NSE, 2017). Given that the act is currently undergoing its 10-year review process, there is an opportunity to encourage policymakers to prioritize the green economy and to invest in economic opportunities that would allow the province to meet the environmental goals of EGSPA (Ecology Action Centre [EAC], 2017). In order to demonstrate to policymakers that the green economy is an opportune area for economic growth and investment, baseline data on the economic and social impact of the existing green economy in Nova Scotia is needed (EAC, 2017).

As little is currently known about the green economy in Nova Scotia, the partner organization – EAC - commissioned the MWB Team #16 to collect baseline data on economic activity occurring within the green economy in Nova Scotia and to characterize its contribution
to job creation, revenue generation, and wage bills paid within the province. In addition to characterizing past and present activity within the green economy, the team forecasted the increase in provincial tax revenue generation that could occur through future growth of the green economy. The team collected the necessary data on job creation and revenue generation through a review of grey literature and journal articles. Data from the literature review was then aggregated in order to quantify: 1) current contributions of the green economy to economic development within Nova Scotia; and 2) future economic outcomes of growth within the green economy.

Considering the lack of information available on the green economy in Nova Scotia and Canada (EAC, 2017), at large, the group also incorporated into the project objectives a methodology toolkit for quantifying the green economy. Through a review of journal articles and grey literature, a methodology toolkit was developed in order to demonstrate the wide variety of methods used to quantify the green economy as well as to highlight potential methods that could be used in the future to further quantify the province’s green economy. To further complement the baseline data on the green economy, an additional literature review was done to examine the costs and benefits of investing in sectors of the green economy.

1.4 Project scope

As EGSPA is a provincial act, the geographical scope of the project will be limited to the province of Nova Scotia. Temporally, the analysis will span from 2007 through 2017, consistent with the 10 years that have passed since EGSPA was enacted in 2007. Considering the numerous and varying perspectives on what constitutes a green economy, the project scope will focus on a succinct, clear definition of a green economy: the aggregated economic activity of jobs within industries whose primary purpose is to reduce environmental impacts of human activity and/or conserve elements of the natural environment (ECO Canada, 2010).

Within the green economy, as defined above, a diversity of jobs and industries exist. Accordingly, in order to ensure that a quality analysis can be executed within the timeframe of the project, the project will focus explicitly on the following sectors of the green economy in Nova Scotia: 1) renewable energy; 2) sustainable leadership at post-secondary institutions and community colleges. The former sector was selected for analysis given the numerous plans, policies and acts that have been produced since the legislation of EGSPA to
develop the province’s renewable energy sector and to reduce the emission of greenhouse gases, in line with the reduction targets put forth in EGSPA (Lahey & Doelle, 2012). It is likely, due to the policymaking and funding efforts of the provincial government, that initial economic growth in the renewable energy sector has occurred. Capturing this economic growth will prove useful to the EAC in its future efforts lobbying the government to further invest in the green economy. The second sector, sustainable leadership at post-secondary institutions and community colleges, was selected for analysis considering the important role that universities play as drivers of economic growth, capacity-building, and innovation (Universities Canada, 2017). As emphasized in EGSPA, innovation and capacity-building within sustainable fields are vital to the province’s transition to a green economy (EGSPA, 2007; Ivany, d’Entremont, Fuller, & Bragg, 2014; Environment and Climate Change Canada [ECCC], 2016). As such, demonstrating the capacity of the sustainable education sector to provide income for the province will allow the EAC to lobby business leaders and politicians to further support research and development efforts within sustainable fields at post-secondary institutions and community colleges.

Within the selected sectors of renewable energy and sustainable leadership at post-secondary institutions, data collection was limited to three indicators of economic activity: job provision, revenue generation, and wage bills paid. These indicators were modeled on the indicators used by Efficiency Nova Scotia in the most recent EGSPA progress report (Nova Scotia Environment [NSE], 2017a). EAC described the progress reported by Efficiency Nova Scotia as the “gold standard” to which the MWB group should aspire to in its review of the renewable energy sector and sustainable education sector. Furthermore, these indicators are consistent with the indicators of green economic growth recommended by a Nova Scotian study (Lahey & Doelle, 2012) as well as those that are frequently used within the literature to quantify the green economy (Pollin & Garrett-Peltier, 2009; ClearSky Advisors Inc, 2011; SECOR-KMG, 2013; Jeyakumar, 2016)

1.5 Research problem and objectives

It is evident that the interests of business leaders and policymakers lie in economic growth. Accordingly, a business case must be presented to them that demonstrates the economic growth that has occurred and can occur in the future within sectors of the green economy. As
such, the research problem has been crafted to reflect the lack of data available on economic activity in the green economy that will be required to encourage political and economic decision-makers within the province to invest in the green economy.

Research Problem:

There is a lack of baseline data indicating the contribution of sectors of the green economy to economic development within the province of Nova Scotia. In addition, there is a lack of data available to demonstrate the potential for the green economy to grow and to contribute to the sustainable prosperity of Nova Scotia.

Objectives:

Flowing from the research problem, as defined above, five research objectives were determined. They are listed below in Figure 1.1.

Figure 1.1: Objectives

**Objective 1)** To quantify baselines estimates of economic activity occurring within the following areas of the green economy: 1) renewable energy; and 2) sustainable leadership at post-secondary institutions

**Objective 2)** To quantify potential the potential economic benefits that could result from an improved retention rate of students who have graduated from programs of sustainable leadership at post-secondary institutions in Nova Scotia

**Objective 3)** To highlight the economic impacts associated with the development of renewable energy and sustainable education programs

**Objective 4)** To highlight strategic opportunities for future investments in Nova Scotia’s renewable energy sector and sustainable education sector

Each of the objectives listed above, their outcomes, and the methods used to achieve them will be discussed in detail in the following chapters of the report.
2. Socioeconomic, Environmental, and Political/Legal Context

2.1 Introduction

In order to understand how EGSPA can be used to advance the transition to the green economy, it is important to understand the past, current, and future challenges and opportunities related to the roll-out of the goals within EGSPA, specifically those related to the achievement of the green economy. Thus, before the research process began, information was collected on socioeconomic, environmental, political, and legal factors related to EGSPA and the green economy, as part of a PESTEL analysis. This section will begin by introducing the concept of the green economy and green jobs. Following the conceptualization of the green economy, the progress (or lack thereof) in growing the green economy will be discussed. The socioeconomic, environmental, political, and legal factors either impairing or supporting the transition to the green economy in Nova Scotia will then be unpacked.

2.2 What is a green economy?

While the meanings attributed to the term “green economy” are numerous and diverse, underpinning most definitions is the belief that a more thoughtful, environmentally conscious sort of economic growth can simultaneously ensure economic benefits, social equity, and resource conservation (Organization for Economic Co-operation and Development [OECD], 2011; UNEP, 2011; TD Economics, 2013). While the term ‘green economy’ has increasingly entered the vocabulary of politicians and members of the public alike, there are some critics that question the idea of harmonious economic growth and environmental protection that the term purports (EAC, 2016). According to these critics, the simultaneous pursuit of growth, resource conservation, and social equity is not plausible because economic growth cannot be decoupled from environmental destruction (Jackson, 2009). A reframing of the term to “conservation economy” or “restorative economy” has been suggested in order to de-emphasize the capitalist growth model and re-emphasize the importance of protecting the natural assets through which economic assets are derived (EAC, 2016).

Discussion of the discord between economic growth and environmental protection is absent from many widely used definitions of the green economy. The United Nations Environment Program (UNEP) definition, referenced by both the EAC and the Province of Nova Scotia, describes the green economy: “In its simplest expression, a green economy is low-carbon,
resource efficient and socially inclusive” (UNEP, 2011). Indeed, this is the simplest expression of the green economy, considering that the UNEP report on the green economy in which this definition can be found is 631 pages long. A concise yet imprecise description of the green economy, this definition leaves room for various understandings of the green economy, including those that support a growth-based model of development. A more nuanced interpretation of the green economy, the “inclusive green economy”, recognizes the social and ecological destruction of the current economic model and acknowledges the importance of social justice and inclusiveness in the transition to a green economy (UNEP, 2015).

Amidst the varying definitions and perspectives, it is difficult to delineate and measure existing green economies and the economic benefits they provide (Veltkamp, 2014). Furthermore, the diversity of definitions has propagated a similarly diverse set of methods for quantifying activity of green economies (Ibid, 2014). Nonetheless, measuring baseline data of green economies, such as number of green jobs, is essential “for measuring growth in the green economy over time” (Ibid, 2014, p. 2). As such, in order to fulfill the task of measuring the green economy, the MWB group conceptualized a definition that is based on the Environmental Careers Organization Canada (ECO Canada) definition of the green job as “one that works directly with information, technologies, or materials that minimize environmental impact” (2010, p. 4). Working backwards from this, this report understands the green economy as: the aggregated economic activity of jobs within industries whose primary purpose is to reduce environmental impacts of human activity and/or conserve elements of the natural environment.

2.3 EGSPA: Lack of progress in the pursuit of a green economy

EGSPA puts forth 25 goals and 2 overarching objectives that aim to guide the Province of Nova Scotia in pursuing sustainable economic development, wherein environmental sustainability and economic prosperity occur simultaneously (NSE, 2017a). Themes of the goals include: cleaner energy, climate change, healthy air and water, protection of biodiversity, and leadership in sustainable practices (NSE, 2017a). To monitor the achievement of the 25 goals and 2 overarching objectives, the government of Nova Scotia established a performance calendar and a set of indicators of prosperity (Ibid, 2017). According to the NSE (2017a, p. 1), by March 31, 2017, “13 goals were achieved and 12 goals are still in progress, with 9 of these goals having
associated targets that extend to 2020”. Goals that have been achieved so far include: “the legal protection of 12% of the province’s landmass by 2015”, “the implementation of a comprehensive provincial water strategy by 2010”, and “the creation of an updated energy efficiency rating system for new and existing homes within the province” (Ibid, 2017, p.5). Substantial progress has also been made on the cleaner energy and climate change goals, as, in 2016, the province generated about 28% of in-province electricity from renewable sources and reduced GHG generation in the province to 17% below the 1990 level (NSE, 2017a; NS Power [NSPI], 2017a).

Progress on other goals of the Act remains ongoing. One such goal that has not yet been achieved is “the province develops a strategy by 2014 to advance the growth of the green economy, and implements the strategy accordingly” (NSE, 2017a, p. 5). In the proposed green economy strategy, the province has outlined four focus areas through which a greener economy can be achieved: 1) promoting regulatory certainty for innovation, 2) development of the clean technology sector, 3) promotion of energy and resource efficiency, and 4) greening of companies, services, and products (Province of Nova Scotia, 2014, p.5). Efforts to implement the proposed green economy strategy have been insufficient to advance the transition to a green economy, as noted by the MWB group’s partner organization, the EAC (Province of Nova Scotia, 2014, EAC, 2017).

The achievement of the green economy goal will be necessary to allow for the province to achieve the two long-term environmental and economic objectives described in the Act: to “demonstrate international leadership by having one of the cleanest and most sustainable environments in the world and to improve the Province’s economic performance to a level that is equal to or above the Canadian average” (Lahey & Doelle, 2012, p.2). Thus, while certain environmental goals of the Act have been achieved, the overall long-term vision of an integrated, thriving economy and environment cannot be realized without the development and implementation of a green economy strategy. Fortunately, the lack of progress on the green economy goal has been recognized by the provincial government, as indicated by the Minister of Environment in her recent letter to the Minister’s Round Table on Environment and Sustainable Prosperity (NSE, 2017a). As such, there is an opportunity, as the Act undergoes its 10-year review process, to amend EGSPA to further support the province’s transition to a green economy.
The lack of progress on the green economy goal is consistent with the lack of integration of EGSPA’s environmental goals into provincial economic policy, which results, in part, from the absence of quantitative economic goals in the Act (Lahey & Doelle, 2012). The explicit inclusion of quantitative green economic goals in the Act, such as the number of jobs created in the reduction of greenhouse gas emissions (Ibid, 2012), is necessary to drive economic policymaking that promotes the transition to a green economy. In order for such economic goals to be written into the Act, implemented, and measured over time, baseline data on the green economy in Nova Scotia must be collected (Veltkamp, 2014). Considering this context, the purpose of this project is actually twofold: 1) to collect data on the existing green economy to develop a business case to convince politicians and business leaders to further promote the green economy through EGSPA, and 2) to determine the baseline of the green economy from which future growth targets can be conceptualized and incorporated into EGSPA.

2.4 Legal/Political opportunities and barriers to the green economy

**Federal level:**

The Government of Canada, in support of the Paris Climate Change Agreement adopted in December 2015, is committed to growing a low carbon economy through a plan known as the Pan-Canadian Framework on Clean Growth and Climate Change (ECCC, 2016). The four main components of this framework are: 1) country wide carbon pricing strategy; 2) taking complementary actions to reduce emissions; 3) developing adaptation capacity; and 4) investing in innovation and jobs in the clean technology sector (Ibid, 2016). An outcome of the Pan-Canadian Framework on Clean Growth and Climate Change was the $2 billion federal Low Carbon Economy Fund announced in June (ECCC, 2017), set aside to help the provinces fund their transition to a renewable economy. Opportunities for job creation and investments in clean technology are provided through the Sustainable Technology Development Canada (ECCC, 2016)

While the Canadian government has signed onto national and international agreements regarding climate change, and the growth of the green economy, they simultaneously hinder this progress by supporting the growth of the fossil fuel industry. The federal government provides $3.3 billion each year in subsidies to the fossil fuel industry (Milman, 2016). Since signing onto
the Paris Agreement and creating the Pan-Canadian Framework on Clean Growth and Climate Change, the federal government has approved three new fossil fuel projects, including Kinder Morgan’s Trans Mountain pipeline expansion project (Wingrove, 2016) and Enbridge’s Line 3 pipeline (Enbridge, 2017), which would expand the Alberta oil sands at a time when scaling down oil sands production and building up the renewable industry is imperative to meet global climate change targets.

**Provincial level:**

Working towards the goals of EGSPA has not been a priority for the current provincial government. While Nova Scotia did achieve Canada’s national 2030 emissions reduction target by 2015, this achievement was realized due to policy changes mandating decreased reliance on coal and oil and increased reliance on renewables, but also due to a decreased demand in electricity, resulting from outmigration of people and companies from the province (Hughes, 2016).

In recent years, the provincial government has made many decisions that have bolstered the fossil fuel industry, including approving the controversial Alton Gas natural gas storage project (Withers, 2016), and the Donkin coal mine, 15 years after the last Cape Breton coal mine had closed (Ludlow, 2017). In addition, Nova Scotia has reached an agreement with the Federal Government to continue using coal-fired electric plants past the year 2030 (Withers, 2016) which would reduce motivations for moving away from burning fossil fuels for electricity.

Approving tire burning as a source of fuel also goes against environmentally-conscious practices (NSE, 2017b). Ending the Community Feed-In Tariff (COMFIT) program shows that the provincial government is not committed to growing the green economy, as this program supported the completion of more than 100 community-led renewable energy projects, contributing to Nova Scotia’s achievement of having 26.6 percent of its electricity produced by renewables by 2016 (The Canadian Press, 2015; NSDOE, n.d.b; NSPI, 2016). These decisions are clear indicators that the current provincial government has stalled in working toward meeting the goals of EGSPA.

Despite the recent lack of political will to work towards achieving the goals of EGSPA, the Act is part of provincial law, which gives weight to the necessity for the provincial government to continue to move ahead with meeting its targets. Other policies and programs that
have been developed out of EGSPA have provided opportunities for progress toward reaching EGSPA’s goals. The Renewable Electricity Plan outlined a plan to achieve ambitious levels of renewable electricity generation (Lahey & Doelle, 2012). Opportunities for job creation and investments in green technology have been provided by programs such as the Clean Technology Fund, the Nova Scotia Graduate Scholarship, and Fundy Ocean Research Centre for Energy (Province of Nova Scotia, 2014; Nova Scotia Department of Labour and Advanced Education [NSDLAE], 2014; NSDOE, 2015b). To further advance green job creation through post-secondary education and job retraining from the fossil fuel industry, the province could work with policies such as the Community Colleges Act, 1995-1996, c.4 and the Adult Learning Act, 2010, c.10.

2.5 Environmental Opportunities and Barriers to the Green Economy

In spite of the political barriers that trouble the transition to a green economy, Nova Scotia is privileged to have abundant natural renewable resources, which allows the province great potential for the development and production of renewable energy (Nova Scotia Co-Operative Council, 2017). The province is surrounded by water with approximately 13,300 km of coastline, and thus it is highly susceptible to the impacts of climate change (Province of Nova Scotia, 2009). While this creates climate change related challenges for the province to mitigate, it also provides a great opportunity for expanding the marine renewable energy sources, which would help the transition away from burning fossil fuels, towards a green economy. As an example, the Bay of Fundy in Nova Scotia - which has the highest tides around the world and about 160 billion tonnes of flowing water two times a day – is the best place for harnessing tidal power in the world (NSDOE, n.d.a). The flowing water from one tide can produce 2,500 megawatts (MW) of electricity, which is equal to the energy demand of the province during its peak consumption period (NSDOE, n.d.a).

Nova Scotia’s coastal location also makes it an ideal place for developing wind farms. The most suitable wind speed for energy production is at about 12m/s (Union of Nova Scotia Municipalities [USNM], 2015). Wind conditions above this point do not necessarily result in higher power output, but instead cause the turbine to stop spinning (USNM, 2015). In NS, the wind speed ranges between 0-10 m/s (Nova Scotia Wind Atlas,
2017), a range that is feasible for many small and large wind energy turbines that function at about 3m/s to 10m/s (USNM, 2015). As such, environmental conditions in Nova Scotia are favourable to grow both wind production and the economic activity that it generates.

The province faces also faces an environmental-related challenge in transiting to a green economy, due to its lack of domestic supply of natural gas and its heavy reliance on coal to generate electricity (Atlantic Energy Gateway, 2012; Willick, 2017). Natural gas, considered a relatively clean fossil fuel, serves as a transition fuel to bridge between emission intensive fossil fuels - such as oil and coal - and renewable energy sources (Zhang et al., 2017). While some have argued that natural gas should not be considered a transition fuel and that financial resources would be better spent developing renewable energy resources (Stephenson, Doukas & Shaw, 2012), the province of Nova Scotia relies too heavily on coal to quickly phase it out without relying on natural gas to do so (Dingwell, 2017). As such, the province must pay the high price to import natural gas, face the environmental consequences of extending the phase-out of coal over a longer period of time, or pursue a rapid transition to renewable energy sources (Dingwell, 2017).

2.6 Economic opportunities and barriers to the green economy

As indicated by the province’s reliance on coal, the transition to a green economy faces a number of economic barriers. A complete transition from coal to cleaner technologies could take time and potentially impact the economy, because of the significant amount of coal-intensive generating stations in the province (NSDOE, 2015a). However, in order for the Nova Scotia economy to continue providing income to its residents for years to come, it must conserve and protect the natural resources through which economic income and social well-being are based. As such, the pursuit of a green economy is necessary to ensure economic activity and human life within the province can be sustained for current and future generations (UNEP, 2011).

In the transition process, there may be certain economic externalities, such as job loss within the coal industry, that must be managed and mitigated. Job loss that could result from the phase-out of environmentally harmful economic activities poses significant economic challenges for the province, considering that Nova Scotia had the second highest rate of unemployment in the country as of September 2017 and that full-time employment is
expected to decrease in 0.4% by the end of 2017 (Statistics Canada, 2017; Province of Nova Scotia, 2017a). While the development of the green economy offers ample job creation opportunities (Bridge & Gilbert, 2017), skill development of the labour force will be necessary to ensure that workers trained in resource extraction activities can be employed in green jobs (European Centre for the Development of Vocational Training [ECDVT], 2010).

In spite of the aforementioned economic challenges, there are also economic opportunities upon which the province can capitalize. For example, the debt to GDP ratio at the end of the financial year 2016-17 is projected to be 36.3% which is much lower than the most indebted Canadian provinces. This ratio will create confidence for investment due to the fact that it is expected to decrease along the forecast horizon, to 35.5% for 2017-18 and to 33.4% at the end of year 2020-21 (National Bank of Canada, 2017). This presents fortuitous conditions to entice business leaders and policymakers to invest in the expansion of the green economy in the province.

2.7 Conclusion

Nova Scotia has a fortuitous environment to capitalize on renewable energy development. As a result of provincial and federal support – through both policy and funding initiatives – significant progress has been made over the past decade in developing Nova Scotia’s renewable energy sector – particularly through the development of the wind industry. However, recent decisions made by the provincial government have demonstrated undying commitment to keeping coal in Nova Scotia’s energy mix and economy. These decisions have been motivated, in part, by concerns for the impacts that a rapid coal phase-out could have on the Nova Scotia economy and community – especially on those members of the economy and community who rely on coal-based electricity generation as a source of income. High unemployment rates also serve as a barrier to the transition to the green economy, considering that job losses will occur in certain sectors as the economy evolves. As such, any transition to a green economy must be conscious of the vulnerabilities within Nova Scotia’s economy and society – ensuring that low-income groups and labourers within Nova Scotia’s carbon-intensive industries are not left behind.

3.1 Introduction

As the global consciousness of the environmental impacts of fossil fuels has grown, so too has global investment in renewable energy development. As a result, renewable energy is the “world’s fastest-growing energy source, with consumption increasing by an average of 2.3%/year between 2015 and 2040” (United States Energy Information Administration [USEIA], 2017, p.2). Within Canada, growth in renewable energy generation increased 17% between 2005 and 2015 (Rabson, 2017). Nova Scotia has been witness to similar levels of growth, with 24% of electricity being generated from renewable sources in 2017, up from 9% in 2007 (NSPI, 2017b). Job creation from this growth is promising, considering that investment in the renewable energy sector is likely to create 6-8 times more jobs than investment in the conventional energy sector (BlueGreen Canada, 2012, p.9).

To achieve its legal responsibilities, as established under EGPSA, and protect the environment, the province launched the Renewable Electricity Plan in 2010 as a strategy to reduce the use of coal and increase the use of clean energy (Province of Nova Scotia, n.d.). This plan, in combination with the Renewable Electricity Regulations, established clear goals: source 25% of electricity from renewable energy by 2015, and 40% by 2020 (NSDOE, 2010.). Through the legislation of these regulations, the province has begun the process to move away from the use of coal and fossil fuels (Ibid, 2010). As a result of the investments made to grow the renewable energy sector and meet the 2015 goal, the province estimates that it will have created approximately 5,000 to 7,000 person-years employment (Ibid, 2010). Thus far, the province has met its 2015 goal, mainly due to the significant growth in wind energy that has occurred over the last decade (NSPI, 2017a). Currently, the province has around 224 commercial wind turbines that generate up to 50% of the province’s electricity (Nova Scotia Power, 2017a). Another significant contributor to the renewable energy sector, hydropower has provided electricity to homes in Nova Scotia for decades (NSPI, 2017c). Within this section of the report, the jobs that exist as a result of these various renewable energy industries will be quantified. Furthermore, the revenue that has been generated from the sales of these renewable energy sources within Nova Scotia’s electricity market will be quantified.
3.2 Methods

The initial research design was crafted to determine revenue generation, employment, and wage bills through primary data collection methods. Due to low response rates and time constraints, this research design was unsuccessful. A second research design was created in order to quantify revenue generation and employment within the renewable energy sector through secondary methods. The methods for both research designs are provided, in detail, under the sections “Attempt 1” and “Attempt 2.”

Attempt 1:

In the first iteration of the research design, data collection on annual wage bills, annual employment rates, and annual revenue generation for the renewable energy sector from 2007 to 2017 was to be collected through interviews with renewable energy businesses. A list of renewable energy businesses (see Table 4.1) was generated through a review of Nova Scotia Power’s website. The team relied largely on NSPI’s website for information on the renewable energy sector, considering that the company is responsible for either generating, transmitting, or distributing 95% of the province’s electricity (NSPI, 2017).

Table 3.1: Renewable Energy Companies within Nova Scotia (Source: NSPI, 2017e)

<table>
<thead>
<tr>
<th>Energy Type</th>
<th>Company Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>Nova Scotia Power</td>
</tr>
<tr>
<td></td>
<td>Pubnico Wind Farm Inc.</td>
</tr>
<tr>
<td></td>
<td>Renewable Energy Services Ltd.</td>
</tr>
<tr>
<td></td>
<td>Glace Bay Lingan Wind Power Ltd.</td>
</tr>
<tr>
<td></td>
<td>Confederation Power Ltd.</td>
</tr>
<tr>
<td></td>
<td>Shearwind Inc.</td>
</tr>
<tr>
<td></td>
<td>RMS Energy</td>
</tr>
<tr>
<td></td>
<td>Maryvale Wind LP</td>
</tr>
<tr>
<td></td>
<td>Watts Wind Energy Inc.</td>
</tr>
<tr>
<td></td>
<td>Amherst Wind LP</td>
</tr>
<tr>
<td></td>
<td>Wind Prospect Inc.</td>
</tr>
<tr>
<td></td>
<td>Black River Wind Ltd.</td>
</tr>
<tr>
<td></td>
<td>Scotian Limited Partnership</td>
</tr>
<tr>
<td></td>
<td>Colchester-Cumberland Wind Field Inc.</td>
</tr>
<tr>
<td></td>
<td>South Canoe Development Partnership</td>
</tr>
<tr>
<td></td>
<td>Municipality of the District of Guysborough</td>
</tr>
<tr>
<td>Hydro</td>
<td>Nova Scotia Power</td>
</tr>
<tr>
<td>Biomass</td>
<td>Nova Scotia Power</td>
</tr>
</tbody>
</table>
The table above portrays Nova Scotia Power as the sole producer of hydro and biomass energy. As noted on NSPI’s website, some independent power producers (IPPs) provide small amounts of hydro and biomass energy but the majority of IPPs are operating in the wind industry (NSPI, 2017f). The names of IPPs operating in hydro and biomass sectors were not provided, but were assumed to make a small contribution to the green economy and thus were excluded from the data collection process. The team intended to call and/or email every renewable energy business as listed above in order to collect data on their annual revenue generation, annual wage bills, and annual employment rates. The data analysis that would follow this data collection process would have involved the aggregation of data collected from each business that would indicate the total annual wage bills, total annual employment rates, and the total annual revenue generation for Nova Scotia’s renewable energy sector.

A few weeks into the data collection process, the team had sent many emails and made many phone calls but had only received a response from Watts Wind Energy Inc. In a few cases, the phone line was dead, emails bounced, or the company, as listed on the NSPI website, did not seem to exist anymore. A more detailed record of the emails and phone calls sent and the responses (or lack thereof) received can be found in Table 1 in Appendix A. Initially, the contact from Watts Wind Energy Inc. showed interest in participating in the study but later indicated that they were still waiting on approval from their management in order to release financial information. Based on the lack of data that was collected in these first few weeks, the group decided that a new research design was necessary.

Attempt 2:

After the first research design involving primary data collection failed, a revised research design involving secondary data collection was devised. Through a review of Emera and NSPI’s websites and financial reports, revenue generation was calculated. Through a review of articles that have quantified the economic impacts of the green economy, employment factors were selected and used to calculate renewable energy jobs. The review of the literature also indicated that the third variable, total annual wage bills, could not be calculated through secondary data. A
A more detailed overview of the data collection and analysis processes for revenue generation and employment are provided below.

**Renewable Energy Revenue Generation:**

*Data Collection*

Through a thorough review of NSPI’s website and the website of its parent company, Emera, it was discovered that Emera produces annual financial reports, containing detailed breakdown of annual electricity production and annual revenue generation from electricity sales for each of its subsidiaries, including NSPI. Available on the Emera website were financial reports for years 2011-2016 (see Table 3.2 for an example of the information on electricity production provided and Table 3.3 for the revenue generation figure provided). Within each report, the following numbers were provided: 1) total annual revenue generation from electricity sales and 2) annual electricity production volumes broken down by electricity source (i.e. renewable versus non-renewable) and 3) total annual production volume. Data for each of these parameters was collected from every report available.

<table>
<thead>
<tr>
<th>Electricity Source</th>
<th>Annual Production Volumes (GWh)</th>
<th>Percent of Total Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>258</td>
<td>2.34%</td>
</tr>
<tr>
<td>Purchased power - COMFIT</td>
<td>24</td>
<td>0.22%</td>
</tr>
<tr>
<td>Purchased power - IPP</td>
<td>825</td>
<td>7.47%</td>
</tr>
<tr>
<td>Wind and Hydro</td>
<td>1357</td>
<td>12.28%</td>
</tr>
<tr>
<td>Total renewables</td>
<td>2464</td>
<td>22.30%</td>
</tr>
<tr>
<td>Total production</td>
<td>11,047</td>
<td>100%</td>
</tr>
</tbody>
</table>

*a. See Appendix A for annual production volume breakdown for each year between 2011-2016.

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Total Revenue Generation from Electricity Sales (Million $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>1,209.7</td>
</tr>
<tr>
<td>2012</td>
<td>1,210.4</td>
</tr>
<tr>
<td>2013</td>
<td>1,304.3</td>
</tr>
<tr>
<td>2014</td>
<td>1,319</td>
</tr>
</tbody>
</table>
Data Analysis

Using the data collected from the reports on annual production breakdown, the percentage of renewable energy production out of total annual production was calculated. Assuming that revenue generated by each electricity source is proportional to the percentage it contributes to annual electricity production, the group used the following calculation to determine revenue generation from renewable electricity resources:

$$Revenue\ Generation_x = \frac{Annual\ Electricity\ Production_x}{Total\ Annual\ Electricity\ Production} \times Total\ Annual\ Revenue$$

Using this equation, revenue generation for each source of renewable electricity listed in the financial annual report was calculated for every year between 2011-2016.

Renewable Energy Jobs

Data Collection

A review of studies measuring employment potential of the renewable energy industries was conducted. Within Google and Google Scholar, the following search terms were used, in combination, to collect literature: “employment potential”, “jobs”, “employment factors”, “quantif*”, “renewable energy.”. Two sorts of methodologies appeared in the literature: 1) input/output models; 2) spreadsheet based analytical models (Cameron & van der Zwaan, 2015).

The first methodology, the input/output models, calculate the job creation potential of a specific renewable energy technology based on the economic inputs it requires (i.e. labour, land, energy) and the economic outputs it produces (i.e. goods and services) across the various sectors and sub-sectors of an economy (Pollin et al., 2014; Cameron & van der Zwaan, 2015). Due to their macroeconomic nature, they are able to capture interdependencies between economic sectors and can thus estimate not only direct employment impacts of renewable energy technologies, but also indirect and induced impacts (Wei, Patadia, & Kammen, 2010; van der Zwaan, 2015). Spreadsheet based analytical models, on the other hand, apply a more simplistic approach to calculating employment factors that “[ignore] those jobs that are less directly associated with an industry” (Cameron & van der Zwaan, 2015, p. 161). As such, spreadsheet analytical models -

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>1,389</td>
</tr>
<tr>
<td>2016</td>
<td>1,327</td>
</tr>
</tbody>
</table>
the more common approach within the literature - only quantify direct jobs as opposed to indirect or induced jobs. The former class of jobs are required to support the renewable energy industry – ranging from jobs within raw material extraction, marketing, consulting, research, and public administration (Ibid, 2015). The latter, induced jobs, are those that result from the economic activity of direct and indirect employees – for example, retail or restaurant jobs that are supported by the spending of a person whose source of income has been directly or indirectly generated by the renewable energy industry (Ibid, 2015). As these types of jobs are difficult to quantify this study will focus explicitly on quantifying direct jobs using employment factors from spreadsheet analytical models.

Very few employment factors in the literature have actually been generated from primary data collection – through interviews and questionnaires (van der Zwaan, 2015). Thus, more often than not, employment factors are adapted from prior research (van der Zwaan, 2015). This was evident in this study’s data collection process, as many of the studies reviewed used literature reviews to find employment factors and adapt them to their region of study.

Through a literature review of employment factor studies, the group collected studies that had either generated or reviewed employment factors for renewable energy technologies. The studies considered for inclusion in the data analysis process are listed in Table 4.4 below.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Unit of employment factor</th>
<th>Study format</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| Cameron & van der Zwaan, 2015 | Jobs/MW                   | Literature review of global renewable energy employment factors | • Provides detailed breakdown of the employment factors found in the literature  
• Provides low, median, and high values for each employment factor  
• Provides distinct estimates for both the manufacturing and installation phases of energy development | • Only includes estimates for wind and solar technologies  
• Presents employment factors at the global rather than regional level  
• Relies on studies that data back to 2001 |
<table>
<thead>
<tr>
<th>Study</th>
<th>Employment Unit</th>
<th>Methodology</th>
<th>Employment Factors</th>
<th>Normalization/Regionality</th>
</tr>
</thead>
</table>
| Greenpeace, 2009         | Person-years employment/MW, Jobs/MW | Literature review of global renewable energy employment factors | • Provides employment factors for all renewable energy technologies | • Does not normalize person-years of employment to full-time equivalent jobs  
• Relies on studies that date back to 2001  
• Does not provide regional employment factors that are specific to Canada/North America |
| Pollin et al., 2014      | Jobs/million dollars invested | Input-output model of the US economy | • Provides employment factors for direct, indirect, and induced jobs  
• Provides employment factors for all renewable energy technologies  
• Is a relatively recent study | • Is specific to the United States’ economy |
| Wei et al., 2010         | Jobs/MW | Literature review of global renewable energy employment factors | • Follows a methodology to normalize the person-years employment to full-time equivalent jobs  
• Only includes studies that have included supporting information for employment factors | • Lists all employment factors found in the literature but does not specify the region through which each factor was derived  
• Relies on studies that date back to 2001 |
| Jeyakumar, 2016          | Jobs/MW | Literature review of global and Canadian renewable energy employment factors | • Reviews 4 Canadian studies, 1 US study, and 1 global study and selects from these studies the employment factors most appropriate for the Alberta setting  
• Relies on relatively recent data that are specific to the Canadian context | • Does not include employment factor for biomass or tidal  
• Does not provide separate estimates for the manufacturing and installation phases  
• Is specific to the Alberta setting |
As demonstrated in Table 3.4, each employment factor study had its advantages and disadvantages in terms of applicability to the context of the project. The selection of employment factors was motivated not only by the relative applicability to the Nova Scotia geography and current timeframe but also based on the availability of necessary data, such as MW of each renewable technology and/or amount of money invested into each renewable energy technology. A thorough Google search, review of government documents, and the NSPI website indicated that current figures on the amount of money invested into each renewable energy technology were not available online. MW of each renewable energy technology, on the other hand, could all be found on the NSPI or NSDOE website (see Table 2 in Appendix A for a detailed breakdown of data sources). Accordingly, the Pollin et al. (2014) study, which generated employment potential based on the amount of money invested, was eliminated for the purpose of this study. From the studies that remained, employment factors that were most relevant to the Canadian context and most recently produced were adapted from Jeyakumar (2016).

The two employment factors that were absent from Jeyakumar (2016), biomass and tidal, were adopted from Greenpeace (2009). While Wei et al. 2010 also provided a biomass employment factor, it was more outdated than that of the Greenpeace study. Greenpeace (2009) was also the only study to provide an employment factor for tidal energy. Within this study, the employment factor for construction, installation and manufacturing (CIM) was provided in person-years of employment rather than number of jobs. While the person-years of employment unit is used to capture the temporary nature of the jobs within the CIM stage of energy development, it can also impair understanding of results (Cameron & van der Zwaan, 2015). Accordingly, the person-years employment of each of these two energy sources was normalized by dividing the number of person-years employment by the typical lifetime of the plants (Wei et al., 2010).

A review of Nova Scotia government and non-governmental organization (NGO) papers was also conducted in order to substantiate the applicability of employment factors within the Nova Scotia context. The only job figures found in the Nova Scotia literature was that of the wind industry. UNSM (2015) estimated that in 2015, the Nova Scotia wind industry had 350 MW installed and supported around 60 full-time jobs in turbine operation and maintenance (OM). If the Jeyakumar (2016) employment factor held true in Nova Scotia, there would be only
35 full-time jobs in OM, 42% less than what the UNSM (2015) claims. As such, the employment factor was adjusted to the Nova Scotian context by dividing the OM jobs in 2015 by the MW installed in 2015.

Data Analysis

Using the employment factors derived from the literature and the current MW of renewable energy sources generated in Nova Scotia, the CIM, OM, and total jobs for each renewable energy source were determined.

Table 3.5: Renewable Energy Employment Factors Derived from the Literature Review

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>CIM Employment Factor (Person-years Employment/MW)</th>
<th>CIM Employment Factor (FTE Jobs/MW)</th>
<th>OM Employment Factor (FTE Jobs/MW)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>3.66(^a)</td>
<td>0.15(^b)</td>
<td>0.17(^c)</td>
<td>Jeyakumar, 2016</td>
</tr>
<tr>
<td>Hydro</td>
<td>49.67(^d)</td>
<td>0.99(^e)</td>
<td>0.04</td>
<td>Jeyakumar, 2016</td>
</tr>
<tr>
<td>Tidal</td>
<td>10</td>
<td>0.13</td>
<td>0.32</td>
<td>Greenpeace International, 2009</td>
</tr>
<tr>
<td>Biomass</td>
<td>4.3</td>
<td>0.11</td>
<td>3.1</td>
<td>Greenpeace International, 2009</td>
</tr>
</tbody>
</table>

- \(^a\) Factor provided was normalized to FTE jobs/MW over the construction lifespan as opposed to the power plant’s entire lifespan. The factor provided was thus multiplied by construction years.
- \(^b\) The factor was normalized to FTE jobs/MW by dividing by the average lifespan of a wind turbine.
- \(^c\) The wind factor here was generated from Nova Scotia specific data provided by UNSM (2015).
- \(^d\) Factor provided was normalized to FTE jobs/MW over the construction lifespan as opposed to the power plant’s entire lifespan. The factor provided was thus multiplied by construction years.
- \(^e\) The factor was normalized to FTE jobs/MW by dividing by the average lifespan of a hydropower plant.

Each of the factors provided in Table 3.5 was multiplied by the current MW of each renewable energy in order to produce job estimates.

3.3 Results and discussion

While initial barriers arose in the quantification process, final results determined from secondary data collection and analysis indicate that the renewable energy sector has a significant impact on the Nova Scotia economy. Results from the revenue generation analysis indicate that the amount of electricity sourced from renewable energy sources within the province has increased substantially between 2011 – 2016. As a result, the revenue generated from the sale of renewable electricity has grown 65.77% from 2011-2016, in comparison to the 7.82% growth in
overall revenue generation that NSPI experienced in the same period. As a 2016, 26.35% of electricity generated and/or transmitted by NSPI came from renewable sources of energy. Assuming that the percentage of electricity produced from renewable resources is equivalent to the revenue generated from renewable resources, the total revenue generated from renewable sources was $349.6 million, equivalent to around 1% of the province’s GDP in 2016 (Statistics Canada, 2017b).

Table 3.6: Annual Revenue Generation from Renewable Energy Sources from 2011-2016

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NSPI Biomass</td>
<td>0</td>
<td>0</td>
<td>15.6</td>
<td>30.8</td>
<td>25.7</td>
<td>26.2</td>
</tr>
<tr>
<td>Purchased Renewable Power</td>
<td>75.4</td>
<td>96.5</td>
<td>101.7</td>
<td>101.4</td>
<td>160.9</td>
<td>191.1</td>
</tr>
<tr>
<td>NSPI Wind and Hydro</td>
<td>135.5</td>
<td>124.9</td>
<td>148.5</td>
<td>162</td>
<td>159.1</td>
<td>132.3</td>
</tr>
<tr>
<td>Total Renewables</td>
<td>210.9</td>
<td>221.4</td>
<td>265.8</td>
<td>294.2</td>
<td>345.7</td>
<td>349.6</td>
</tr>
</tbody>
</table>

According to the data collection and analysis performed on renewable energy jobs, the employment supported by the renewable energy sector in Nova Scotia totaled 894 FTE jobs, equivalent to 25% of the province’s utility-related jobs and 0.25% of the total full-time labour force in Nova Scotia in 2014 (Province of Nova Scotia, 2017b).

Table 3.7: Total Jobs Created in Nova Scotia’s Renewable Energy Sector

<table>
<thead>
<tr>
<th>Energy Type</th>
<th>FTE Jobs in Construction, Manufacturing and Installation</th>
<th>Jobs in Operation and Maintenance</th>
<th>Total Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>397</td>
<td>16</td>
<td>413</td>
</tr>
<tr>
<td>Biomass</td>
<td>11</td>
<td>303</td>
<td>313</td>
</tr>
<tr>
<td>Tidal</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Wind</td>
<td>73</td>
<td>85</td>
<td>158</td>
</tr>
<tr>
<td>All renewable energy</td>
<td>484</td>
<td>410</td>
<td>894</td>
</tr>
</tbody>
</table>

As demonstrated in Table 3.7, certain renewable energy technologies, such as hydro, are significantly more labour intensive in the construction, manufacturing and installation period. It is important to consider that while many construction and installation jobs are likely to have been locally sourced, the manufacturing jobs may have been outsourced, depending on the manufacturing sector in Nova Scotia (Wei et al., 2010). Unfortunately, most employment factors
aggregate construction, manufacturing, and installation, so the construction and installation jobs could not be disaggregated from the manufacturing jobs. Resultantly, the CIM may overestimate the number of jobs that have been created within the Nova Scotia economy.

While hydro has created the greatest total amount of jobs, biomass has the highest labour intensity/MW, which is not surprising considering the labour required not only to generate energy but to grow and harvest the crops by which the energy is generated (Thornley, Rogers & Huang, 2008). Following hydro and biomass, wind energy provides a total of 85 long-term OM jobs. While the study was unable to develop a rigorous methodology to estimate the total annual wage bills of each renewable sector, if one assumes that all positions within the wind OM sector were turbine technicians, that each turbine technician worked 40 hours a week, 50 weeks a year, and was paid the average Canadian turbine technician wage - $24.72/hour (Payscale, 2017), then the total annual wage bill of the OM wind sector would be $4,202 million.

Available information on the history of renewable energy development in Nova Scotia was insufficient to discern the fraction of jobs, with the exception of biomass, that were created after the legislation of EGSPA. Given that Emera’s financial reports indicate that biomass did not contribute to annual production volumes until 2013, it can be assumed that biomass jobs were created between 2013-2016. Furthermore, considering that wind energy development was the focus of funding provided by the Renewable Electricity Plan, it is likely that NSPI’s website seems to indicate that existing tidal and hydro power plants have been operating for decades, suggesting that existing tidal and hydro jobs were created before EGSPA was legislated (NSPI, 2017c; NSPI, 2017h). However, the tidal figure presented in this study does not include the recent jobs that have been generated in the development of the Cape Sharp Tidal demonstration project, which has the potential to contribute up to 950 direct and indirect jobs to the Nova Scotia economy (Emera, 2016b). As indicated by this figure as well as the results of this study, the province has witnessed significant economic growth in its renewable resource sector which it can expect to further increase through future renewable energy development projects, such as Cape Sharp Tidal and the solar projects to be developed under the Solar for Community Buildings Program (Province of Nova Scotia, 2017b).

3.4 Limitations and future research
Revenue Generation Methods

The quantification of the revenue generation attributed to renewable energy generation and transmission is based on the assumption that annual revenue generation is proportional to annual production volume. While this may be the case, it does not capture the different margins that renewable and non-renewable energy sources have. As indicated in the Emera financial reports, NSPI margins were impacted by the relatively higher cost of electricity generation associated with the COMFIT program and IPPs (Emera, 2016a). Increased electricity prices may affect more than margins, as businesses may have to make job cuts to compensate for increased production costs (Wei et al., 2010). These sorts of feedback mechanisms should be considered in future research through a cost-benefit analysis.

Renewable Energy Jobs Methods

Due to the numerous flaws of spreadsheet-based analytical employment factors, the results of this study are inherently flawed. This is not an uncommon limitation of research carried out within this field, as noted by Winfield (2013) who asserts that most of the data on economic indicators of the green economy in Ontario is produced through models rather than empirical research. As simplified models, employment factors erase the complexity of economic activity associated with the renewable energy sectors. Depending on where, when, and how they are derived, employment factors for one given technology may vary up to one order of magnitude (Cameron & van der Zwaan, 2015).

Given that employment factors can only capture direct employment effects, they cannot capture the indirect employment effects of a given technology and thus, they likely underestimate the total jobs created through renewable energy development (Cameron & van der Zwaan, 2015). On the other hand, employment factors may also overestimate local CIM jobs, given that the manufacturing of supplies may be outsourced (Wei et al., 2010). In the future, more research should be carried out in order to understand the percent of manufacturing jobs that exist in the Nova Scotia economy.

In addition to the uncertainties regarding local versus outsourced jobs, many employment factors do not capture the effects that the scale of energy developments or the time they have been in operation have on the number of jobs created (Cameron & van der Zwaan, 2015). As explained by Cameron & van der Zwaan (2015), “Employment factors can be expected to reduce
as technologies and production techniques mature” (p. 163). Thus, employment factors, calculated through primary or secondary research, should be adapted as the scale and technology of energy production change. These concerns should be taken into consideration by future researchers as they attempt to further refine quantifications of the green economy in Nova Scotia.

Employment factors are also subject to the economic characteristics of the time and place in which they are derived (Greenpeace, 2009). As such, the factors found in the literature may have no bearing on the economy in Nova Scotia. While the wind OM factor was adjusted to the Nova Scotia economy, the remaining factors could not be verified. Similarly, it could not be discerned from the Jeyakumar (2016) study why specific factors were chosen for the Albertan context, making it difficult to estimate their applicability to the Nova Scotian context. Future research could ground truth the employment factors in the literature through interviews with the renewable energy companies listed in Table 3.1.
4. Measuring Economic Activity in Nova Scotia’s Sustainable Education Sector

4.1 Introduction

In addition to the renewable energy sector, sustainable education programs at post-secondary institutions and community colleges were selected for analysis due to the economic activity and innovation that the education sector drives (Universities Canada, 2017). Nova Scotia’s economy is bolstered significantly by students’ spending, as exemplified by the $154 million dollars that international students, alone, contributed to the economy in the 2008-2009 school year (Minister’s Post-Secondary Education Research Advisory Panel, 2009). Furthermore, universities in Nova Scotia have an impact of over 2 billion dollars a year on Nova Scotia’s economy (Summerby-Murray, 2016). The jobs provided within this sector are significant, considering that in the Halifax region alone over 16,000 people are employed by post-secondary institutions (Summerby-Murray, 2016).

Unfortunately, many students graduating from university or college programs leave the province upon graduation (Jacob, 2015). According to the current president of Dalhousie University, many students express a desire to stay but are forced to leave due to lack of economic opportunities (Tattrie, 2016). As a result, the province of Nova Scotia loses a significant opportunity to generate income taxes from the students who leave the province upon graduation. Given the impact that university/college students have on the Nova Scotia economy, the province has a clear motive to retain students within the province upon graduation (Nova Scotia Finance and Treasury Board [NSFTB], 2016). As such, the retention of students “may function as a policy lever” to encourage the provincial government to invest in building the green economy and growing the opportunities available within Nova Scotia for the students graduating from the sustainability-related programs offered throughout the province (EAC, 2016, p. 14).

Thus, the aim to quantify the economic impacts of the sustainable education sector was two-fold: (i) to quantify baseline estimates of economic activity occurring in this sector, and (ii) to quantify the potential economic benefits that could result from an improved retention rate of students who have graduated from programs of sustainable leadership in Nova Scotia. In demonstrating the potential economic growth that the province could achieve by retaining graduates of sustainability-related programs, this project will highlight the importance of
investing and growing Nova Scotia’s green economy. Furthermore, it will highlight the economic benefits that the sustainable education sector plays in providing well-paying jobs to Nova Scotians.

4.2 Methods

The websites of all post-secondary institutions in Nova Scotia were examined to develop a list of all programs in the fields of sustainable leadership that demonstrate a commitment to environment protection, sustainability, or resource conservation based on the program descriptions. To quantify the baseline economic activity in this sector, data were collected on the economic activity indicators of i) annual jobs supported and ii) annual wage bills. In addition, data was collected on the number of students graduating from these programs in 2017.

The websites were examined first to obtain any publicly available financial reports and graduation lists. Further, the administrative staff in each program and in the registrar’s offices were contacted for financial and graduation data, respectively. Due to a lack of responses to the emails, the staff at the Dalhousie University’s Studley campus were visited in person to provide guidance on collecting the required data from Dalhousie University’s website.

The data on job provision was collected from the departmental website based on the number of teaching faculty, cross-appointed faculty, administrative staff, and technician staff that were posted online. The number of cross-appointed faculty members working in multiple departments were not double counted. The data on the number of students graduating from sustainable leadership programs at post-secondary institutions in Nova Scotia were collected based on the graduation lists in Fall and Spring 2017 that were available on Universities’ websites (Dalhousie University, Cape Breton University, and Acadia University).

Given the sensitivity of financial data, the salary ranges were determined based on their respective collective agreements available through the website of the representing unions. The salary range for the Dalhousie University’s teaching faculty was determined based on the 2014-2017 Collective Agreement published by the Dalhousie Faculty Association (DFA), an organization that represents the interest of Dalhousie’s teaching staff for any employer-employee relation matters. DFA (2017) has identified the minimum regular salary rates for 2016/17 for the following positions (or equivalent) of Lecturer, Assistant Professor, Associate Professor, and Professor to be in a range of $64,117 to $101,985 - effective July 1, 2016. The minimum range
of salary rates was used in order to better represent the wide variety of the faculty position included in the data.

The salary range for the administrative staff and the technicians was retrieved from the 2016 Collective Agreement published by Nova Scotia General Employees Union (NSGEU) local 77, which is an organization recognized as the bargaining agent for employees of Dalhousie University (Nova Scotia General Employees Union Local 77, 2016). As per the collective agreement (Ibid, 2016), the clerical and secretarial roles in Dalhousie University were paid an hourly wage of $13.31 to $30.36 across the different classification levels between July 2016 – June 2017. For the purpose of this project, it was assumed that the tallied administrative staff were all full-time. Thus, the hourly wage rate was multiplied by 1,690, given that the regular work week is 32.5 hours. The annual wage of the technician positions was also determined using the same approach based on the hourly wage of $19.19 to $33.23 (Ibid, 2016).

4.3 Results and discussion

Due to the limitations encountered during the data collection process, the data on the number of job supported and annual wage bills paid within post-secondary institutions and community colleges was limited to Dalhousie University. Based on our research and analysis of data, this study found that Dalhousie University’s sustainability-related programs provide about 228 jobs annually, which amounts to an annual wage bill of $13.34 to $21.63 million (refer to Table 4.1 for calculations and key findings). As demonstrated in Table 4.1, most of the people employed in sustainable programs at Dalhousie are paid between $64,117 - $101,985, ranging from 25% to 98% above the average income in Nova Scotia (NSFTB, 2015).

In the 2016-17 period about 834 Dalhousie faculty staff had an annual salary of $100,000 or more (Dalhousie University, 2017). In addition, Statistics Canada reports that in 2016-17 period, the median salary for all full-time academic teaching staff at Canadian Universities was $98,400 (Ibid, 2017). These statistics suggest that the higher ranges of salaries represented in Table 4.1 are better estimation of the total wage bill for the teaching faculty during a fiscal year.

Dalhousie University offers 228 jobs through its 15 environmental programs. Other sustainability related programs across the province may also provide a similar number of job opportunities per program, which reinforces the importance of these programs to the economy of Nova Scotia.
Table 4.1: Total number of jobs created, and the range of annual salary for teaching faculty, cross-appointed faculty, administrative staff and technician staff at Dalhousie University’s environmental programs.

<table>
<thead>
<tr>
<th>Employee Title</th>
<th>Total Number of Jobs</th>
<th>Range of the Annual Salary per one employee</th>
<th>Lower Range of the Salary</th>
<th>Higher Range of the Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Faculty</td>
<td>127</td>
<td>$64,117 - $101,985</td>
<td>8,142,859.00</td>
<td>12,952,095.00</td>
</tr>
<tr>
<td>Cross Appointed Faculty</td>
<td>68</td>
<td>$64,117 - $101,985</td>
<td>4,359,956.00</td>
<td>6,934,980.00</td>
</tr>
<tr>
<td>Administrative Staff</td>
<td>23</td>
<td>$22,493.9 - $51,308.4</td>
<td>517,359.70</td>
<td>1,180,093.20</td>
</tr>
<tr>
<td>Technician Staff</td>
<td>10</td>
<td>$32,431.1 - $56,158.7</td>
<td>324,311.00</td>
<td>561,587.00</td>
</tr>
<tr>
<td>Total</td>
<td>228</td>
<td>NA</td>
<td>13,344,485.70</td>
<td>21,628,755.20</td>
</tr>
</tbody>
</table>

In addition to exploring employment within the sustainable education sector, this study also reviewed universities across Nova Scotia and determined that currently about 31 sustainability-related programs are offered at post-secondary institutions (see Appendix B, Table 1). Based on the graduation lists published by the Universities of Dalhousie, Cape Breton, and Acadia, approximately 368 students graduated in fall and spring 2017 from 19 different sustainability-related programs.

This report used the model presented by the Halifax Partnership to calculate the revenue generation for the province if all the graduating students remained in Nova Scotia over their wage-earning lifetimes (Jacob, 2015). Based on this method, the report determined that should all the students remain in Nova Scotia, they could earn approximately $340 million in after-tax income over the course of their lifetime that they would be spending within the Nova Scotian economy. Furthermore, the retention of all these students in Nova Scotia’s green economy would result in about $176.64 million in income taxes for the province. It is important to note that these figures represent the potential economic benefit that could be derived from retaining just one year of graduates. Were the graduation rate to remain the same over the next 20 years, the retention of all students graduating from sustainable education programs at post-secondary institutions included in this study over the next 20 years would add up to $3.533 billion dollars (in 2015 dollars).

The table below represents the data for total number of graduates from the environmental programs at post-secondary institutions in Nova Scotia.
Table 4.2: Total number of students graduated from environmental programs at Dalhousie University, Cape Breton University, and Acadia University in the 2017 Fall and Spring graduations.

<table>
<thead>
<tr>
<th>University Name</th>
<th>Number of Environmental programs</th>
<th>2017 Total Number of Graduated Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalhousie University</td>
<td>15</td>
<td>336</td>
</tr>
<tr>
<td>Cape Breton University</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>Acadia University</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>368</td>
</tr>
</tbody>
</table>

As evidenced by the results of this chapter, sustainable programs at Dalhousie University provide well-paying jobs to hundreds of Nova Scotians. Should this study have been able to collect data from the remaining post-secondary institutions and community colleges within the province, it is likely that the number of employees within the sustainable education sector would increase significantly from the number of employees at Dalhousie University. In addition to providing employment opportunities, post-secondary institutions and community colleges should also be recognized for the contribution to the capacity building and skill development required to transition Nova Scotia to a green economy. In training around 350 students annually, the programs at Dalhousie University, Cape Breton University, and Acadia University are sending “green” labour into a market that is insufficiently sized to absorb them all. Given that retaining all 350 students within the province for their wage-earning lifetimes would allow the province to generate additional tax revenues and would increase spending within the province’s economy, it would be economically beneficial to strategically grow the green economy to place these graduating students in jobs that align with their field of study.

4.4 Limitations and future research

A major limitation of the study was the limited number of post-secondary institutions and community colleges from which it was possible to collect data. Due to the absence of online information, data collection could not be carried out within community colleges, leaving them excluded entirely from the study. The report acknowledges
this gap and suggests that future research work with the administrative staff of Nova Scotia Community College to collect required data. Within the post-secondary institutions, analysis for employment was limited to Dalhousie University while analysis for graduate retention was limited to Dalhousie University, Cape Breton University, and Acadia University. In order to quantify the economic impact of the entire sustainable education sector within Nova Scotia, additional research should aspire to collect data from all post-secondary institutions and community colleges within Nova Scotia. Future efforts to quantify graduation rates of other provincial post-secondary institutions and community colleges will require interviews and surveys to be carried out, considering data available online is insufficiently detailed to discern graduation rates.

Given the sensitivity of departments on disclosing financial data, the data collected on the job creation and the annual wage bills was determined based on the minimum regular salary rates for the teaching faculty established in the 2014-2017 Collective Agreement for the Dalhousie Faculty Association (DFA). Therefore, the figure for total wage bills presented in this study is likely an underestimation of the actual compensation rate. Further, it was assumed that all staff were full-time employees. Discerning part-time positions from full-time positions was not possible, thus the total actual compensation rate does not reflect the relative full-time and part-time positions supported by Dalhousie.

For the purpose of quantifying the impact of student retention, the study was unable to quantify the number of students who leave Nova Scotia annually. Accordingly, the estimates provided demonstrate the potential economic benefits that retention of all students could provide. Thus, it does not differentiate between: 1) the amount of tax revenues that is currently provided by the students who have already chosen to remain and; 2) the amount of additional tax revenue that could be achieved if additional students remained. Future research could collect data through student surveys, in order to empirically investigate the migration rate of students within sustainable education programs. Furthermore, the study followed Jacob’s estimation of tax-revenue and income that would be generated through retaining the net youth migration that occurs each year. Jacob (2015) based its economic analysis on all youth and used average income to generate results, as opposed to this study’s focus on a specific segment of youth. Thus, this study may underestimate the tax-revenue- and income-effect that the retention of students trained in environmental programs could have, considering that the average income of
jobs within the green economy may be above the average income of the wider economy. Based on observations within the literature (SECOR-KMG, 2013; Minnesota Department of Employment and Economic Development [MDEED], 2014), jobs within the green economy pay well above average income. As such, tax-revenue and after-tax income figures that were presented in this study could be conservative.
5. Investing in the Renewable Energy Sector

5.1 Introduction

Considering the investment and growth that has occurred within the renewable energy sector within Nova Scotia over the past decade or so, it is likely that significant economic activity has been generated – thus, providing justification for past, current, and future investment in the renewable energy sector. While the results of Chapter 3 of this report indicate the potential employment and revenue generation created by the renewable energy sector, they do not account for the potential costs that may have been incurred as a result of this growth. In order to develop a business case for investment in the renewable resource sector, the costs of renewable energy development – such as increasing electricity prices or job losses in conventional energy sectors – must also be considered. While it was not within the scope of this project to develop a business case or cost benefit analysis of the renewable energy sector in Nova Scotia, selected case studies that have quantified the economic impacts of renewable energy sectors within other provinces will be presented in this section. Further insights will be provided through a discussion of the economic costs and benefits of renewable energy development.

5.2 Methods

In order to understand the business case of the renewable energy sector, literature (mostly consisting of grey literature) was collected and analyzed. The literature review was executed through Google and Google Scholar searches that combined the following terms: “renewable energy”, “business case”, “financial impacts”, “cost-benefit analysis”, and “economic impacts”. Through these search terms, general information on the financial impacts of renewable energy was collected. In order to collect literature that was specific to the Canadian context, the same search terms were used in combination with “Canada” as well as the names of various Canadian provinces such as “Quebec”, “Ontario”, “Newfoundland”, “British Columbia”, and “Alberta”. From the literature generated through these searches, studies conducted in the Canadian context that demonstrated a comprehensive consideration of financial impacts – such as jobs, wages paid, and revenue generation - were selected for further analysis.

5.3 Case studies
Through the literature review, various studies within the provinces of Ontario, Quebec, and Alberta were discovered. In many cases, the studies did not conduct a cost-benefit analysis but rather quantified the economic benefits of renewable energy development, excluding any consideration of economic costs of renewable energy from their calculations. As noted by Cameron & van der Zwaan (2015), this is not unusual for studies analyzing the economic impact of renewable energy development. The case studies to be explored in this section are listed in the Table 5.1 below.

Table 5.1: Case Studies Reviewed to Enhance Understanding of the Business Case of Renewable Energy

<table>
<thead>
<tr>
<th>Reference</th>
<th>Location</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boehringer et al., 2012</td>
<td>Ontario</td>
<td>Determines that 1.97 jobs are lost in non-renewable sectors for every 1 job created in the renewable sector</td>
</tr>
<tr>
<td>Pollin &amp; Garrett-Peltier, 2009</td>
<td>Ontario</td>
<td>Forecasts job growth in the renewable energy industry according to the Integrated Power System Plan.</td>
</tr>
<tr>
<td>SECOR-KPMG, 2013</td>
<td>Quebec</td>
<td>Quantifies economic indicators such as jobs, wealth creation, and tax revenue within the wind industry</td>
</tr>
<tr>
<td>Jeyakumar, 2016</td>
<td>Alberta</td>
<td>Forecasts job growth in renewable industries and job losses in coal industry.</td>
</tr>
</tbody>
</table>

As evidenced by the financial figures presented below in Table 5.2, the potential financial benefits generated by the wind industry are certainly not trivial, with total indirect and direct annual wealth creation from the wind industry alone adding up to $472.8 million in Quebec. Workers within this industry, totaling around 2,280 each year, are paid on average 30% more than the average income in Quebec (Secor-KPMG, 2013). Similar conclusions were made by Minnesota Employment and Economic Development (2014) that determined that annual wages in the renewable energy sector were, on average, 42% higher than the state’s average income. Within Ontario, the job creation likely to be induced by the Green Energy Act is similarly impressive, with Pollin & Garret-Peltier (2009) anticipating that a total employment of 90,000 jobs over a ten-year period could result from $18.6 billion investment into the renewable energy sector. Another Ontario study, ClearSky Advisors Inc. (2011), estimates that within the solar
industry alone, approximately 1,100 full-time jobs in operation and maintenance will have been created by 2018, as a result of the installation of 3,000 MW of solar PV capacity.

Table 5.2: Financial Impacts of Wind Industry in Quebec, as of 2013 (based on SECOR-KMG, 2013)

<table>
<thead>
<tr>
<th>Economic Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual direct jobs supported</td>
<td>2,280</td>
</tr>
<tr>
<td>Annual indirect jobs supported</td>
<td>2,734</td>
</tr>
<tr>
<td>Annual direct wealth creation</td>
<td>$239.6 million</td>
</tr>
<tr>
<td>Annual indirect wealth creation</td>
<td>$233.2 million</td>
</tr>
<tr>
<td>Annual direct tax-revenues</td>
<td>$36.8 million</td>
</tr>
<tr>
<td>Annual indirect tax-revenues</td>
<td>$38.6 million</td>
</tr>
<tr>
<td>Annual average salary provided</td>
<td>$48,140</td>
</tr>
</tbody>
</table>

Within the case studies provided conflicting results on the job losses within the non-renewable sector. According to Jeyakumar (2016), the simultaneous phase-out of coal and the addition of 5,000 MW of wind energy would result in net job growth. Boehringer et al., (2012), however, conclude that for every renewable energy job created in Ontario under its feed-in-tariff program, 1.97 jobs would be lost in the non-renewable energy sector. The differences between the conclusions of Boehringer et al. (2012) and those of Garrett-Peltier (2009) are reflective of the differences in the methodologies of the two studies. While both quantified the financial impacts of energy development through a computable general equilibrium model of the Ontario economy, Boehringer et al. (2012) accounted for the decreased demand for non-renewable energy while Pollin & Garrett-Peltier (2009) did not. As indicated by these case studies, measurements of the financial impacts of renewable energy development differ by geography and by study. This is, of course, a result of the unique economic settings that characterize each geography under analysis. However, differing conclusions on the financial impacts – both costs and benefits – of renewable energy development will also result from the methods used and assumptions made by each study (Winfield, 2013). These case studies, thus, do not conclusively demonstrate that renewable energy development will produce financial benefits for everyone but rather that there will be winners and losers and that the costs of renewable energy development must be weighed against the detrimental costs of climate change and environmental degradation that could result from a business-as-usual approach to energy development (Winfield, 2013). The potential negative economic externalities of renewable energy development indicated in
Boehringer et al. (2012) emphasize the need to ensure that the transition to a green economy is inclusive and does not leave laborers working in carbon-intensive industries behind.

5.4 Discussion

Through the wider literature review, the different conclusions on the economic impacts of developing renewable energy sources became evident. Around the world, attention has been drawn to the significant job and wealth creation generated by the renewable energy industry. On the other hand, critics of renewable energy development have voiced concerns over the elevated energy costs and job losses that may result from increasing renewable energy supply and decreasing demand for non-renewable energy sources. The various costs and benefits highlighted in both the aforementioned case studies and the wider literature are listed in Table 5.3 below.

<table>
<thead>
<tr>
<th>Costs</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased energy costs, relative to non-renewable energy sources (Emera, 2016; Frank, 2016)</td>
<td>• Growth in well-paying, low-carbon job sectors (Pollin &amp; Garrett-Peltier, 2009)</td>
</tr>
<tr>
<td>• Low and unreliable capacities to generate electricity (Frank, 2016)</td>
<td>• Predictable, steady energy prices (in contrast to unpredictable, unstable prices of traditional energy sources) (D’amato, 2017)</td>
</tr>
<tr>
<td>• Job losses within non-renewable energy sectors (Boehringer et al., 2012)</td>
<td>• Stable rates of return on investment (Gomberg, 2017)</td>
</tr>
<tr>
<td>• Steep capital investments required in early development stages (Abreu, 2013)</td>
<td>• No cost to comply with environmental regulations (Gomberg, 2017)</td>
</tr>
</tbody>
</table>

As indicated in Table 5.3, the literature describes varied economic impacts of renewable energy. In the studies reviewed, a common cited concern was the higher costs of renewable energy. While some assert that the cost of renewable energy is only marginally higher than that of non-renewable energy (Weis & Partington, 2011), others argue that the higher energy costs induced by renewable energy development could negatively impact the wider economy, including slow growth, and cause job losses to occur outside of the renewable energy sector (Winfield, 2013). Higher costs aside, renewable energy technologies promise predictable, steady energy prices that non-renewable energy sources cannot guarantee (D’amato, 2017; Gomberg,
As a result, the development of renewable energy technology presents a low-risk investment opportunity that is likely to provide stable rates of return (Gomberg, 2017).

Another economic cost highlighted in the literature is the steep capital investment required in the early stages of renewable energy development (Abreu, 2013). Fortunately, as the market for renewable energy has grown, the capital costs of renewable energy technologies have drastically decreased (Wiser & Bolinger, 2011). Furthermore, those who claim the capital costs of renewable energy technology as a deterrent to renewable energy development may not be considering the “real costs” of non-renewable alternatives (Winfield, 2013). As explained by Winfield (2013), “in modelling exercises by renewable energy proponents, where externalized environmental costs and risks are taken into account, the net cost of renewable energy programs emerges as comparable if not better than the outcomes of relying on conventional supplies” (p. 20). Ultimately, the costs of continuing to burn fossil fuels to meet our energy needs will be detrimental to the economy and to the local and global community. While transition to renewable energy sources will not come without its costs, a business-as-usual approach to energy generation will not allow for prosperity that can be sustained in the future.

5.5 Going forward

Considering that the alternative to transitioning to renewable energy sources poses significant economic, social, and environmental risks, it is imperative that Nova Scotia further invest in renewable energy development. The province has made significant progress on reducing its greenhouse gas emissions and increasing its supply of renewable energy, through various government-led initiatives such as the COMFIT program (Lahey & Doelle, 2012; Gorman, 2015). While COMFIT allowed for the development of around 150 MW of community-owned energy, it has since been discontinued by the provincial government out of concerns for raised electricity prices (Gorman, 2015). Ongoing initiatives that seem promising include the Community Solar program – through which community groups and organizations install PV solar technology on their roofs or properties and sell back extra electricity (Province of Nova Scotia, 2017b) – as well as the development of tidal energy technology within the Bay of Fundy. In particular, the further development of solar PV capacity in Nova Scotia may create significant opportunities for growth in the green economy, considering that solar energy has the potential to generate 10 to 20 times more jobs per MW installed than wind energy (Jeyakumar,
2016). Furthermore, the development of tidal energy within the Bay of Fundy could lead to the creation of 20,000 jobs as well as the contribution of $1.7 billion to Nova Scotia’s GDP by 2040 (Offshore Energy Resource Association [OERA, 2015]). Considering that Nova Scotia has been working on harnessing its tidal energy since 1984, the province has the opportunity, moving forward, to be at the forefront of innovative tidal technology and to profit from exporting tidal technology and expertise to the rest of the world (Daborn, 2016). It is through action and innovation that Nova Scotia will be able to continue on its path to a green economy and a state of sustainable prosperity.

While the results from Chapter 3 indicate that biomass has a high job creation potential, due to the relatively high labour intensity of the biomass growth and harvest processes, the Nova Scotia government should proceed cautiously in further investing in biomass development. While all forms of renewable energy have potential environmental costs, biomass has particularly concerning environmental impacts, such as soil erosion and nutrient depletion, habitat fragmentation, and air and water pollution (Abbassi & Abbassi, 2010). In the Renewable Electricity Plan, the province acknowledged the environmental concerns related to biomass production and generation, explaining that the development of biomass resources will be reviewed again in 2015. In the most recent electricity plan, released in 2015, the province clarified that it would prioritize the development of other forms of renewable energy (NSDOE, 2015a).

In addition to investing further in renewable energy sources such as solar and tidal power, the province must also provide financial assistance to those who will be most affected by the economic costs of the development of the province’s renewable energy sector. Given that increasing the amount of renewable energy within Nova Scotia’s electricity mix may raise the price of electricity, government initiatives – such as the energy efficiency financing opportunities and Homewarming programs provided by Efficiency Nova Scotia [ENS] (ENS, 2017) – must ensure that low-income Nova Scotians are not harmed by increased energy prices. As suggested by Abreu (2013), a Universal Service Program should be put in place in order to ensure that all Nova Scotians can afford electricity. Abreu (2013) explains,

We can fund the $9-14 million cost of a Universal Service Program from general tax revenues including the savings from existing [energy efficiency programs], a refund of the HST rebate for households earning over $100,000 and a contribution from NSPI, or a small fee on electricity bills (p. 9).
In spite of these recommendations made by Abreu in 2013, Nova Scotia has yet to establish a Universal Service Program. This is a necessary step that the province will have to take in order to ensure that the transition to the green economy is equitable and inclusive. Furthermore, the province must invest in the sustainable education sector in order to grow Nova Scotia’s green labour force as well as to retrain labourers who will likely lose their jobs as carbon-intensive economic activities are phased out of Nova Scotia’s economy. The imperative reasons for supporting the sustainable education sector will be further discussed in the following chapter.
6. Investing in the Sustainable Education Sector

6.1 Introduction

Given the important influence of students on Nova Scotia’s economy, it is vital for government officials to adopt strategies that would help retain students in the province. As indicated by the results of Chapter 5, the environmental-focused programs offered across the province not only produce individuals with specialization in environmental fields, but also positively impact the province’s economy through the well-paying jobs that they provide. While the province has recently directed more funding towards research within environmental fields (NSDLAE, 2014), the sustainable education sector needs further attention from the province in order to address the serious problem of youth outmigration. To present this argument, this section will provide an overview of the provincial initiatives in the education sector and provide insight on the importance of new investment in the sector for future economic growth.

6.2 Methods

For the purpose of understanding the importance of investing in the education sector, literature was selected, identified and analyzed. The literature review was performed through Google searches that combined the following terms “budget”, “education sector”, “university*”, “investment”, and “Nova Scotia”. Furthermore, an additional search was conducted to understand more specifically the economic impacts of the sustainable sector using search terms such as “sustainable”, “environmental”, “education”, and “economic impacts.” Through these searches, general information on the economic impacts of the sustainable education sector within Nova Scotia was collected and further analyzed in order to identify strategic opportunities for the government to expand the green economy through the education sector.

7.3 Current educational initiatives in Nova Scotia

Various initiatives currently exist within the education sector that could be useful to grow the sustainable education sector as well as other sectors of the green economy within Nova Scotia. For example, the Government of Nova Scotia in its 2017-18 budget has increased its funding allocation for the Graduate to Opportunity program by $1.7 million to encourage employers to hire new graduates (Province of Nova Scotia, 2017). The Graduate to Opportunity
(GTO) is a provincially led initiative that aims to create a stronger workforce by retaining the new graduates in Nova Scotia through a competitive salary incentive program (Province of Nova Scotia, 2016). The program provides employers with 25% of the first year’s salary required for new employees and 35% of the first year’s salary for new graduates from a designated employment equity group (Ibid, 2016).

Nova Scotia government is also allocating another $1.7 million to fund a new program for employers to hire recent Master’s and PhD graduates (Province of Nova Scotia, 2017). This funding will not only create new job opportunities for the recent graduates, but will also help companies to find skilled, trained and talented workers to address their labour market needs. In addition to this funding, Nova Scotia government is investing $379,000 in the Mitacs Accelerate program to create 94 additional research internships in the province (Ibid, 2017). The Mitacs Accelerate program is a national initiative that is offered through a partnership between universities, the private sector and governments to support students in finding internship positions (Mitacs, 2017). Furthermore, as a strategy to promote technical training programs, the government is investing $1.3 million to eliminate the tuition apprentices pay for these programs (Ibid, 2017). Through initiatives such as these, the province can leverage capacity building and skill development for jobs within the green economy as well as improve the connections between training programs and the job market.

6.4 Importance of investing in sustainable education programs

In the journey towards sustainable development, it necessary not only for markets to favour environmentally-friendly activities but also for citizens to think and act in environmentally-friendly ways (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2017). To achieve these changes, knowledge, skills, values and behaviors must be disseminated to the public in order to empower individuals to participate in the green economy (Ibid, 2017). As a result, education is essential to progress in sustainable development (Ibid, 2017). Within Canada, there is a growing interest in sustainable education programs, as exemplified by the sustainable education sector in Vancouver that grew approximately 39% between 2001 and 2008 (Veltkamp, 2014). Under its sustainable education sector, the city of Vancouver provides jobs to around 1,700 people - a conservative figure that does not capture employment at the doctoral and postdoctoral level (Veltkamp, 2014). Thus,
sustainable education programs not only provide opportunities for the dissemination of environmental-related knowledge and values but also for employment within fields that support the transition to a green economy.

In addition to environmentally-friendly values, it is through the education sector that individuals can obtain training that provides the “green skills” and knowledge required to perform successfully in “green jobs” and live in a state of sustainable prosperity (Louw, 2013; Dlimbetova et al., 2016). As discussed in Chapter 5, economic benefits for all Nova Scotians are not a guarantee as the renewable energy sector is developed. While the promise of new jobs may hold true for some, others may find their trades have become obsolete in the transition to the green economy. In order for the jobs created through investment in renewable energy development to be filled by residents of Nova Scotia – especially those most at risk of losing their jobs in the transition to renewable energy sources - provincial education and training/retraining programs that provide the skills required to fill these jobs will be necessary. Hence, training individuals with “green skills” is highly important to fulfill the professional requirements of “green” labour markets and to ensure that any prosperity generated by the growth in the green economy can be reaped by residents of Nova Scotia, especially those within low-income communities and carbon-intensive industries that will become obsolete in a green economy (Ibid, 2016).

Not only is education required to allow for Nova Scotians to become versed in the knowledge and skills required to fulfill the needs of green jobs, but it is also an essential component of job creation. As explained by Ivany et al., (2014), innovation serves as a significant driver of wealth and job creation, and accordingly should be viewed as indispensable to Nova Scotia’s economic development. Universities function as sites where innovative research can take place (Council of Ontario Universities, 2017). As such, universities play a key role in informing growth in the green economy by providing knowledge and innovation that is required to build renewable energy technologies, protect natural habitats, provision sustainable food, and conserve natural resources.

6.5 Going forward

Nova Scotia must capitalize on its environmental setting and take advantage of the wind, solar, and water resources that it has to generate the energy required to fuel a clean economy and
provide for the needs of the Nova Scotia community (Abreu, 2013). In order to do so, support must be provided to post-secondary institutions and community colleges in order to create and disseminate the knowledge required to further develop the province’s renewable energy sector. As indicated by the 2017-18 provincial budget, the government of Nova Scotia has increased its expenditure on post-secondary education and youth retention. Yet, the tuition fees in Nova Scotia are still the second highest in Canada, with an average of $7,218 per year (Canadian Federation of Students Nova Scotia [CFSNS], 2017). The tuition fees are anticipated to increase by 5.6% in the near future; herein, they will become the highest in the country (Ibid, 2017). As a result of this, the knowledge and skills required to enter jobs in the green economy may be inaccessible to low-income students. Further financial support must be provided to post-secondary institutions and community colleges to ensure that tuition remains accessible and that financial assistance can be provided to students unable to afford tuition. There is also a need for the Employment Support and Income Assistance Act to be amended to make it easier for individuals on income assistance to enroll in post-secondary education. In keeping tuition rates low and providing financial assistance to low-income households, the transition to a green economy can be made an inclusive, equitable process.

Considering that 1,300 youth leave the province every year (Jacob, 2015) and that retaining them would provide significant economic benefits, the issue of student retention should be also prioritized as an area for government funding. Another related issue, youth unemployment rate in Nova Scotia has increased by 13.2% in the year 2016, making it the second highest unemployment rate in the country (MacAdam, 2017). As such, there is a clear need for government initiatives, such as Graduate to Opportunity, to help graduates find jobs within the Nova Scotia economy. Considering the number of students graduating every year from Dalhousie University, Acadia University, and Cape Breton University under sustainability-focused programs, the province could also prioritize its spending to favour growth in sectors of the green economy, such as renewable energy, in order to create the jobs that graduating students are seeking. Growing the green economy in Nova Scotia thus requires strategic investments to the sustainable education sector as well as other sectors of the green economy (such as the renewable energy sector), so that the graduates of sustainable education programs can find jobs within their fields and the laborers within carbon-intensive industries can access retraining programs in order to gain the skills required to fill green jobs.
7. Discussion

7.1 Introduction

A diverse set of issues were analyzed and discussed throughout this report. Aspects of the green economy were not only quantified but also analyzed from a business case perspective to explore the economic significance of further growing the sectors of the green economy quantified in Chapter 3 & 4. Considering the methodological challenges encountered in the quantification process, the work presented in this report should be conceptualized as preliminary – as laying the groundwork required to quantify aspects of Nova Scotia’s green economy and pointing to the barriers that one can expect to encounter in the quantification process. Another important theme that emerged in the context of the research was that of inclusivity and equality – essential components of sustainable development that are not necessarily ensured in the growth of the green economy. As such, this report highlights the imperative nature of considering the economic costs implicated in the transition to the green economy and ensuring that the groups of people who will be most vulnerable to these costs will be properly supported. Key takeaway themes such as these, as listed in Figure 7.1, will be further discussed within this chapter.

Figure 7.1: Key Takeaways

1) There is preliminary evidence that growth in employment and revenue generation has occurred within the renewable energy sector under EGSPA.

2) The sustainable education sector serves as a source of employment, innovation and knowledge creation, and capacity development - all essential components of the transition to a green economy.

3) The retention of students within sustainable education programs at Nova Scotian institutions provides significant economic incentives to grow the green economy.

4) While the development of renewable energy in Nova Scotia promises growth in the green economy, it also poses economic challenges for carbon-intensive industries and low-income households.

5) The economic challenges involved in the transition to a green economy should not be viewed as deterrents but rather should be mitigated through financial assistance programs and skill development initiatives.

6) Further quantification of Nova Scotia’s green economy is necessary in order to establish baseline levels of economic activity.
7.2 Quantification of the green economy

Through a mix of primary and secondary methods, economic activity within the renewable energy sector and sustainable education sector was characterized. Due to the difficulties encountered in the primary data collection process as well as the uncertainties implicated in the secondary research methods employed, the preliminary nature of the numbers generated within this study cannot be understated. In the case of the sustainable education sector, data collection primarily relied on Dalhousie University. As a result, the jobs and wage bills for the sustainable education sector presented in this report can explicitly be applied to Dalhousie University, rather than the entire sector. In the case of the renewable energy sector, many of the outcomes were determined through analytical models, rather than empirical data – a common practice within the literature that quantifies economic activity within renewable energy sectors. Nonetheless, the preliminary results presented in this report indicate the economic importance of selected sectors of Nova Scotia’s green economy, as highlighted in Figure 7.2.

While the work in growing and quantifying the green economy in Nova Scotia has only just began, the progress that has been made thus far should be recognized. From 2011 to 2016, the revenue generated from the sale of renewable electricity within Nova Scotia grew 65.77%. Within the renewable energy sector, alone, nearly 900 Nova Scotians have been employed – representing about 1% of Nova Scotia’s labour force. Within Canada, at large, the clean technology labour force outnumbers the direct employment of industries such as forestry and logging, pharmaceuticals and medical devices (Analytica Advisors, 2017). People employed within the clean technology sector are also likely to be paid above average incomes (SECTOR-KMG, 2013; MDEED, 2014; Analytica Advisors, 2017). Thus, as the renewable energy sector in Nova Scotia has grown, the jobs that have been created are likely to pay better than the average wage or salary within the province. The results of this report also indicate that around 200 people employed within the sustainable education sector are paid annual salaries that range
Figure 7.2: Economic Impacts of Sustainable Education and Renewable Energy Sectors

| Revenue from Renewable Energy Generation in 2016 | $349.6 million |
| Full-Time Equivalent Jobs in Construction, Manufacturing and Installation in the Renewable Energy Sector | 484 |
| Total Annual Wage Bills Paid at Dalhousie's Environmental Programs | $13.3 - $21.6 million |
| Potential Tax-Revenue Collected through the Retention of Students in Environmental Programs* | $176.64 million per year of graduates |

*Potential tax-revenue that could be collected over the wage-earning lifetime of each year of students graduating from environmental programs within Dalhousie University, Cape Breton University, and Acadia University

from 25% to 98% above the provincial average income (NSFTB, 2015). As demonstrated by the results of Chapter 4, Nova Scotia’s renewable energy sector and sustainable educator sector not only provide employment opportunities but also significant potential for the province to generate additional tax revenue. Additional tax revenue could be generated if more students graduating from sustainable or environmental-related programs were able to find jobs within their fields and remain within the province for the duration of their wage-earning lifetimes. Considering the benefits provided through revenue generation, employment, and tax-revenue generation, renewable energy and sustainable education sectors not only provide environmental benefits but also economic value to the Nova Scotia population.

The economic value of sectors of the green economy in Nova Scotia is further evidenced by the recent quantification of economic activity within the energy efficiency sector and the waste management sector. According to Efficiency Nova Scotia, the province’s energy
efficiency sector “currently provides over 1,200 full-time jobs” and “[contributes] $192 million annually to Nova Scotia’s economy” (NSE, 2017a, p. 2). Within the waste management sector, Divert Nova Scotia found that the recycling of beverage containers and tires currently supports 836 jobs that will provide a total of $29.2 million in wages for the year of 2017 (Divert NS, 2017). When combined, the energy efficiency, sustainable education, renewable energy, and recycling sectors provide a total of 2,758 jobs. As demonstrated by these results, the transition to a green economy does not have to be a “job killer” (BlueGreen Canada, 2012), but rather opens up opportunities for Nova Scotians to be employed in well-paying fields that contribute to resource conservation and environmental protection.

7.3 Strategies for future development of the green economy

The quantification of sectors of Nova Scotia’s green economy carried out in Chapter 3 and 4 is demonstrative of the potential economic benefits that these sectors can generate. Within Chapter 5, a literature review revealed a number of studies conducted in Canada that have also quantified economic activity within the renewable energy sector and pointed to the significant employment potential of renewable energy industries. Solar energy, in particular, emerged as a leader in employment potential, as this industry creates 10 to 20 times the number of jobs/MW installed than the wind industry (Jeyakumar, 2016). Herein, future investment in the renewable energy sector should prioritize the development of the solar industry. In addition, further development of the tidal industry presents ample opportunities for innovation and job and wealth creation upon which the province could capitalize. Supporting the research and development of the tidal industry could allow Nova Scotia to become a global leader in tidal technology and to reap the economic benefits of exporting tidal technology to other countries (NSDOE, n.d.b). As discussed within Chapter 6, future investments in sustainable education programs within Nova Scotia will be necessary to allow for knowledge on clean energy technology, such as tidal turbines, to be both generated and disseminated.

Analysis carried out within Chapter 5 also indicated that the transition to renewable energy sources may not come without economic costs – including raised electricity prices, large capital investments, and job losses within the non-renewable energy sector. These economic costs, however, must be weighed against the potential environmental, social, and economic costs that could result if Nova Scotia did not transition away from its dependence on fossil fuels and
continued to drive climate change and the depletion of natural resources. In order to ensure that the economic costs are not inequitably borne by low-income households, First Nations’ communities, and laborers within carbon-intensive industries, the government must also invest its time and money into social programs – such as a Universal Electricity Service program as well as skill development programs within the sustainable education sector. Additional financial assistance should also be provided through the Employment Support and Income Assistance Act to allow low-income households to access sustainable education programs and gain the knowledge and skills required to live and work in a green economy. Equal attention must be given to developing initiatives such as these so that the transition to a green economy in Nova Scotia may be inclusive and may reduce rather than exacerbate socioeconomic inequality within the province.

7.4 Future Research

Given the preliminary nature of the results presented in this report, further quantification of Nova Scotia’s green economy is necessary. If the government decides to act on the Minister of Environment’s recommendation that EGSPA be updated to support the transition to the green economy, quantitative economic goals should be incorporated into the Act. Establishing quantitative targets for the green economy will first require that baseline data on the green economy be collected. Once the baseline levels are determined, quantitative goals can be set and their progress can be tracked through annual assessments. Thus, if the government is to commit to growing Nova Scotia’s green economy, rigorously measuring economic activity in green sectors will be imperative.

As demonstrated by the challenges encountered in the primary data collection processes of Chapter 3 and 4, future work must anticipate the time and effort required to gain first-hand insight into economic activity of private businesses. A well-thought approach should assess methodologies for quantifying activity within the green economy and discern their applicability in the Nova Scotia setting (see Appendix C for a review of methodologies). Before any data is collected, interviews with government officials and industry leaders should be carried out in order to discern the best way to move forward in quantifying economic activity of green sectors. Based on challenges experienced within this study as well as those highlighted in the literature, future efforts to quantify the green economy should include more primary data collection but
also be weary that it is unrealistic to rely solely on primary data to draw a complete picture of Nova Scotia’s green economy. For example, future researchers could carry out interviews with a sample of Nova Scotia businesses in each renewable energy industry, determine how many MW of energy they operate, and how many people they employ. Using the responses to these questions, employment factors for each renewable energy industry in Nova Scotia could be generated from a sample of businesses. The employment factors could then be multiplied by the total MW of each energy type in order to draw conclusions on total employment within Nova Scotia’s renewable energy sector.

Any assessment of the green economy would be remiss without an acknowledgement of the subjective valuation inherent to the delineation of “green” from “non-green” economic activity (Bruvoll et al., 2012). For example, in accepting all renewable energy forms as part of the green economy, the researcher conceals the relative environmental costs of different forms of renewable energy, such as the methane emissions and biodiversity losses caused by hydropower dams (Bruvoll et al., 2012). Thus, the inclusion or exclusion of certain activities should be approached critically. Researchers should be clear about the valuation criteria used to delineate the “green” from “non-green” and should rely on environmental assessment tools – such as life cycle assessment, in order to support decision-making processes. In the absence of critical assessments of the relative environmental costs and benefits of activities included in the green economy, the transition to a green economy could occur without improving the eco-efficiency of economic activity. In addition, a critical perspective of the concept of economic growth must also be incorporated into any assessment of growth in the green economy, considering that it may not be possible to decouple economic growth from environmental degradation (Jackson, 2009) and that increased resource efficiency may result in increased resource use (Sorrell, Dimitropoulos, & Sommerville, 2009). Thus, the delineation and measurement of the green economy should be driven not by capitalist interests in the growth prospects of green sectors, but rather by the intent to reduce the impact of human activities on the natural environment (Böhringer et al., 2012).
8. Conclusion

Considering the various and distinct components included, this report provided broad coverage of issues concerning the quantification of specific sectors of the green economy and the further development of those sectors within Nova Scotia. Due to its breadth, the report is limited in the relative depth through which each component could be explored. The depth of Chapter 3 and 4 was further limited by the challenges faced in obtaining primary data from industry representatives. Nonetheless, in covering various issues related to EGSPA and the green economy in Nova Scotia, the report has laid the groundwork for future research in these areas as well as provided sufficient reason for the policymakers of Nova Scotia to consider the economic benefits of growing the renewable energy and sustainable education sectors of the green economy. In addition, the report has expressed the imperative that the provincial government has to advance sustainable economic development, considering the perilous outcomes for the environment, the economy, and the local and global community should a business-as-usual approach to economic development be taken in the short- and long-term future. Moving forward, investments should be made into renewable energy and sustainable education sectors but should also be supported by financial assistance programs and skill development initiatives that will allow the transition to the green economy to be inclusive and equitable. Further quantification of the green economy is required, considering the preliminary nature of the work carried out within this study. Future efforts to quantify the green economy should take into consideration the various methodological approaches that have been previously employed, as expressed in Chapter 3 and 4, and adapt them to the Nova Scotia setting. Should the government choose to move ahead in further embedding the transition to the green economy within EGSPA, it must recognize the indispensability of baseline data on the green economy and should use its resources and political clout in order to carry out the exhaustive, rigorous work that is required to produce well-founded results.
9. References


## 10. Appendices

**Appendix A: Renewable Energy Sector**

Table 1: Contact Log for Renewable Energy Sector

<table>
<thead>
<tr>
<th>Company</th>
<th>Sector</th>
<th>Date Contacted</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nova Scotia Power</td>
<td>General electricity</td>
<td>October 26th</td>
<td>Called and left a voicemail with the environmental governance department of Emera as well as sent emails on two separate occasions. Received no reply.</td>
</tr>
<tr>
<td>Renewable Energy Services Ltd.</td>
<td>Wind</td>
<td>October 26th</td>
<td>Called and left a voicemail. Received no reply.</td>
</tr>
<tr>
<td>Confederation Power</td>
<td>Wind Energy</td>
<td>October 26th</td>
<td>Could not find contact information</td>
</tr>
<tr>
<td>Shear Wind</td>
<td>Wind Energy</td>
<td>October 26th</td>
<td>Website doesn't exist anymore. Tried emailing previous chief executive and the email bounced.</td>
</tr>
<tr>
<td>Glace Bay Lingan Wind Power Ltd.</td>
<td>Wind Energy</td>
<td>-</td>
<td>Could not find contact information</td>
</tr>
<tr>
<td>Pubnico Point Wind Farm Inc.</td>
<td>Wind Energy</td>
<td>October 26th</td>
<td>Phone never picked up.</td>
</tr>
<tr>
<td>Watts Wind Energy</td>
<td>Wind Energy</td>
<td>October 26th</td>
<td>Sent email, received a reply explaining that management had not approved our request.</td>
</tr>
<tr>
<td>Clean Foundation</td>
<td>Energy</td>
<td>October 30th</td>
<td>Sent email, received a reply explaining they were not a renewable energy business.</td>
</tr>
<tr>
<td>Nova Scotia Department of Energy</td>
<td>Energy</td>
<td>November 1st</td>
<td>Sent emails on three separate occasions. Received no reply.</td>
</tr>
<tr>
<td>Energise Bridgewater</td>
<td>Wind Energy</td>
<td>November 3rd</td>
<td>Sent email, received a reply explaining they do not collect data at the municipal level.</td>
</tr>
<tr>
<td>Quest Canada</td>
<td>Sustainable Development</td>
<td>October 30th</td>
<td>Sent email. Received no reply.</td>
</tr>
<tr>
<td>Fundy Force</td>
<td>Tidal Energy</td>
<td>October 30th</td>
<td>Sent email, received reply explaining that they are an NGO so they don't report any profit.</td>
</tr>
<tr>
<td>Offshore Energy Research Association of Nova scotia</td>
<td>Renewable Energy</td>
<td>October 29th</td>
<td>Sent email. Received no reply.</td>
</tr>
<tr>
<td>Natural Resources Canada</td>
<td>Natural Resources</td>
<td>October 31st</td>
<td>Sent email, received response saying they would be in touch shortly but never heard back.</td>
</tr>
<tr>
<td></td>
<td>Wind Energy</td>
<td>October 31st</td>
<td>Sent email. Received no reply.</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------</td>
<td>--------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>RMS Wind</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maryvale Wind LP</td>
<td>Wind Energy</td>
<td>October 31st</td>
<td>Sent email. Received no reply.</td>
</tr>
<tr>
<td>Wind Prospect Inc.</td>
<td>Wind Energy</td>
<td></td>
<td>Indicated on website that they sold their wind assets in 2010/2011.</td>
</tr>
<tr>
<td>Colchester-Cumberland Wind Field Inc.</td>
<td>Wind Energy</td>
<td>November 1st</td>
<td>Sent emails on two separate occasions. Received no reply.</td>
</tr>
<tr>
<td>Scotian Web Limited Partnership</td>
<td>Wind Energy</td>
<td>November 1st</td>
<td>Sent message through contact form on the website on two separate occasions. Received no reply.</td>
</tr>
<tr>
<td>Municipality of the District of Guysborough</td>
<td>Wind Energy</td>
<td>November 1st</td>
<td>Sent email on two separate occasions. Received no reply.</td>
</tr>
<tr>
<td>COMFIT</td>
<td>Wind Energy</td>
<td>October 31st</td>
<td>Sent email. Received no reply.</td>
</tr>
<tr>
<td>Green Economy Network</td>
<td>Green economy</td>
<td>November 13th</td>
<td>Sent email to ask advice for data collection, received response saying they don't know much about Nova Scotian context.</td>
</tr>
</tbody>
</table>

Table 2: Summary of Data Inputs and Sources for Renewable Energy Revenue Generation and Employment Calculations

<table>
<thead>
<tr>
<th>Data Point</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW of Wind Energy</td>
<td>NSDOE, n.d.b.</td>
</tr>
<tr>
<td>MW of Hydropower</td>
<td>NSPI, 2017g</td>
</tr>
<tr>
<td>MW of Biomass Energy</td>
<td>Emera, 2016</td>
</tr>
<tr>
<td>MW of Tidal Energy</td>
<td>NSPI, 2017</td>
</tr>
<tr>
<td>Employment Factors for Biomass and Tidal Energy</td>
<td>Greenpeace, 2012</td>
</tr>
<tr>
<td>Employment Factors for Wind and Hydro Energy</td>
<td>Jeyakumar, 2016</td>
</tr>
<tr>
<td>Jobs in Wind Energy in Operation and Maintenance</td>
<td>UNSM, 2015</td>
</tr>
<tr>
<td>Lifespan of Bay of Funday Tidal Plant</td>
<td>Gray, 2012</td>
</tr>
<tr>
<td>Lifespan of Biomass Plant</td>
<td>Wei et al., 2010</td>
</tr>
<tr>
<td>Lifespan of Wind Turbine</td>
<td>Wei et al., 2010</td>
</tr>
<tr>
<td>Construction Period of Hydroelectric Plant</td>
<td>Pembina Institute, 2015</td>
</tr>
<tr>
<td>Construction Period of Wind Turbine</td>
<td>Pembina Institute, 2015</td>
</tr>
<tr>
<td>NSPI Electricity Sales 2011-2016</td>
<td>See Emera 2011-2016</td>
</tr>
<tr>
<td>NSPI Electricid Production Breakdown 2011-2016</td>
<td>See Emera 2011-2016</td>
</tr>
</tbody>
</table>

Table 3: Breakdown of Annual Production Volumes Reported by NSPI in 2011

<table>
<thead>
<tr>
<th>Electricity Source</th>
<th>Annual Production Volumes (Gwh)</th>
<th>Percent of Total</th>
</tr>
</thead>
</table>

71
<table>
<thead>
<tr>
<th>Electricity Source</th>
<th>Annual Production Volumes (Gwh)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Purchased power - IPP (renewable)</td>
<td>743</td>
<td>6.23%</td>
</tr>
<tr>
<td>Wind and Hydro</td>
<td>1335</td>
<td>11.20%</td>
</tr>
<tr>
<td>Total renewables</td>
<td>2078</td>
<td>17.44%</td>
</tr>
<tr>
<td>Total</td>
<td>11,917</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4: Breakdown of Annual Production Volumes Reported by NSPI in 2012

<table>
<thead>
<tr>
<th>Electricity Source</th>
<th>Annual Production Volumes (Gwh)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>130</td>
<td>1.20%</td>
</tr>
<tr>
<td>Purchased power - IPP (renewable)</td>
<td>845</td>
<td>7.80%</td>
</tr>
<tr>
<td>Wind and Hydro</td>
<td>1234</td>
<td>11.38%</td>
</tr>
<tr>
<td>Total renewables</td>
<td>2209</td>
<td>20.38%</td>
</tr>
<tr>
<td>Total</td>
<td>10,839</td>
<td>100%</td>
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</table>

Table 5: Breakdown of Annual Production Volumes Reported by NSPI in 2013

<table>
<thead>
<tr>
<th>Electricity Source</th>
<th>Annual Production Volumes (GWh)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>258</td>
<td>2.34%</td>
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<tr>
<td>Purchased power - COMFIT</td>
<td>24</td>
<td>0.22%</td>
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<tr>
<td>Purchased power - IPP</td>
<td>825</td>
<td>7.47%</td>
</tr>
<tr>
<td>Purchased power - COMFIT &amp; IPP</td>
<td>849</td>
<td>7.69%</td>
</tr>
<tr>
<td>Wind and Hydro</td>
<td>1357</td>
<td>12.28%</td>
</tr>
<tr>
<td>Total renewables</td>
<td>2464</td>
<td>22.30%</td>
</tr>
<tr>
<td>Total</td>
<td>11,047</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 6: Breakdown of Annual Production Volumes Reported by NSPI in 2014

<table>
<thead>
<tr>
<th>Electricity Source</th>
<th>Annual Production Volumes (Gwh)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Purchased power - IPP (renewable)</td>
<td>743</td>
<td>6.23%</td>
</tr>
<tr>
<td>Wind and Hydro</td>
<td>1335</td>
<td>11.20%</td>
</tr>
<tr>
<td>Total renewables</td>
<td>2078</td>
<td>17.44%</td>
</tr>
<tr>
<td>Total</td>
<td>11,917</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 7: Breakdown of Annual Production Volumes Reported by NSPI in 2015
<table>
<thead>
<tr>
<th>Electricity Source</th>
<th>Annual Production Volumes (GWh)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>206</td>
<td>1.85%</td>
</tr>
<tr>
<td>Purchased power - COMFIT</td>
<td>280</td>
<td>2.52%</td>
</tr>
<tr>
<td>Purchased power - IPP</td>
<td>1009</td>
<td>9.07%</td>
</tr>
<tr>
<td>Purchased power - COMFIT &amp; IPP</td>
<td>1289</td>
<td>11.58%</td>
</tr>
<tr>
<td>Wind and Hydro</td>
<td>1275</td>
<td>11.46%</td>
</tr>
<tr>
<td>Total renewables</td>
<td>2770</td>
<td>24.89%</td>
</tr>
<tr>
<td>Total</td>
<td>11,129</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Appendix B: Sustainable Education Sector**

Table 1: Contact Log for Sustainable Education Sector

<table>
<thead>
<tr>
<th>Organization</th>
<th>Date Contacted</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Breton University</td>
<td>Oct 24th &amp; Nov 14</td>
<td>Sent email, no reply.</td>
</tr>
<tr>
<td>Acadia University</td>
<td>Oct 24th</td>
<td>Sent email and received a reply that email was forwarded to the Vice-president Academics; did not receive any other message after that.</td>
</tr>
<tr>
<td>St. Francis Xavier University</td>
<td>Nov 14th</td>
<td>Sent email to two separate contacts but no reply.</td>
</tr>
<tr>
<td></td>
<td>Oct 24th</td>
<td>Sent email, no reply.</td>
</tr>
<tr>
<td>Saint Mary's University</td>
<td>Oct 24th &amp; Nov 14</td>
<td>Sent email and received a response on November 20th. The contact shared that a pdf of Spring Graduation list for SMU, however, this list did not include people's specific major. SMU does not publish a list that includes individual student's major.</td>
</tr>
<tr>
<td>Dalhousie University</td>
<td>Oct 30th &amp; Nov 10th</td>
<td>Sent email to 7 contacts within Dalhousie University. Did not receive replies from any except one department on Nov 20th with the total amount of expenses on salaries for their department. However, did not use the number in the report because other departments did not provide similar information. The salaries in this report was estimated based on the salary ranges published in the faculty members' collective agreement.</td>
</tr>
</tbody>
</table>

Table 2: List of all programs in the fields of sustainable leadership at postsecondary institutions in Nova Scotia that demonstrate a commitment to environment protection, sustainability, or resource conservation based on the program descriptions. The table was prepared by reviewing the universities’ websites.

<table>
<thead>
<tr>
<th>University</th>
<th>Level</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Undergraduate</td>
<td>Bachelor of Environmental Sciences (BSc)</td>
</tr>
<tr>
<td>Institution</td>
<td>Undergraduate</td>
<td>Graduate</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Dalhousie University</td>
<td>Bachelor of Environmental Landscape Horticulture (Btech)</td>
<td>Bachelor of Community Design (BCD)</td>
</tr>
<tr>
<td></td>
<td>Integrated Environmental Management (BSc)</td>
<td>Bachelor of Environmental Design Studies (BED)</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Environmental Science (BA and BSc)</td>
<td>Bachelor of Environmental Engineering (BEng)</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Environment, Sustainability &amp; Society (BA, BSc, BMgmt, BCSc, BInf)</td>
<td>Bachelor of Ocean Sciences (BSc)</td>
</tr>
<tr>
<td>NSCC</td>
<td>Diploma</td>
<td>Master of Science - Oceanography (MSs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Master of Marine Management (MMM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Master of Resource &amp; Environmental Management (MREM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Master of Environmental Studies (MES)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Master of Planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental Engineering (MEng)</td>
</tr>
<tr>
<td>Saint Mary's University</td>
<td>Undergraduate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Environmental Science</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Environmental Studies</td>
<td></td>
</tr>
<tr>
<td>Cape Breton University</td>
<td>Undergraduate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Engineering Technology - Environmental Studies</td>
<td>Bachelor of Technology Nautical Science</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Graduate</td>
<td>Master of Education in Sustainability, Creativity and Innovation</td>
</tr>
<tr>
<td>Acadia</td>
<td>Undergraduate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Environmental and Sustainability Studies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Environmental Geoscience</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Environmental Science</td>
<td></td>
</tr>
<tr>
<td>St. Francis Xavier University</td>
<td>Undergraduate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Climate &amp; Environment (BA + BSc)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Environmental Sciences (BSc)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor of Aquatic Resources (BA + BSc)</td>
<td></td>
</tr>
<tr>
<td>Mount Saint Vincent University</td>
<td>NA</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3: List of all programs in the fields of sustainable leadership at Dalhousie University, and the number of faculty members, cross-appointed teaching faculty, administrative staff and teaching assistants in each program. The table was prepared by reviewing each program’s website.

<table>
<thead>
<tr>
<th>University</th>
<th>Level</th>
<th>Department</th>
<th>Program</th>
<th># of Faculty Members</th>
<th># of Cross-appointed Teaching Faculty</th>
<th># of Administrative Staff</th>
<th># of Teaching Assistants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalhousie University</td>
<td>Undergraduate</td>
<td>Department of Plant, Food, and Environmental Sciences</td>
<td>Environmental Sciences (BSc)</td>
<td>37</td>
<td>None</td>
<td>2 Administrators &amp; 7 Technicians</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Environmental Landscape Horticulture (Btech)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Department of Engineering</td>
<td>Integrated Environmental Management (BSc)</td>
<td>15</td>
<td>None</td>
<td>2</td>
<td>unknown</td>
</tr>
<tr>
<td>Environmental Science</td>
<td></td>
<td></td>
<td>Environmental Science (BA or BSc)</td>
<td>4</td>
<td>11</td>
<td>1</td>
<td>unknown</td>
</tr>
<tr>
<td>College of Sustainability</td>
<td></td>
<td></td>
<td>Environmental, Sustainability &amp; Society (BA, BSc, BMgmt, BCSc, or BInf)</td>
<td>10</td>
<td>29</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>Oceanography</td>
<td>Graduate Level</td>
<td>Oceanography</td>
<td>Ocean Sciences (BSc)</td>
<td>22</td>
<td>None</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Marine Affairs Program</td>
<td></td>
<td></td>
<td>Oceanography (MSs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School of Resource and Environmental Studies</td>
<td></td>
<td></td>
<td>Resource &amp; Environmental Management (MREM)</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Employee Title</td>
<td>Range of the Annual Salary per one employee</td>
<td>Source for the salary ranges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Faculty</td>
<td>$64,117 - $101,985</td>
<td>(Dalhousie Faculty Association, 2017)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross Appointed Faculty</td>
<td>$64,117 - $101,985</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative Staff</td>
<td>$22,493.9 - $51,308.4</td>
<td>(Nova Scotia General Employees Union Local 77, 2016)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technician Staff</td>
<td>$32,431.1 - $56,158.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Total number of jobs created, and the range of annual salary for teaching faculty, cross-appointed faculty, administrative staff and technician staff at Dalhousie University’s environmental programs.

<table>
<thead>
<tr>
<th>Employee Title</th>
<th>Range of the Annual Salary per one employee</th>
<th>Source for the salary ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Planning</td>
<td>Planning Programs (BCD, BED and Master of Planning)</td>
<td>8 All have been counted in the previous parts.</td>
</tr>
<tr>
<td>Civil and Resource Engineering</td>
<td>Environmental Engineering (BEng and MEng)</td>
<td>21 All have been counted in the previous parts.</td>
</tr>
<tr>
<td>Total</td>
<td>NA</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 5: Total number of students graduated from environmental programs at Dalhousie University, Cape Breton University, and Acadia University in the 2017 Fall and Spring graduations.
<table>
<thead>
<tr>
<th>University</th>
<th>Level</th>
<th>Program</th>
<th>Number of Graduates in Spring 2017</th>
<th>Number of Graduates in Fall 2017</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalhousie University</td>
<td>Undergraduate</td>
<td>Environmental Sciences (BSc) - Truro</td>
<td>12</td>
<td>0</td>
<td>(Dalhousie University, 2017)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental Landscape Horticulture (Btech) - Truro</td>
<td>4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Integrated Environmental Management (BSc) - Truro</td>
<td>8</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental Science (BA and BSc)</td>
<td>39</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environment, Sustainability &amp; Society (BA, BSc, BMgmt, BCSc, BInf)</td>
<td>52</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental Engineering (BEng)</td>
<td>22</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bachelor of Community Design (BCD)</td>
<td>35</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bachelor of Environmental Design Studies</td>
<td>59</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ocean Sciences (BSc)</td>
<td>6</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Graduate</td>
<td></td>
<td>Oceanography (MSs)</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine Management (MMM)</td>
<td>21</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resource &amp; Environmental Management (MREM)</td>
<td>15</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental Studies (MES)</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Planning</td>
<td>20</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>Level</td>
<td>Program</td>
<td>Undergraduates</td>
<td>Graduates</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------</td>
<td>--------------------------------------------------------------------------</td>
<td>----------------</td>
<td>-----------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Cape Breton University</td>
<td>Undergraduate</td>
<td>Bachelor of Engineering Technology - Environmental Studies</td>
<td>20</td>
<td>4</td>
<td>(Cape Breton University, 2017)</td>
</tr>
<tr>
<td></td>
<td>Graduate</td>
<td>Master of Education in Sustainability, Creativity and Innovation</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>NA</td>
<td>15 Programs</td>
<td>307</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Acadia University</td>
<td>Undergraduate</td>
<td>Environmental and Sustainability Studies</td>
<td>5</td>
<td>Unknown</td>
<td>(Acadia University, 2017)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental Science</td>
<td>3</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>NA</td>
<td>2 Programs</td>
<td>20</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>NA</td>
<td>19 Programs</td>
<td>335</td>
<td>33</td>
<td>NA</td>
</tr>
</tbody>
</table>
Appendix C: Methodology Toolkit

Methods used to collect data for toolkit:

To complete the Methods Toolkit, semi-structured and unstructured reviews of the literature were conducted using search engines and databases including Google Scholar, EconLit, Canadian Business & Current Affairs Database, and Web of Science. Search terms included measur* (renewable OR wind OR hydro* OR green OR sustainable) economy Canad*

Preference was given to papers focusing on a Canadian context, but papers looking at other jurisdictions were also considered if they were deemed relevant to the project in other ways. Renewable energy sectors including wind energy and hydropower were given preference over solar power, in keeping with the rest of this research project.

Table 1: Methodologies to Quantify the Green Economy Found in the Literature

<table>
<thead>
<tr>
<th>Association</th>
<th>Title</th>
<th>Data Sources</th>
<th>Measured Factors</th>
<th>Applicability for NS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Hydropower Association</td>
<td>Hydropower and the Canadian Economy: Jobs and Investment in Canada’s Largest Electricity Source</td>
<td>Spending data for hydroelectric power-specific single year capital investment and operations expenditure, estimated from annual reports and financial statements of individual utilities and companies.</td>
<td>Direct impacts: additional GDP and employment created through wages, materials and capital investments.</td>
<td>Canadian, but not NS-specific</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indirect impacts: additional GDP and employment created through expenditure from the hydroelectric power industry from other goods and services producing industries.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Induced impact: economic impacts of consumer expenditures resulting from wages generated by the production of the direct and indirect requirements.</td>
<td></td>
</tr>
<tr>
<td>Pacific Coast Collaboration</td>
<td>West Coast Clean Economy: 2010-2014 Jobs Update</td>
<td>Employment baselines from the Green Goods and Services Survey (2010-2011); job numbers for 4</td>
<td>New growth: growth of the labour pool through new investments and new jobs</td>
<td>Canada &amp; US</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Indirect effects: jobs associated with focus industries within Ontario (i.e., suppliers of goods and services for focus industries)
Induced effects: jobs created through overall economic growth (i.e., through increased expenditure resulting from wages) | Ontario specific, supplemented with Canadian and US data |
|---|---|---|---|---|
US BLS: number of green jobs, the industrial, occupational, and geographic distribution of the jobs, and employee wages.
Green Jobs Initiative: number of jobs (focusing on "good" jobs in the clean economy).
Metropolitan Policy Program: economic activity, of establishments and the jobs associated with them. | International |
<table>
<thead>
<tr>
<th>Organization</th>
<th>Study Title</th>
<th>Methodology</th>
<th>Multipliers</th>
<th>Data Supplemented With</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver Economic Commission</td>
<td>Green and Local Food Jobs in the City of Vancouver</td>
<td>Primary data collection via telephone survey of businesses. Secondary data collected from Statistics Canada, to estimate the number of jobs in the Green Building Design and Construction and the Local Food sectors.</td>
<td>Intensity ratios</td>
<td>Vancouver specific, supplemented with Canadian data</td>
</tr>
<tr>
<td>Blue Green Canada</td>
<td>MORE BANG FOR OUR BUCK How Canada Can Create More Energy Jobs and Less Pollution</td>
<td>Green Energy Act Alliance, Blue Green Canada, WWF, “Building the Green Economy.” (See above)</td>
<td>Direct and indirect job multipliers (job creation - jobs per $1 million spent). Direct, indirect, and induced effects; input-output model; open and closed model.</td>
<td>Ontario specific, supplemented with Canadian and US data</td>
</tr>
</tbody>
</table>
Appendix D: PESTEL

Project # 16: Opportunities for Growth through the Environmental Goals and Sustainable Prosperity Act: Research Design

PESTE(L) Analysis: Brainstorm & Collaborative Synthesis
MWB 5000: Management Without Borders
Team Members:
Monica Del Aguila
Kathleen Mifflin
Yashvi Pathak
Maryam Fazeli
Lianne Jones
Laura Cutmore
**Brainstorm**

Brainstorming was a helpful tool for the group to get different ideas that contributes to our analysis of the external factors, opportunities and threats that are influencing EGSPA. The following table shows the result of our brainstorming.

<table>
<thead>
<tr>
<th>Political</th>
<th>Economic</th>
<th>Social</th>
<th>Technological</th>
<th>Environmental</th>
<th>Legal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in political leadership</td>
<td>Labour Force and Unemployment</td>
<td>Public support for clean energy and technology</td>
<td>Social media</td>
<td>Climate change mitigation and adaptation efforts</td>
<td>Legislation on emission reduction and efficiency targets</td>
</tr>
<tr>
<td>Pressure from international environments</td>
<td>GDP Growth</td>
<td>Public participation and engagement</td>
<td>Evolution of renewable technology</td>
<td>Geography</td>
<td>Government grants, subsidies, and rebates for energy efficiency</td>
</tr>
<tr>
<td>Momentum from federal initiatives</td>
<td>Carbon tax</td>
<td>Socially and ecologically conscious millennials</td>
<td>Low carbon emission cars</td>
<td>Coal industry</td>
<td>Subsidy programs for graduates of environmental programs</td>
</tr>
<tr>
<td>Influence of different politicians</td>
<td>Austerity budgets</td>
<td>Lack of consideration of indigenous perspectives</td>
<td></td>
<td>Environmental activities like protection zones</td>
<td>School funding</td>
</tr>
<tr>
<td>Influence of industry</td>
<td>Provincial budget surplus</td>
<td>Education</td>
<td></td>
<td>Risk management and adaptation approaches in infrastructure</td>
<td>Carbon tax legislation</td>
</tr>
<tr>
<td>Slow movement of bureaucracy</td>
<td>Expected direction of economic change</td>
<td>Communication</td>
<td></td>
<td>Targets for emissions and efficiency goals</td>
<td>Programs for capacity building and training in manufacturing</td>
</tr>
<tr>
<td>COMFIT</td>
<td>Globalization and Global Demand</td>
<td>Public involvement</td>
<td></td>
<td></td>
<td>International agreements</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Change behaviour</td>
<td></td>
<td>First Nations jurisdictions</td>
</tr>
</tbody>
</table>

**Executive Summary**

**Word Count:**
This report provides an analysis and evaluation of the current Political, Economic, Social, Technological, Environmental and Legal (PESTEL) factors associated with the Environmental Goals and Sustainable Prosperity Act (EGSPA), that can influence the functioning of the Act. The report comprises of a synthesis, individual PESTEL reports and reference sheet.

For the purpose of the performing PESTEL analysis, various peer-reviewed scholarly articles, government reports and pieces of grey literature were studied and analyzed. Each individual was assigned to thoroughly analyze one of the components of PESTEL framework and identify the major factors within that component that could impact EGSPA.

As a result of this analysis, the group has identified various political, environmental, social, technological, economic and legal factors that act either as threats or opportunities in processes required to implement EGSPA. This study has also identified how these factors are interrelated and interdependent. The outcome of this document is not only helpful for the users of the Act but also for the students as they have a detailed understanding of the various factors and how they can impact opportunities for growth through EGSPA in the future.

PESTEL Individual Analysis: Political
By: Laura Cutmore
Word Count: 1466

Introduction
Political factors that affect Nova Scotia’s Environmental Goals and Sustainable Prosperity Act (EGSPA) come from all levels of government and political spheres. Provincial political factors have the most direct effect on how EGSPA has been adhered to since its implementation, but political factors from First Nations, federal, and international levels have also had indirect, but strong impacts. At all levels of government and internationally, threats to achieving and advancing the goals of EGSPA come from a lack of political will. Opportunities, on the other hand, come from the ambitious action of various sectors and jurisdictions, by giving Nova Scotia a base of achievements to build on and providing inspiration and incentive to continue making progress. Political factors that have affected EGSPA since its adoption in 2007 include decisions made by successive provincial governments to advance or stall work on EGSPA, as well current and recent First Nations, federal, and global politics. While the history of these political spheres is important for context, we will, for the most part, focus on the present political climate to understand how progress on EGSPA can be made from where we are now.

Provincial
Since 2007, three different political parties have formed the Nova Scotian provincial government. When EGSPA was adopted in 2007, the governing party was the Progressive Conservative (PC) party, led by Premier Rodney J MacDonald. In 2009 the New Democratic Party (NDP) and Premier Darrell Dexter were elected. From 2013 to the present, the Liberal Party has been in power, under Premier Stephen McNeil (Nova Scotia Legislature, 2017).

While the PC’s introduced and adopted EGSPA, not many of EGSPA’s goals were achieved until the NDP government took office (Nova Scotia, 2007; Nova Scotia, 2017). Although some progress has been made under Premier McNeil’s previous and current Liberal governments, improving the green economy, and achieving and advancing EGSPA’s goals has not been a priority for the Liberals. By 2015, Nova Scotia had met Canada’s national 2030 climate targets by reducing its emissions 30 percent below 2005 levels (Hughes, 2016). This
achievement came, in part, through policy changes mandating decreased reliance on coal and oil, and increase reliance on renewables and natural gas (Hughes, 2016). However, a large portion of this emissions reduction was due to decreased demand in electricity, a result of Nova Scotia’s poor economy forcing people and companies to leave the province and several factories to close down (Hughes, 2016). While Premier McNeil’s Liberals did introduce a ban on high-volume hydraulic fracturing for onshore shale gas in 2014 (CBC News, 2014), they have also been pushing through the controversial Alton Gas natural gas storage project (Withers, 2016) and approved the opening of the Donkin coal mine, 15 years after the last Cape Breton coal mine had closed (Ludlow, 2017). The Liberals also ended the Community Feed-In Tariff (COMFIT) program that supported the completion of more than 100 community-led renewable energy projects, contributing to Nova Scotia’s achievement of having 26.6 percent of its electricity produced by renewables by 2016 (The Canadian Press, 2015; Nova Scotia Department of Energy, n.d.; Nova Scotia Power, 2016). Most recently, Premier McNeil’s Liberals approved tire burning as a source of fuel (Nova Scotia Department of Environment, 2017b). These decisions indicate that the Liberals lack the political will to continue working on protecting the environment or growing the green economy.

First Nations

First Nations politics in Nova Scotia have had some impact on EGSPA since its implementation. Many Mi’kmaq communities embraced Nova Scotia’s emissions reduction targets and goals to grow the green economy. Millbrook First Nation, for instance, utilized the COMFIT program to implement a six megawatt wind project in their community (Nova Scotia Department of Energy, 2012). On the other hand, Indigenous-led opposition contributed to the eventual fracking ban, further incentivizing Nova Scotian reliance on renewables over fossil fuels, even so-called transition fuels like natural gas (Ross, 2014).

National and International

While national and international environmental politics may not have a direct impact on EGSPA, events from recent years will have an indirect impact on Nova Scotian environmental politics. The Paris Agreement that came out of the United Nations Framework Convention on Climate Change Conference of Parties (UNFCCC COP) 21 set global carbon emission targets, committing signatory countries to limit global warming to below 2 degrees Celsius and aiming to remain below 1.5 degrees Celsius (United Nations, 2015). As Canada signed onto the Paris Agreement in April 2016, the entire country is committed to making progress on climate adaptation and mitigation, including reducing carbon emissions (Justin Trudeau, Prime Minister of Canada, 2016). Prime Minister (PM) Justin Trudeau and the Provincial and Territorial Premiers signed the Vancouver Declaration in March 2016, from which came a Pan-Canadian Framework on Clean Growth and Climate Change which all the Premiers except those of Saskatchewan and Manitoba signed onto (Newfoundland et al., 2016). Nova Scotia, then, is committed to helping Canada meet its international climate commitments set out in the Paris Agreement. Included in the Vancouver Declaration was a carbon pricing plan which the Nova Scotia Liberals initially fought, but have since come out with a plan for (Doucette & Bailey, 2016; Nova Scotia Department of Environment, 2017a). Their plan, released in late September, was for a cap and trade system; the plan is, however, not ambitious and limited in scope and is, therefore, unlikely to effectively help fund a transition to a renewable economy or deter high-emitters (Ecology Action Centre, 2017). Another outcome from the Pan-Canadian Framework on
Clean Growth and Climate Change was the $2 billion federal Low Carbon Economy Fund announced in June (Environment and Climate Change Canada, 2017), set aside to help the provinces fund their transition to a renewable economy.

Besides this funding and the mandated carbon pricing system, the federal government has provided little pressure for the Nova Scotia to take ambitious action on climate change. Despite signing onto the Paris Agreement, PM Trudeau’s Liberal government continues to use the climate targets set out by Stephen Harper’s Conservative government before COP 21 (Payton, 2016). As previously explained, Nova Scotia has already met these targets, meaning there is no federal directive to continue to reduce emissions before 2030 (Hughes, 2016). PM Trudeau’s Liberals have also approved and continued to support many fossil fuel expansion projects including Kinder Morgan’s Trans Mountain pipeline expansion, Enbridge’s Line 3 pipeline (Justin Trudeau, Prime Minister of Canada, 2016), Trans Canada’s Keystone XL pipeline (Tasker, 2017), Petronas’ Pacific NorthWest Liquid Natural Gas (LNG) project (Canadian Environmental Assessment Agency, 2016) (the Pacific NorthWest LNG pipeline project has since been abandoned by Petronas but it never lost the support of Trudeau’s Liberals (Ghoussoub, 2017)). These fossil fuel projects would, if built, contribute huge emissions to the climate and make it difficult, if not impossible, for Canada to reach its climate targets (Minksy, 2016). This support for carbon intensive projects does not model climate leadership for the Nova Scotian Liberals, or put pressure on the provincial government to support ambitious climate action.

The election of Donald Trump in the United States instated a world leader who is a climate change denier (The White House Office of the Press Secretary, 2017a). In the eight months since taking office, Trump has pulled the United States out of the Paris Agreement (The White House Office of the Press Secretary, 2017c), resurrected the Keystone XL pipeline project which had been cancelled by President Obama (Baker & Davenport, 2017), and lifted the ban on new coal leases on public land (The White House Office of the Press Secretary, 2017b). However, despite setbacks from the United States and stalling from Canada, progress on carbon emission reduction and transition to renewables has been made worldwide. Global fossil fuel-related carbon emissions have remained nearly stable for the last three years (International Energy Agency, 2017), and for the past five years investment in new renewable energy was approximately double investment in new fossil fuel infrastructure (Renewable Energy Policy Network for the 21st Century, 2017).

**Conclusion**

All of these political factors have some influence on the future of EGSPA. There are many opportunities to build on the progress the Nova Scotian and Mi’kmaq governments have already made, as well as opportunity to learn and take example from global efforts and achievements toward creating a green economy. There is also the opportunity, and responsibility, to fill the leadership voids left by the lack of ambitious action from PM Trudeau’s federal government and the climate change denial of Trump’s United States. The greatest threat to the future of EGSPA, when considering political factors, is the lack of political will of Premier McNeil’s Liberals to capitalize on these opportunities and prioritize environmental action. Moving forward, persistent recognition of the economic benefits of taking action on climate change and growing the green economy may be the best way to encourage Premier McNeil and his party to continue working on and advancing EGSPA.
References


**PESTEL Individual Analysis: Environment**

Maryam Fazeli  
Word Count: 1505

**Introduction**  
In 2007, Nova Scotia passed the *Environmental Goals and Sustainable Prosperity Act (ESGPA)* outlining the principles required for maintaining a sustainable economic growth. Prosperity of NS, as one of the primary objectives noted in this Act, is recognized to be dependent on adopting clear goals that help in achieving environmental health, economic quality and social well-being within the province (EGSPA, 2007, c.7. s.4). Some guiding goals for attaining sustainable prosperity, acknowledged in *EGSPA*, are adopting goals that address the climate change adaptation strategies, greenhouse gas (GHG) emission levels, and clean energy programs (Ibid. s.3). Having considered these goals, the environmental opportunities and challenges affecting the goals set in this Act, as the subject of the analysis, will be focused around the themes of climate change adaptation and mitigation. The environmental factors assessed in this paper include, NS’s geographical location, current GHG emission status, and land protection.

**Climate Change Adaptation**

**Geographical Location**  
One of the key environmental factors to consider is the geographical location of Nova Scotia, as an important focus area that needs to be prioritized in order to build an effective climate change adaptation plan. Climate change has a significant impact to the environment, economy and human society because of the changes in global temperature, rise of sea level and the increase in frequency of extreme climate events such as storm surges, flood and coastal erosion (NS Environment, 2009, p.1). Province of NS is surrounded by water and has about 13,300 km of coastline which makes it highly susceptible to the impacts of a rising sea level (Gov. of NS, 2009, p.8) due to a combination of factors such as regional subsidence, sinking land below sea level, and of course climate change (Gov. of NS, 2009, p.13). As a result of these factor, over the next century, NS is expected to experience a total of 70 to 140cm rise in water level (Ibid. p.13).

Further, over the past few decades, there has been an increase in developments along the provincial coastline where about 70% of the population reside (Gov. of NS, 2009, p.1). NS has more than 25 local and regional ports managed by municipalities and private companies, and over 200 small craft harbours managed by various community groups (Ibid. p.10). The rising sea level will be a threat to the coastal communities and industries in the areas, and can have a significant impact to the economic prosperity of the province. Currently, there is a limited control and power on land use and zoning in the coastal areas, because 86% of these lands are privately owned (Ibid. p.10). In addition, NS is located at the northern end of the Atlantic hurricane track and can be susceptible to more damaging storms like the Hurricane Juan in 2003 (NS Environment, 2009, p.2).
It is inevitable that global temperature will continue to rise and so the need for building resilience in the communities. In order to withstand the posed challenges, the province needs prioritize on establishing more land-use bylaws and sustainable building standards for coastal infrastructure developments (NS Environment, 2009, p.11). NS in its most recent climate change action plan introduced a climate change adaptation fund to help communities understand the impacts of climate change, prepare for it, and adapt to the anticipated changes (Ibid. p.11). This is a great opportunity to assess the threats associated with climate change and encourage different organizations in private, public, or not-for-profit sectors to partake in building resiliency in the communities.

**Climate Change Mitigation**

**Renewable Energy Capacity**

While the geographical location of NS places it at a higher risk to the impacts of climate change, it also provides a great opportunity for expanding the marine renewable energy sources and transition away from burning fossil fuels. As an example, the Bay of Fundy in NS, with the highest tides around the world and about 160 billion tonnes of flowing water two time a day, provides the best potential for harnessing tidal power in the world (NS Dept. of Energy, n.d., p.1). The flowing water from one tide can produce 2,500 megawatts (MW) of electricity, which is equal to the energy demand of the province during its peak consumption period. This source of energy can also contribute gross domestic product (GDP) of up to $1.7 billion to the province (Ibid. p.1).

**Greenhouse Gas Emissions**

The extended coastal areas across the country brings an urgency for governments to make measurable environmental commitments to reduce the impacts of climate change, all which can positively aid in achieving the objectives set in **EGSPA**. Climate change is directly linked to an increase in anthropogenic greenhouse gases such as carbon dioxide, methane, and nitrous oxide in the atmosphere, which can absorb solar energy and re-emit it back as heat, causing warming of earth (Montzka et al., 2011). Canada’s total GHG emissions in 2015 were 722 megatonnes (Mt) of carbon dioxide equivalent (CO2 eq) (ECCC, 2017a). The Government of Canada, in support of the Paris Climate Change Agreement adopted in Dec 2015, is committed to growing a low carbon economy through a plan known as the Pan-Canadian Framework on Clean Growth and Climate Change, which is mandated to be followed across the country (Gov. of Canada, 2016). The four main components of this framework are pricing carbon pollution; taking complementary actions to reduce emissions; developing adaptation capacity; and investing in innovation and jobs in the clean technology sector (Gov. of Canada, 2016).

Although, identifying the most pollution intensive sectors in the province and its current GHG emission status can address the goals of **EGSPA** more directly. NS is the 7th highest GHG emitter in the country and accounts for 2.2% of the country’s total emission level (ECCC, 2017b, p.52). In 2015, the total GHG emissions in the province was 16.2 Mt CO2 e, the sources of which were the sectors of electricity (41.4%), transportation (28.4%), buildings (14.2%), waste and others (6.2%), oil and gas (3.7%), agriculture (3.1%), and emissions-intensive and trade exposed industries (3.1%) (Ibid. p.52). The electricity sector is the highest source of the emissions in the province because of the coal fired generating
stations (NS Dept. of Energy, 2015, p.6) followed by the transportation sector. Given these statistics, NS’s climate change action plan (NS Environment, 2009, p1) has identified that targeting these two sectors can help in achieving its GHG emission targets.

Nevertheless, there are significant challenges that halt the process for switching to cleaner sources of energy. NS recognizes the importance of transition to cleaner technologies and therefore, it has committed to expand its renewable energy sources for electricity by 40% by the year 2020 (EGSPA, 2007, c.7. s. 4). While NS is well positioned to achieve this target, a complete transition from coal to cleaner technologies could take time and potentially impact the economy, because of the significant amount of coal intensive generating stations in the province (NS Energy, 2015, p.6). Partly, this is due to a lack of domestic supply for natural gas as a transition fuel, which is relatively clean in comparison to coal (Willick, 2017). The two largest natural gas projects, ExxonMobil’s Sable and Encana’s Deep Panuke field, are planning to decommission in the near future (Willick, 2017) which will further diminish the chance of fuel switching to natural gas.

**Land protection**

Another important environmental consideration should the long-term viability and protection of nature and wilderness areas in the province. Since 2015, about 12% of the province’s landmass is protected meeting the land protection target set in EGSPA (Fairbairn, 2015). Nature reserves and wilderness areas protection can be a direct approach in lessening the impacts of climate change because natural forests can capture the GHGs in the atmosphere and reduce the pollution in the air (Prov. Of NS, 2013, p. 13). One concerning issue can be the illegal clear cutting incidents in the province (Doucette, 2017). Clear cutting can destroy the habitat of a wide variety of animals, plants, and limit the food supply for them. A newly introduced provincial review of forestry practices is intended to examine the harvesting practices and assess the associated concerns (Doucette, 2017) which is good first step in managing the provincial forests.

**Conclusion**

This paper aimed at reviewing some of the most important environmental factors that have an effect on the Environmental Goal and Sustainable Prosperity Act (2007). These factors include Nova Scotia’s geographical location, its current GHG emission status, and land protection in natural areas. It is inevitable that NS’s location makes it vulnerable to the impacts of climate changes as a result of continuous rise of sea level and more frequent storm surges and coastal erosions. However, the surrounding ocean and the presence of Bay of Fundy provides the opportunity for expanding the renewable energy in the province and growing the clean energy sector. The significant coal fired generating stations across the province make it very challenging to transition to cleaner energies without compromising the economic well-being of the province. In these respects, a sustainable growth is possible by implementing changes with consideration to the opportunities and challenges in the areas of climate change adaptation and mitigating.

**References**


PESTEL Individual Analysis: Social

By: Monica Del Aguila  
Word count: 1510

Introduction

In 2007 the Environmental Goals and Sustainable Prosperity Act (EGSPA) came into force (Lahey and Doelle, 2012). EGSPA recognizes that in order to achieve the proposed goals, it needs citizen commitment (Tirone, 2012). However, putting these goals into practice and obtaining positive results is not only a legal or political concern but also an important social issue (Tirone, 2012).

Tirone (2012) argues that the Act may be poorly performing because the population of Nova Scotia may not know or identify with these goals, or may not be ready to make the behavioral changes necessary to achieve the goals.

It is clear that social forces are influencing the proper performance of EGSPA. In this regard, this paper uses the PESTEL analysis tool, focusing in the social force and also provides an analysis of the various social factors affecting the proper performance of the EGSPA.

Social Analysis: Opportunities and Threats

1. Public support for clean energy and clean technology

   Nowadays, people around the world are taking action and raising their voices to demand a change (WWF, 2017). Moreover, business are investing more money in clean energies, generating more local jobs and solid economies. Communities are creating energy efficient buildings, airports, railroads in order to make them climate resilience (WWF, 2017). For instance, there are a significant number of local companies in Nova Scotia participating in global cleantech markets, which creates sophisticated products and services that are environmentally friendly (Government of Nova Scotia, 2014).

   Another good example is the creation of Community Feed-In-Tariff (ComFIT) as part of the Renewable Electricity Plan to promote renewable power production in local homes, farms and businesses (Patterson et al., 2016). Patterson et al. (2016) states “ComFIT Nova Scotia was a creative way to get communities to buy-in to renewables – literally and figuratively. It put power into the hands of local communities on an unprecedented scale, shifting us from a system that sends tons of money out of the province for fossil fuels to one that keeps money in the province to enrich communities that make use of clean, domestic resources”.

   Therefore, there are grounds to believe that the increasing public support (citizens and organizations) for clean energy represents a great opportunity for achieving EGSPA goals.

2. Public participation /engagement

   Tirone (2012, p. 74) argues that “there appears to have been little public consultation leading up to the adoption of EGSPA”. The Nova Scotia Round Table on Environmental Sustainability that is mentioned in the section 6 of EGSPA, is responsible of leading a thorough public review of the Act every 5 years (Tirone, 2012) and offers citizens with the opportunity to submit written feedback and to take part in public workshops (Government of Nova Scotia,
However, this Round Table performance is known for offering limited public participation and review as part of the structure of EGSPA (Tirone, 2012). For instance, variations in the EGSPA targets are expected by the citizens; nevertheless, the government usually makes those changes without public consultation. This type of circumstances weakens the Act and the trust of the citizenship in the government’s intentions towards sustainability (Carver, 2010).

Public participation is fundamental in the process of policymaking as lead to generate commitment and a sense of ownership between citizens who have contributed in creating the policy (Tirone, 2012). A public participation process that is thoughtfully designed and carried out effectively can have meaningful outcomes that lead to the creation of policies that are well supported by people (Tirone, 2012). For instance, policies such as the establishment of Efficiency Nova Scotia, the ban on hydraulic fracking, and the community renewables and renewable electricity standards, have had a successful public participation in Nova Scotia, with citizens involved and supporting them (Ecology Action Center, 2017). In this regard, it is necessary the same level of engagement and commitment in relation to the goals of the Act (Ecology Action Center, 2017).

3. Socially, ecologically conscious millennial generation
   According to new studies, millennials (ages 18-35) knows and are concern about the effects of Climate change in the environment (Loewe, 2017). Moreover, more than half of millennials support government initiatives to fight climate change (Aronoff, 2017). A clear example is the massive campaigns that this group of people had carried out in USA against the fossil fuel industry (Aronoff, 2017). Thus, it is of paramount importance to engage millennials towards green growth and sustainable development, because this generation is not only looking for achieving personal goals but they are also looking for making a positive impact for society (Aronoff, 2017).

4. Lack of consideration of indigenous perspective
   First and foremost, the history surrounding indigenous people in Canada is very complex. Years of savage occupation and the violation of their traditional culture and values have been affecting these communities for a long time (Green Party of Nova Scotia, 2017). Federal and Provincial governments should work together with Canada’s Indigenous communities and develop a bond based on trust and respect (Green Economy Network, 2016).
   The respective governments should guarantee an adequate and meaningful consultation before the development of any renewable energy project on First Nations Lands, as well as give these indigenous communities the opportunity to take part and obtain benefits from such projects (Green Economy Network, 2016). This attitude will enhance the economic opportunities and collective prosperity of indigenous communities, stakeholders and the rest of Canadians (Marchi, 2017).

5. Education / Training for greener jobs
   Education plays an essential role for developing the skills and competences that people needs to remain competitive and to obtain the jobs of tomorrow or greener jobs (Committee of the Regions, 2013). In Nova Scotia various universities and colleges offer diploma programs in environment-related areas, guaranteeing the availability of highly skilled employees (Atlantic Canada Opportunities Agency, 2011). However, in the conversion from fossil fuels to renewable energy, the government of Nova Scotia should also support workers in improving their skills as
well as guaranteeing that all citizens will have access to new employment opportunities in industries such as in renewable energy production, energy efficiency, etc. (Green Party of Nova Scotia, 2017). For instance, Europe has developed an education program named “Rethinking Education” which aims to encourage the Member States and regions to invest more in education and training; thus, ensuring that they have the right people for the jobs of tomorrow (Committee of the Regions, 2013).

In its labour market research study Eco Canada (2010, p. 27) identified 3 skills gaps that currently are affecting business’s capability to adapt and satisfy changing needs: “the ability to adapt to the quick pace of technological change, increased knowledge of sustainable development and of a new breed of interdisciplinary thinkers”. It is important that EGSPA establishes clear goals related to educational strategies in order to engage Nova Scotians in action that supports the Act (Tirone, 2012).

6. Communication

The Lack of public understanding about EGSPA represents a significant issue for the good performance of the Act and it can be considered as a barrier for a meaningful public participation (Tirone, 2012). The technical language used in the EGSPA, makes it difficult for regular citizens to understand it (Tirone, 2012). For instance, a target described in the EGSPA progress report states: “in 2009 NOx emissions from NSPI decreased by about 36 per cent, compared with emissions in 2000” (Government of Nova Scotia, 2010, p. 24). This language can be intimidating and the vast majority of people do not understand the extent of the described goal (Tirone, 2012).

Tirone (2012) argues that using an effective communication method contributes to generate a social behaviour change. A clear example of a successful communication strategy and that could be used by EGSPA, is the Efficiency Nova Scotia’s Home Energy Assessment Program. This program has developed guidelines that show the public how to maximize home energy efficiency (Tirone, 2012). Therefore, communication programs should help citizens to understand and develop a sense of ownership about EGSPA (Tirone, 2012).

7. Behaviour change

Nowadays where human lifestyles are having a detrimental impact on the environment (Sawitri et al., 2015), it is necessary that people adopt environmentally supportive behaviors (Tirone, 2012). EGSPA recognizes that citizen actions and attitudes are key elements for its success (Tirone, 2012). For instance, a survey made it in Canada showed that even when people were worry and commitment with the environment, elements such as time and poor knowledge of available resources influence them to take behaviors that are not friendly to the environment (Tirone, 2012).

Thus, developing programs that address both individual and community level behaviour change depict a major opportunity for the Act to obtain and encourage people to commit in environmental protection and stewardship (Tirone, 2012). However, if looking for success, these programs should take into consideration elements such as perfect understanding of the problem, a comprehension of the needs and motivations of the Nova Scotians and a perfect understanding of the conditions in which the program is executed (Tirone, 2012).

Conclusion
The main social factors affecting EGSPA are: Public support for clean energy and clean technology, Public participation, and Education. These social factors play an important role in the intentions of the Nova Scotia government to achieve the goals established in the Act and must be responsible and seriously taken into account. Policies that are supported by citizens are more likely to succeed because citizens feel identified and committed to it (Tirone et al., 2012). Therefore, it is of paramount importance to engage citizens of Nova Scotia with EGSPA and its goals through a suitable and meaningful public participation process, if the legislative goals are to be fulfilled (Tirone et al., 2012).

References


**PESTEL Individual Analysis: Technological**

Lianne Jones

Word Count - 1393

**Introduction**

The most common way of thinking about the technological factor is the ways in which technology can be a part of a green economy. The discussion around this can involve how they affect each other, and how it can thrive in Nova Scotia. Due to this close relationship, the situation calls for focusing on different types of green technologies, why some see Nova Scotia as a good place to develop them, and how social media can be used to promote a green economy.
Green Technology Development

Green technology could be a method of boosting Nova Scotia’s economy. In a 2014 article, Peter Hayes explained that the market for clean and renewable energy grew by 31 percent each year, between 2008 and 2010, and $254 billion was invested in it in 2013 alone. He argued that if a green technology hub was developed in the Annapolis Valley, close to 1000 jobs could be created across rural Nova Scotia (Hayes, 2014 p. E3). This presents the idea that green technology could revitalize the provincial economy, and that the ways in which green technology has improved and changed since the implementation of the Environmental Goals and Sustainable Prosperity Act in 2007 should be examined. Existing companies could also transition to using green technologies to increase resource productivity and their competitiveness in the market. Some also believe that doing so can help retain employees gives them something to market to consumers and potential employees (Minister’s Round Table on Environment and Sustainable Prosperity [Round Table], 2014). This reveals the connection between the technological and economic components of a green economy.

Renewable Energy

Nova Scotia is a peninsula province which gives it a lot of access to opportunities for wind, solar, tidal, and biomass energy, despite the province still being dependent on fossil fuels as of 2014. The Government of Nova Scotia did hold stakeholder consultations as part of the of determining how they can move away from them. These consultations revealed that biomass energy is something the province could consider as a source of energy for the future but there was still a need for further research. For example, when what woodland owners (who would be directly impacted by using biomass energy) thought of this was looked into, it revealed concerns about the sustainability of forests as a key obstacle to this, and disagreements on how could that be offset (MacGregor, Adams & Duinker, 2014). This proves the potential for a green economy is there, but there are concerns about how components of it could be managed in a sustainable fashion. The Ecology Action Centre would have to find evidence of how that could be done to get more people on board with a green economy. The government has already made a number of investments in renewable energy showing they understand their importance to the future (Round Table, 2014) and the EAC needs to remind them of those.

Studies have also been conducted on what circumstances led to the best development of renewable energy resources. One found that the markets that saw the best development were the ones that had easy transmission access, low transmission costs, and high feed-in-tariff costs (Alagappan, Orans, & Woo, 2011). A combination of those components makes renewable energy more appealing to investors and consumers, because it reveals clear, concrete benefits for investing in renewable energy which for some is what they need to move forward with it.

Low Carbon Emission Vehicles

A more specific example of uses for renewable energy is electric cars. They first gained popularity in the early twentieth century, but declined after World War I due to cheap gasoline, and have only returned to prominence in recent years. Some argue that if renewable energy sources were used as the source of power for electric vehicles the environmental benefits of electric cars could be fully reached. They already have low emissions, but the use of renewable resources would bring that down to zero, and there are multiple potential jobs that come from investing in the development of them (Liu, 2013). As previously cited research mentioned, Nova Scotia is well placed for the use of multiple forms of renewable energy (MacGregor, Adams &
Duinker, 2014), so developing electric cars that run on it has the potential to be something that Nova Scotia could invest in.

While electric cars are still developing, hybrid vehicles are more common in today’s society. It should also be noted that they are usually more expensive than non-hybrid vehicles, once again highlighting the connection between the economy and green technology. In fact, a study done by Yizao Liu found that vehicle owners in the United States were more inclined to purchase a hybrid vehicle when they were given an incentive to do so such as tax rebates. Someone’s willingness to purchase one also was found to be influenced by their annual income and the size of their family, due to the relatively small size of hybrid vehicles (2011). This shows the struggles that low carbon emission vehicles face in trying to get a foothold in society, and how there are a number of developments that still need to be made before they can really become something that is considered viable. For the Ecology Action Centre, they could use this information to promote Nova Scotia as a place to develop electric and hybrid vehicles, which could serve as a way to encourage the government to promote Nova Scotia as a place for automakers to develop green vehicles.

Hybrid and electric vehicles are not necessarily an obvious way to develop a green economy, but they can be an example of the benefits that come from investments in green technology. It could also be argued that hybrid and electric vehicles are examples of how switching to renewable energy will not eliminate or completely change the ways in which people live, but instead help find new ways of doing what they do now such as powering a vehicle.

Options for the EAC

It appears that many of the green technologies that exist today, existed when the Environmental Goals and Sustainable Prosperity Act was passed into law in 2007. Developments have come from research into how to implement them, and the benefits that using them give the economy. That approach is the one with the most potential for the Ecology Action Centre to use when trying to convince the Nova Scotia government and local businesses to get on board with a green economy. A switch to a green economy would create new opportunities for job creation, some of which might the help those who will lose their jobs due to the switch over. One of the most common discussions that government officials have about environmental policies is how to balance them with economic needs which means green technology should always be discussed with the economy involved.

The Ecology Action Centre could also use technology to gather support for a green economy. Social media has become an very common way for people to communicate. A social media campaign to promote a green economy could catch the attention of young people in the process of making decisions about their future and where they want to build their careers, and convince them to stay in Nova Scotia. Social media could also help the Ecology Action Centre encourage members of the public to turn up the pressure on the government to support and take further measures to move towards a green economy. No articles that specifically cover the ways social media can influence or be involved in a green economy could be found so if the Ecology Action Centre want have social media be a part of this movement then their best method would be to look at the ways in which it has been utilized for other movements around the world.

Conclusion
In this situation, technology is clearly something that can be used as an asset to help with the economic and social components. It does not stand on its’ own as it might in a different situation, but it is still worthy of analysis to see the ways in which it can play a part. What this analysis reveals is that if the ways in which technology can benefit a green economy are not looked at or studied, the Ecology Action Centre might have set themselves up for a more uphill climb than they intended.

References


PESTEL Individual Analysis: Economic

Yashvi Pathak
Word Count - 1350

Background: The Environmental Goals and Sustainable Prosperity Act, also known as EGSPA, came into existence in the year 2007 and is applicable to the Province of Nova Scotia (Government of Nova Scotia, 2017). With the long-term objective of “establishing clear goals that foster an integrated approach to environmental sustainability and economic well-being; and working towards continuous improvement in measures of social, environmental and economic indicators of prosperity”, the Act aims at achieving sustainable economic prosperity (Government of Nova Scotia, 2017). The Act has 25 specified goals and the deadline for achieving these goals are 2020. As of March 31st, 2017, 13 out of 25 goals were achieved and 12 goals are still in progress (Government of Nova Scotia, 2017). There are various external factors which affects the act. The aim of this document to identify and analyze the economic factors which has an impact on the Act. A thorough analysis of these economic factors is extremely essential as they play an important role in the fulfillment of above mentioned objective.

The very first economic factor which has an impact on the Act is Labour Force and Employment Opportunities. The enforcement of the Act has created new markets by stimulating demand for green technologies, goods and services and has created a potential for new opportunities
The energy efficiency industry of the Province currently provides over 1,200 full time employments with a total wage bill of over $62 million and these businesses contribute $192 million annually to the economy (Government of Nova Scotia, 2017). However, as on October 6, 2017, the labour force in the Province increased by 1.7% compared to September 2016 and unemployment increased 13.6% over September 2016 (Finance and Treasury Board, 2017). An increasing rate of unemployment poses a high level of risk to the economic development of the Province as well as on the EGSPA. The long-term goal of EGSPA to achieve sustainable economic growth depends on two important components; a.) Availability of “Green Jobs” and, b.) Skilled labour force who are trained to perform green jobs (Government of Nova Scotia, 2017). These two components influence each other. Absence of any of these components or any imbalance between them will have a negative impact on the Act in achieving its goal and the opposite is also true. Growing labor force, specialized in green jobs will create a big pool of talent and provide companies (involved in green jobs) opportunities to hire. Similarly, availability of green jobs is also important as there is no use of highly specialized workers without any job opportunity, it will create the problem of unemployment instead. Therefore, both of these factors play an important role in the success of EGSPA.

**Government’s Budget** is another key economic factor that affects the efficiency of the Act. Government’s investment in green jobs plays an important role in achieving the sustainable economic growth objective. In the year 2017, the Government in its Nova Scotia Alternative Budget, 2017 has announced a total of $158.5 million investment in Environment, Energy and Climate Change Sector with $16.5 million investment in “Green Jobs Transition Fund” (Canadian Centre For Policy Alternatives Nova Scotia Office, 2017). This will have a positive impact on the Act, as it will attract investors to invest in this sector and will promote the growth of companies doing green business. An increase in government’s spending in this sector can not only promote investments by businesses but can also encourage young talents to make career in this field. Any reduction in the investment by the government can hamper the investment opportunities in “Green Businesses”. This factor is interrelated to the previous factor. An increase in government’s spending will create green jobs in the province and will also create a pool of skilled workforce specialized in these jobs. However, the government should also allocate some budget to promote the educational programs which are related to environment, sustainable development, energy and climate change. This will increase the size of the labor force specialized in green business.

The other economic factor which has a great impact on the Act is **Gross Domestic Product (GDP) Growth Rate** of the Province. A higher GDP growth rate coming from green jobs can motivate government to invest more in green jobs. Apart from government, private investors all over the globe will also strive to invest in the economy and green jobs. The opposite is also true in case of decline in GDP growth rate. The GDP of Nova Scotia rose 0.9% in the year 2016 following a increase of 1.0% in the year 2015 (Statistics Canada, 2016). An increase in green jobs will not only reduce the issue of unemployment in the economy but will also increase governments revenue through individual and corporate taxes which in return will increase the GDP growth rate. Also, it will reduce government’s Debt to GDP ratio.

**Government’s taxation policy** also have a significant impact on the objectives of the Act. Any rebate to the businesses involved in green businesses can attract new investors in the sectors. Currently in Nova Scotia businesses can receive in-store or mail-in rebates to help them offset the cost of buying premium energy efficient products for their businesses (Canada Business Network, 2017). The eligible product categories are (Canada Business Network, 2017):
· Agricultural technologies
· Kitchen, refrigeration, and laundry equipment
· Heating and cooling equipment
· Power management software
· Lighting
· Compressors and pumping technologies

Any changes in the government’s taxation policy can have a positive or negative impact on the objective of the Act.

Globalization and increasing global demand for energy efficient products also has an impact on the objective of the Act. Now a days companies are investing more and more on energy efficient products. Citizens are also shifting their preferences towards energy efficient products. The increasing global demand for these products will have a positive impact on the Act. Nova Scotia is privileged to have good geographical location in terms of producer of wind energy, solar energy and water energy. More and more companies around the world who try to meet the increasing energy efficient demand of its customers can see Nova Scotia as a good marketplace where they can set up their operation base. Therefore, we can say that globalization and increasing global demand for energy efficient products can have a positive impact on the objective of EGSPA.

Conclusion: Therefore, based on the above analysis we can conclude that the various economic factor which can have an influence on the objective of the EGSPA are Labour force and Unemployment, Government’s Budget, GDP Growth Rate, Government’s Taxation Policies, Globalization and Global demand for the energy efficient products. These factors can impact the EGSPA in both positive and negative ways. All of these factors should be analysed on a regular basis, in order to avoid any risk.

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PESTEL Individual Analysis: Legal

Kathleen Mifflin
Word Count: 1,500

1. Introduction

The Environmental Goals and Sustainable Prosperity Act (EGSPA) provides a legal framework through which the province can achieve equitable economic development that conserves Nova Scotia’s natural resources and reduces provincial emissions of greenhouse gases (EGSPA, 2007, c.7). While the policies and funding initiatives pursued by both the provincial and federal governments have thus far made possible the achievement of various goals within EGSPA, important legal challenges that must be addressed in the future include: 1) the lack of environmental goals present in economic policymaking, 2) the insufficient consideration of vulnerable groups in provincial policymaking, and 3) the investor-state-dispute mechanisms of international agreements. The legal analysis that follows will develop an overview of the legal challenges and opportunities impacting EGSPA under the following sections: federal, provincial, and international.

2. Federal Level

Federal influence on the implementation of EGSPA occurs largely through two mechanisms: the creation of national frameworks that guide provincial environmental policy and the provision of funding to sustainability initiatives. The most relevant national framework is the Pan-Canadian Framework on Clean Growth and Climate Change that was released in 2016. Under this framework, the federal government has made it mandatory for all provinces to adopt a carbon pricing program (Environment and Climate Change Canada [ECCC], 2016). The framework also provides opportunities for job creation and innovation within clean technology fields through federal funding programs such as Sustainable Technology Development Canada (ECCC, 2016).

3. Provincial Level

3.1. Environmental Policy Framework

Because EGSPA was produced in the form of a legislated act, as opposed to a non-legislated green plan, its goals and the deadlines for achieving them are embedded within provincial law (Lahey & Doelle, 2012). As such, successive provincial governments are obligated to pursue the goals listed within the Act (Lahey & Doelle, 2012). The environmental policies that have been produced by the provincial government since the legislation of the Act have provided and will continue to provide legal opportunities for the goals of EGSPA to be achieved. For example, The Renewable Electricity Plan lays out a schedule to increase renewable electricity generation that is more ambitious than the schedule included within EGSPA itself (Lahey & Doelle, 2012). Pre-EGSPA legislation, such as the Environmental Act, 1994-1995, c.1, also provide opportunities for the achievement of environmental goals such as land conservation and solid waste reduction.
Flowing from the federal *Pan-Canadian Framework on Clean Growth and Climate Change*, the provincial government recently announced the Cap and Trade program that will come into force in 2018 (Climate Change Nova Scotia, 2017). Because the province decided to limit its scope to provincial boundaries, the plan may be insufficient to encourage the extra-provincial competition required to drive innovation of clean technologies (EAC, 2017). Reflecting the government’s desire to prevent businesses from leaving Nova Scotia, the plan will likely provide businesses with initial carbon allowances for free (Doucette, 2017). As a result, an opportunity has been missed to generate revenue to assist vulnerable groups, such as low-income residents and First Nations’ communities, in adjusting to the outcomes of the carbon pricing plan (Bubna-Litic & Chalifour, 2012; EAC, 2017).

3.2 Funding Opportunities for Innovation and Job Creation

Innovation has been widely recognized by policymakers, business leaders, and the academic community as an essential to prosperity within Nova Scotia (Ivany, d’Entremont, Christmas, Fuller & Bragg, 2014). The “sustainable prosperity” to which *EGSPA* aspires requires innovation that not only drives job and wealth creation but also environmental protection and resource conservation. Provincial funding programs, such as the Clean Technology Fund, the Nova Scotia Graduate Scholarship, and Fundy Ocean Research Centre for Energy, provide opportunities to businesses and research institutions within Nova Scotia to develop innovative clean technology and to drive job creation within the province (Government of Nova Scotia, 2014; Nova Scotia Department of Labour and Advanced Education [NSDLAE], 2014; Nova Scotia Department of Energy [NSDOE], 2015).

3.3 Labour and Economic Policy Framework

Though environmental policy has proved a successful tool for achieving environmental goals within *EGSPA*, economic policy has not been similarly leveraged to pursue green economic growth within the province. Lack of integration of environmental goals into economic policy results, in part, from the content of the *Act* itself, which only provides discreet environmental targets for the province to achieve (EAC 2011; Lahey & Doelle, 2012). As discussed by Lahey & Doelle, 2012, specific economic goals that integrate economic activity with resource conservation – such as “the number of new jobs created or revenues retained in the province as a result of avoided imports of fossil fuels” – should also be incorporated into the *Act* (p. 26). At present, there is an opportunity for changes such as those suggested by Lahey & Doelle, 2012 to be made to the *Act*, as it is currently undergoing its 10-year review process and the Minister of the Environment has indicated the importance of amending the Act to support the transition to a green economy (Nova Scotia Environment, 2017).

Aside from amendments to the *Act*, integration of economic and environmental goals will also require the provincial government to extend the influence of *EGSPA* into broader policymaking processes (Lahey & Doelle, 2012). Improved collaboration between government departments is necessary to build the capacity of the population to work and live in a green economy and to ensure that laborers working within resource intensive industries are not left without jobs (Lahey & Doelle, 2012; EAC, 2017). Existing policies that function to improve occupational capacity within the province - such as the *Community Colleges Act*, 1995-1996, c.4
and the *Adult Learning Act*, 2010, c.10 - could be used to advance skill development for green jobs.

3.4 Public and First Nations Consultation Framework

For *EGSPA* to achieve long-term success, it must not only integrate environmental principles into economic policy but also involve the residents of Nova Scotia in processes of green economic growth, environmental protection, and resource conservation. Thus far, public participation in matters related to *EGSPA* has been insufficient, perhaps reflecting the unwillingness or inability of citizens to relate to the goals of *EGSPA* and to make the necessary attitude and behavioural changes required to achieve them (Tirone, Gallant & Sykes, 2012). The underwhelming public participation is also reflective of the insufficient public consultation executed by the province in matters relating to the *Act* (Tirone et al., 2012). The provincial government could enable and encourage residents of Nova Scotia to engage with *EGSPA* and its goals by improving the dissemination of sustainability goals and sustainability initiatives and creating opportunities for citizens to be involved in the *Act’s* review processes (Tirone et al., 2012).

In addition to the issues concerning the general public, the concerns of First Nations’ communities are not being adequately considered in environmental policymaking, as demonstrated by the outcomes of the *Terms of Reference Consultation Process* for the *Marine Renewable Energy Act* wherein none of the recommendations made by the Mi’kmaq of Nova Scotia were incorporated into the final version of the Act (Kwilmu’kw Maw-klusuaqn Negotiation Office, 2015). In order to ensure equitable outcomes of environmental policymaking, First Nations’ communities must be better incorporated into decision-making processes related to green growth and environmental protection.

4. International

Considering the globalized processes through which economic development and environmental degradation occur, Canadian economic and environmental policymaking processes shape and are shaped by international agreements. International agreements that operate to address globally relevant sustainable development issues place pressure on the federal and provincial governments to take action, as demonstrated by the Paris Agreement’s impact on federal climate change policy (ECCC, 2016). International free trade agreements (FTA) open global markets and provide increased opportunities for innovation in Nova Scotia to profit (Ivany et al., 2014). On the other hand, provincial and federal governments are faced with the investor-state-dispute mechanisms of FTAs that protect the rights of foreign corporations to freely operate in Canada rather than protect the rights of Canadian governments to regulate environmentally harmful activities of businesses (Canadian Centre for Policy Alternatives, 2016). Thus, FTAs create legal barriers that may hinder the same policymaking processes driven by global agreements on sustainable development, such as the Paris Agreement.

5. Conclusion

Due to the legislated nature of the *Act*, the set of environmental goals in *EGSPA* are law, thus holding successive provincial governments responsible for achieving them. As evidenced
by the numerous environmental plans, policies, and regulations that have been in play since EGSPA was legislated, environmental policymaking has proved helpful to the implementation of EGSPA. In the future, however, barriers to environmental policymaking may arise as a result of international FTAs. Efforts to achieve the environmental goals of the Act have not been matched by efforts to transition to a green economy. Thus, future economic policymaking must prioritize the growth of the green economy and the capacity-building of a green labour force. Lastly, the long-term success of the Act will require improved public participation as well as improved consultation and consideration of the needs of vulnerable groups such as First Nations communities or low-income members of the population who may suffer financially as a result of environmental policies.

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Synthesis

Word Count: 748

Nova Scotia’s Environmental Goals and Sustainable Prosperity Act (EGSPA) was introduced in 2007 in order to promote environmental protection and green economic growth within the province (EGSPA, 2007, c.7). While provincial environmental policies have led to initial success, progress on transitioning Nova Scotia to a green economy remains relatively stagnant due to the lack of political will of the current provincial leadership (Lahey & Doelle, 2012). The greatest opportunity to advance progress on EGSPA is Nova Scotia’s commitment to the Pan-Canadian Framework on Clean Growth and Climate Change (Newfoundland et al., 2016; Justin Trudeau, Prime Minister of Canada, 2016). This commitment holds Nova Scotia and Canada accountable to meeting climate targets, and implementing environmental policy.

One the greatest barriers to achieving the goals of the Act is Nova Scotia’s reliance on coal to generate electricity (Nova Scotia Energy, 2015; Environment and Climate Change Canada, 2017). Targeting the electricity sector and transitioning it to cleaner technologies could have significant positive impact on reducing the total greenhouse gas emissions and growing the green economy. Considering its coastal location, Nova Scotia is well-suited to take advantage of the power of the ocean in order to develop marine renewable energy sources, such as tidal power, and transition away from using fossil fuels to generate electricity (Nova Scotia Department of Energy, n.d., p.1). Financial support from both the provincial and federal government, through initiatives such as Sustainable Development Technology Canada, support further research and development of the renewable sources of energy that the environment of Nova Scotia has to offer (Environment and Climate Change Canada, 2017).

As the provincial government has made initial progress in reducing greenhouse gases and increasing renewable electricity generation, the Nova Scotian economy has seen growth in green sectors – as exemplified by the 1,200 full-time jobs currently provided by the energy efficiency industry (Nova Scotia Environment, 2017). In spite of this initial progress, the province has fallen short in producing economic policy that aligns with the environmental goals of EGSPA (Lahey & Doelle, 2012). As indicated by recent decisions from Stephen McNeil’s Liberals - including the opening the Donkin coal mine, the approval of tire burning as a fuel source, the termination of the Community Feed-In Tariff (COMFIT) program, and the support of the controversial Alton Gas project - there is a lack of political will, at present, to work towards a rapid and just transition to a renewable economy (Ludlow, 2017; Nova Scotia Department of Environment, 2017; The Canadian Press, 2015; Withers, 2016). Furthermore, as evidenced by the Labour and Advanced Education Business Plan 2016-2017, the provincial government has not prioritized the training and capacity-building required to ensure laborers are prepared to enter the green economy. Any future growth in the green economy will require the provincial government to integrate environmental goals into economic policy and to build the capacity of the population to work and live in a green economy.

Ensuring that the well-being of all residents of Nova Scotian is safeguarded in the implementation of EGSPA also requires thorough consultation with the public and First Nations’ to be carried out during environmental policymaking processes (Tirone, Gallant & Sykes, 2012;
Bubna-Litic & Chalifour, 2012). Public participation is essential to ensure that citizens have a sense of ownership within the activities carried out by the government (Tirone et al., 2012). So far, the design and application of public participation processes related to EGSPA have been perceived as insufficient and inequitable (Sinclair and Diduck, 2005). Dissatisfaction with public participation efforts can be attributed, in part, to the excessive use of technical language in the Act itself that acts as barrier for people to understand the goals listed within it (Tirone et al., 2012). As such, it is of paramount importance to encourage citizens of Nova Scotia to engage with EGSPA and its goals through a well-established and meaningful public participation process (Tirone et al., 2012).

For EGSPA to achieve long-term success, there must be a political will to invest further in the green economy, to develop economic policies that prioritize the growth of green sectors over resource-intensive ones such as coal mining, and to build capacity of residents of Nova Scotia to live and work in a green economy. The political will is influenced by the will of the people to partake in the implementation of EGPSA and to hold the provincial government accountable. Through improved consultation with the public and First Nations’ communities, the province can reach a more equitable, participatory process through which “sustainable prosperity” can be achieved.

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