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The Evolution of Energy Service Companies (ESCOs) in Ontario:

Extending the Traditional ESCO Model to Renewable Energy Contracting

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Abstract

A number of ESCOs in Ontario are expanding their standard business model of energy performance contracting to include financing and expertise for the inclusion of renewable energy generation. This paper is a qualitative exploration of this business practice, referred to here as "renewable energy contracting". Through semi-structured interviews with ESCO experts and a literature analysis, this research seeks to understand what this expanded business model looks like in practice and what its main drivers and constraints are. With the use of a modified PEST analysis the findings are analysed to discover how policymakers can best support this business practice. The results of the TOWS analysis reveal how ESCO managers can best use their strengths and minimise their weaknesses to seek out opportunities for this business model while minimising the effects of external threats. The main findings are that a high degree of policy support and political stability are required for the business practice to remain economically feasible, and that certain social and technological factors are also essential to the success of renewable energy contracting.

Keywords: ESCOs, Canada, renewable energy contracting, TOWS, PEST analysis

Executive Summary

A number of ESCOs in Ontario are expanding their standard business model of energy performance contracting to include financing and expertise for renewable energy generation. This business practice has emerged as a result of energy policy opportunities in Ontario as well as from client requests for engaging in renewable energy generation.

Since this is a relatively new phenomenon, there is little known about this business practice, referred to here as "renewable energy contracting". Therefore, this thesis is an exploration of this expanded ESCO business model and aims to answer the question:

Under what conditions will this expanded ESCO business model, which includes funding and expertise for both energy efficiency investments and renewable energy equipment, work in Ontario and how can ESCOs best exploit the opportunities for this business practice?

The research question can be broken down into the following four sub-questions:

1) How is this current business practice, referred to here as "renewable energy contracting" defined?
2) Which drivers have contributed to the emergence of this business practice?
3) Which factors external to the ESCO industry make the business environment conducive to renewable energy contracting?
4) How can the ESCO industry in Ontario best take advantage of renewable energy contracting opportunities?

Through a literature analysis and data collection from nineteen semi-structured interviews, it was discovered that *renewable energy contracting takes two main forms:*

1) *Including renewable energy elements as one of many facility improvement measures in a performance contract.*
2) *Building, owning, and operating rooftop-mounted solar PV projects separately from performance contracts. With this arrangement, ESCOs receive income from the government for generation through the Ontario government's feed-in tariff (FIT) program and clients receive roof licensing payments.*

In answering the second research question, the data from interviews and the literature was analyzed to find that:
The most important drivers for renewable energy contracting were client demand and supportive government policies that made renewable energy contracting more economically feasible. The main constraints were also found to be economic and political: the financial success of the business practice currently depends on supportive government policies, but the political climate is uncertain. ESCOs were also found to have core competencies that were easily transferable to the expanded business model.

In order to discover which external factors make the business environment conducive to renewable energy contracting, a modified PEST analysis (the PEST+I analysis) was conducted, which looked at the political, economic, social, technological and institutional factors that are important for the expanded business model. The findings were as follows:

Political: Renewable energy contracting currently requires political support in the form of policies such as the FIT program, or reduced electricity rate subsidies. Overall, political stability is a prerequisite for long term planning for energy actors such as ESCOs, but the Ontario government is known for changing policies, in part due to its complex, deregulated electricity system.

Economic: The business practice is not currently financially viable without government support. Decreasing production costs for renewable energy equipment, government support for technology development, and electricity rates that are fully reflective of externalities would help this business practice become financially viable without government support.

S*ocial*: Equity concerns regarding electricity rate policies must be addressed in order to make them politically feasible.

Technological: The electricity transmission and distribution system must be upgraded in order to accommodate renewable energy generation.

Institutional: In order to achieve cognitive and sociopolitcal legitimacy, ESCOs can take advantage of their rebranding opportunity to promote renewable energy contracting. ESCOs also have a number of tools at their disposal for achieving legitimacy, such as partnerships with educational institutions.

A series of recommendations for policymakers were drawn from the PEST+I analysis. Most of these focused on providing economic incentives for renewable energy investments, ensuring policy stability and policy alignment with other levels of government, and allowing electricity prices to more closely resemble their true costs.

Finally, a TOWS analysis was conducted to determine how ESCO managers can best use their strengths and minimise their weaknesses to seek out *opportunities for renewable energy contracting* while minimising the effects of external threats. The results can be summarized in the following recommendations for ESCOs:

ESCOs can use their strengths to take advantage of opportunities by:

1. Using their knowledge and skills regarding risk, financing, building science, and incentives to provided renewable energy contracting under the FIT regime.
2. Promoting renewable energy contracting to existing clients.

ESCOs can use their strengths to minimise threats for the expanded business model by:

3. Using their risk management skills to mitigate technological and supply risks.
4. Continuing to use their flexible business model to deal with political uncertainty.
5. Forming stronger linkages with renewable energy equipment firms in order to stay ahead of new entrants.

The tactics that ESCOs can use to minimize their weaknesses in light of the emerging opportunities are to:

6. Bring on renewable energy experts to take advantage of this emerging business model.
7. Take advantage of this stage of identify formation to re-establish ESCO credibility and to gain legitimacy for renewable energy contracting.

In order to address both these weaknesses and threats at once, ESCOs can:

8. Form linkages with educational institutions to establish an employee base for renewables and to lend credibility to this new business practice.

ESCOs are encouraged to keep an eye on developments in the competition and policy circles, and to promote renewable energy contracting in order to increase the business practice`s legitimacy and chances of success.

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Abbreviations

EPC= Energy performance contracting

ESCO=Energy Service Company

FIT= Feed-in tariff

HVAC= Heating, Ventilation, and Air conditioning

IPSP= Integrated Power System Plan

M&V= Monitoring and Verification

OPA= Ontario Power Authority

Solar PVs= Solar Photovoltaics

1 Introduction

Over the past number of decades, climate change and its myriad effects have become a growing concern. Climate change mitigation and adaptation constitute some of the largest challenges facing humanity in the 21st century. The consensus among global atmospheric scientists is clear: warming of the climate system is unequivocal (IPCC, 2008, p. 30) and most of the observed increase in global average temperatures since the mid 20th century is *very likely* due to the observed increase in anthropogenic GHG concentrations(IPCC, 2008, p. 39), the majority of which are due to consumption of fossil fuels (IPCC, 2011, p. 3). Energy consumption is set to increase, with world electricity demand expected to grow more strongly than any other final form of energy (IEA, 2010b, p. 8).

As a result of this increasing trend, a warming of about 0.2°C per decade is projected, for the next two decades and after this point, temperature increases will depend on emissions scenarios (IPCC, 2008, p. 45). The effects of climate change vary across regions, and the potential effect include the increased risk of extinction for a number of species, coastal erosion, more extreme weather events, and changes in crop productivity(IPCC, 2008, p. 48).

A number of potential solutions for lowering anthropogenic GHG emissions have been suggested in the literature. The main findings are that finite fossil fuel energy sources must be replaced by renewable sources of power over the coming decades, and that energy use must be decoupled from economic growth and used much more efficiently than it is currently. Action on climate change has been slow to progress on the policy level, but there is some consensus regarding what the most cost effective solutions are for meeting mitigation goals: of the options suggested to reduce the release of anthropogenic GHG emissions, energy efficiency investments are said to be the most cost effective.

According to the landmark report for McKinsey & Company, the least expensive CO_2 abatement options are energy efficiency investments(McKinsey & Company, 2009, p. 27). In the study's well-known abatement curve, it is evident that many of the lowest cost measures, such as changes in lighting, building envelope retrofits, and HVAC system replacements, are all related to energy efficiency in buildings.

Globally, the building sector presents the largest and most cost-effective opportunity for making gains in energy efficiency and it provides ample co-benefits (UNDP & GEF, 2010). Part of the reasons why there is so much potential for gains in the building sector is that buildings are large energy users, responsible for 18% of global GHG emissions, which are expected to increase53% from 2005 to 2030(McKinsey & Company, 2009, p. 104).

On average, buildings emit 35% of GHGs into the atmosphere and use 33% of Canada's total energy production (Canadian Urban Institute, 2008). Canada's residential and commercial building sectors contribute approximately 80 and 69 megatonnes of CO_2 per year respectively (Canadian Urban Institute, 2008).

The focus of this research is on one actor that addresses the need for such increases in building efficiency through performance contracting: energy service companies (ESCOs for short). ESCOs provide the expertise and financing to find energy savings measures, calculate their payback periods, implement these measures, and then monitor, verify, and guarantee the savings.

The ESCO industry in Ontario has seen its share of changes in the past three decades. With an initial push from government incentives, the industry grew in the early 90s, but since then a number of unsuccessful companies have gone out of business and only a handful of resilient ESCOs have remained. According to the President of the Energy Services Association of Canada, there are about 10 ESCOs in Canada today, as compared to the 25 that existed ten years ago. The remaining ESCOs are larger and generate a great deal of income, but are mostly concentrated in the commercial and public sector in Canada (Hansen, Langlois, & Bertoldi, 2009).

Many ESCOs in Ontario have seen a shift in from purely providing energy savings to meeting clients' overall needs. In recent years this trend has moved ESCOs in Ontario towards new opportunities involving renewable energy generation. In Ontario, the government's long-term energy plans involve substantially reducing load requirements through energy efficiency measures and to invest in renewable energy generation. One of the main policies aligning with the latter goal at the present is the feed-in tariff program, which provides a guaranteed price for renewable electricity going into the grid.

Partially as a result of this policy shift, a number of ESCOs in Ontario are starting to provide renewable energy as part of performance contracts or as a separate service offering. For these "renewable energy contracting" strategies, ESCOs are taking advantage of some of the potential synergies between energy efficiency and generation. Currently, there is little data and literature available on this emerging business practice. As a result, this research aims to explore this business model as it currently stands, the drivers and constraints involved, how policymakers can make an environment more conducive to this business practice, and how ESCOs can fully take advantage of this business practice. It is hoped that the recommendations from this research will serve to encourage ESCOs and other actors to explore and engage in more holistic energy solutions.

1.1 Problem Definition

In recent years, ESCOs in Ontario have started to expand their portfolio of services in order to meet changing customers' needs. One such business model provides clients with financing and expertise for both energy efficiency investments *and* renewable energy equipment such as solar PVs.

There are many benefits of this business practice for clients: they gain access to expertise and financing for energy efficiency investments that they may not have thought of themselves, accessible financing for a renewable energy supply, profit from either feed-in tariffs or savings from not buying energy from conventional sources, and opportunities for leveraging the renewable energy investment for their own branding strategy.

In theory, ESCOs are in a good position to provide renewables as part of their services for a number of reasons:

1) Unlike renewable energy developers, ESCOs have financing as one of their core competencies, which is necessary for clients that do not have the up-front capital to set up renewable projects themselves.

2) ESCOs in Ontario are generally larger companies that also provide many other products and services. They often already have capacity in the area of renewables under a separate department.

3) ESCOs already have relevant knowledge regarding the Ontario energy system from a policy and technical standpoint.

4) As experts in energy efficiency investments, ESCOs can stand to benefit from the synergies between having a renewable energy supply and energy efficiency. For instance, energy efficiency investments decrease the necessary loads for renewable energy generation and high return energy efficiency investments can be leveraged to invest in renewables.

In practice, little is known about whether these supposed advantages are the driving forces behind ESCOs engaging in this new business practice. While at least one ESCO has been involved in renewable energy contracting for over ten years, many ESCOs in Ontario have only begun delivering renewable energy contracting as part of their service offerings, and it is not clear why this is so.

While there are many advantages for ESCOs wishing to integrate renewables in the services they provide, there are also various risks involved. Aside from the regular technical and performance risks associated with both energy efficiency and renewables, there are policy risks, as renewables in their current stage of development must often be supported by government policies in order to be profitable. So far, very little literature exists on the topic and it is unknown how ESCOs can best manage these risks while taking full advantage of this business opportunity.

1.2 Purpose

This qualitative study aims to determine which factors, both external to the ESCO industry and within the industry, make a business environment conducive to the expanded business model described in this research. This research also aims to uncover the tactics the ESCO industry can use to fully benefit from this new business opportunity.

1.3 Research Question

This research, therefore, aims to ask the question: *Under what conditions will this expanded ESCO business model, which includes funding and expertise for both energy efficiency investments and renewable energy equipment, work in Ontario and how can ESCOs best exploit the opportunities for this business practice*?

The research question can be broken down into the following four sub-questions:

1) How is this current business practice, referred to here as "renewable energy contracting" defined?
2) Which drivers have contributed to the emergence of this business practice?
3) Which factors, external to the ESCO industry make the business environment conducive to renewable energy contracting?
4) How can the ESCO industry in Ontario best take advantage of renewable energy contracting opportunities?

1.4 A Note on Terminology

The term "ESCO" is used throughout this text to describe energy service companies that do energy performance contracting. The author is aware that this term is no longer used in the industry as much as it used to be and that many variations are now in use such as "energy management firms" due to the evolution of ESCOs, which is discussed in the Findings section of this paper. Nonetheless, the term "ESCO" has been chosen for this thesis for the sake of continuity with previous research on the subject and because it is a familiar term to those in the industry.

The term "renewable energy contracting" refers to both energy performance contracts that include renewable energy equipment and for the business practice ESCOs have of building, owning and operating renewable energy projects. The terms "expanded business model" and "business practice" are used interchangeably with "renewable energy contracting" so as to avoid repetition.

"Renewable energy" is meant to include all forms of renewable energy, but there is a focus on renewable electricity generation for this thesis and solar PV generation in particular. The term "renewables" is used to denote "forms of renewable energy".

1.5 Disposition

The following chapter of this paper outlines the methodology for this research, where the analytical frameworks used to analyze the literature and findings are discussed. The research design is also laid out here to give the reader a sense of which research methods and sources were chosen and why.

The third chapter is a literature analysis, which gives the background for understanding the current state of ESCOs in Ontario. A brief overview of ESCO history in Canada, of the Canadian policy context, and of the Ontario electricity system are given in order to illustrate the current technical and policy boundaries surrounding the ESCO industry. This background and the discussion of ESCO drivers and barriers in this section also inform key variables used as parameters for the analysis in the fifth chapter.

In the Findings chapter, the results from the interviews are discussed. These findings and those from the literature are then examined in Chapter 5 using the PEST and TOWS analytical frameworks. The results from these analyzes inform the recommendations for policymakers and ESCO managers. This chapter also includes a discussion of the validity of the results and the analytical framework, as well as areas of further study for this research.

Concluding statements are then made in the sixth and final chapter, where the author summarizes the main findings of this research.

2 Methodology

This chapter describes the analytical frameworks used for this research and delineates what steps were taken by the author to conduct this research. The limitations, scope, and data collection methods are also explained.

To address the aims of this study, the author looked at a number of analytical models and tools. The original intention was to do an economic and financial analysis of the business practice, to see which financial parameters would be necessary make the expanded business model feasible. While conducting this research, however, it became clear that the necessary data for these calculations was generally unavailable, mostly because it was proprietary.

Since this research is based on the data that was made available, it is necessarily qualitative. The analytical frameworks chosen are the modified PEST analysis and the TOWS analysis by Weirich, which is based on the SWOT analysis. These two models were found to cover most of the variables the author deemed relevant, based on the ESCO literature.

2.1 Analytical Frameworks

The PEST analysis and TOWS analysis (as described by Weihrich in 1982) are used here to explore the internal and external forces acting upon ESCOs engaging in renewable energy contracting. The PEST Analysis used here has been modified by the author to include institutional factors, as inspired by Aldrich and Fiol, and hence is referred to as the PEST+I model in this paper.

PEST+I Analysis

The PEST Analysis is a well-known and commonly used analytical tool for examining the external forces that act on and influence organizations (Campbell & Craig, 2005, p. 501). The PEST acronym stands for political, economic, sociological, and technological factors. Examples of political considerations would be the likelihood of policy changes and the existence of political stability. Economic factors include changes in financial parameters such as interest rates. Sociological factors, such as demographic shifts and shifts in the labour force are also considered under the PEST analysis. Examples of technological factors considered under this analysis are changes in production, distribution and supportive technologies.

In this study, the PEST analysis is used to group and explain the key external factor found in the literature and in interviews that are important for ESCOs wishing to do renewable energy contracting.

The PEST framework was chosen because it is a simple and systematic way to view the external factors that influence the business practice's success for ESCOs. In this study, it is a complement to the TOWS analysis, which looks at factors both internal to and external to ESCO. For TOWS, the main external factors are opportunities and threats, which are not necessarily covered by the more simplistic PEST model.

The Institutional Context of Industry Creation

The PEST Analysis does not include a couple of institutional factors that were found to be of material importance for this research. Specifically, the PEST analysis does not address the issues of institutional legitimacy in the form of cognitive legitimacy and sociopolitical legitimacy. The argument made by Aldrich and Fiol in their seminal work was that emerging industries are constrained by both of these factors.

Cognitive legitimacy, is the stage of recognition in which firms are taken for granted by customers and other actors(Aldrich & Fiol, 1994, p. 645). With limited cognitive legitimacy, it is difficult for outsiders to understand the business model because there is not yet a standard model for the industry and there are competing versions in existence.

Sociopolitical legitimacy is achieved when a new industry fits into already existing norms. This legitimacy is a process by which key stakeholders accept a new venture as appropriate and right (Aldrich & Fiol, 1994, p. 645).

The ESCO industry itself has achieved cognitive and sociopolitical legitimacy, but the expansion of the traditional performance contracting model to renewable energy contracting requires these two factors to be in place. This is because the business practice is not fully understood by potential clients and it implicates the larger discourse regarding decentralization of power sources and who should be responsible for generation.

Aldrich and Fiol offer a number of strategies for achieving both cognitive and sociopolitical legitimacy at the organizational, intraindustry, interindustry, and institutional levels. These suggestions range from alternative forms of communication to achieve cognitive legitimacy to promoting cooperation with third parties and educational institutions at the interindustry and institutional levels in order to achieve sociopolitical legitimacy. Many of these strategies were used to inform the recommendations drawn from the TOWS and PEST+I analyzes.

For the purposes of this research, these two institutional factors- cognitive and sociopolitical legitimacy- have been added to the PEST analysis as an additional type of factor that warrants consideration. Hence the model used in this research is the PEST+I model, where I represent the two institutional legitimacy factors.

SWOT & TOWS Analyses

The SWOT analysis dates back to the 1950s and 1960s and remains one of the most widely used tools for analyzing internal and external environments in order to attain a systematic approach and support for decision situations (Ghazinoory, Abdi, & Azadegan-Mehr, 2011, p. 24). Specifically, SWOT analysis is a technique used for problem solving, decision-making or strategic planning, which involves analyzing the strengths, weaknesses, opportunities, and threats concerning a task, department, or organization (Goleman, 2002, p. 468).

The SWOT analysis has been criticized for being an outdated technique that relies on listing descriptions rather than analysis(Goleman, 2002, p. 468). Indeed, one of the main criticisms in the literature regarding the SWOT analysis is that it does not prioritize factors (Ghazinoory, et al., 2011, p. 34). To address this shortcoming, the SWOT analysis has been adapted in a number of ways, notably by Weihrich in his 1982 TOWS study. Here, Weihrich, compared strengths and weaknesses against opportunities and threats as a way of selecting an appropriate strategy for the organization being assessed (Weihrich, 1982). The strengths, weaknesses, opportunities, and threats are organized in a matrix that produces four combinations: SO (strengths-opportunities), WO (weaknesses-opportunities), ST (Strengths-

Threats), and WT (Weaknesses-Threats). For each of these categories, potential strategies are suggested as away to address each of the four situations.
For this study, a TOWS analysis is conducted to discover:

a) How the ESCOs industry's core competencies and strengths can help ESCOs in Ontario take advantage of the emerging opportunities and minimise exposure to threats for this business proposition.

b) How the ESCO industry's weaknesses can be minimized and external threats can be addressed in order to fully benefit from the emerging business proposition.

In this study, the TOWS analysis by Weihrich will be used, so there will be two main steps:

1. SWOT: Exploring the strengths, weaknesses, threats and opportunities of ESCOs vis-à-vis this new business practice.

2. TOWS: Exploring the strategies that ESCOs can take to address the interactions between these internal strengths and weaknesses and the external threats and opportunities.

In the first step, the literature and findings from the interviews are assessed to find the ESCOs' strengths, weaknesses, opportunities and threats related to renewable energy contracting. For a list of guiding questions for this exercise, see Table 1.

Table 1-SWOT Analysis: Guiding Questions

SWOT Analysis- Guiding Questions		
SWOT Model Description		**How SWOT Will be Applied**
Internal	Strengths	What are the Ontario ESCO industry`s current core capabilities and strengths that lend themselves well to this business practice?
	Weaknesses	What weaknesses make ESCOs vulnerable to decreased profitability or credibility in using this business proposition?
External	Opportunities	What opportunities have presented themselves to make this business proposition feasible or desirable? What related opportunities are likely to present themselves in the near future?
	Threats	What are the existing and potential threats that would undermine the feasibility or desirability of this business proposition?

In the second step, the TOWS framework is used, as first proposed by Weihrich. The SWOT results from step 1 will are put into the TOWS matrix to discover how ESCOs can best position themselves to take advantage of or minimize the effects of the situation in each of the four quadrants. See Table 2 for the summarizing table and guiding questions for the TOWS analysis.

Table 2- TOWS Analysis Framework and Guiding Questions

	S-Strengths *What are the Ontario ESCO industry`s current core capabilities and strengths that lend themselves well to this business practice?*	**W-Weaknesses** *What weaknesses make ESCOs vulnerable to decreased profitability or credibility in using this business proposition?*
O-Opportunities *What opportunities have presented themselves to make this business proposition feasible or desirable? What related opportunities are likely to present themselves in the near future?*	SO: Strengths-Opportunities *Are there opportunities that ESCOs are particularly well equipped to explore?*	WO: Weaknesses-Opportunities *Do ESCOs lack any ability to explore existing opportunities? How can ESCOs overcome these weaknesses?*
T-Threats *What are the existing and potential threats that would undermine the feasibility or desirability of this business proposition?*	ST: Strengths-Threats *Are ESCOs particularly well equipped to deal with certain threats?*	WT: Weaknesses-Threats *What strategy can ESCOs use to minimize weaknesses and threats?*

Source: Adapted from Weihrich (1982)

The TOWS analysis was chosen as an analytical framework to complement the PEST+I analysis because, while the PEST+I analysis focuses mostly on factors external to the ESCO industry, the TOWS analysis includes factors both internal to and external to the ESCO industry. The recommendations derived from the PEST+I analysis are mostly suitable for policymakers whereas recommendations derived from the TOWS analysis are mostly suitable for ESCO firms and the industry as a whole. However, recommendations for ESCOs will also be drawn from the PEST+I analysis.

The TOWS analysis is useful to help gage which forces are under ESCOs' control (expressed as strengths and weaknesses) vis-à-vis this business model, and what external opportunities it can take advantage of (opportunities) and hedge against (threats) in order to best take advantage of this business proposition.

2.2 Research Design

Since this business practices in its infancy, this research is exploratory, and is necessarily qualitative. There's little information available to make a quantitative study regarding the economic feasibility of this business practice, but perhaps as ESCOs gain more experience with it, there may be more data available in the future for such a study.

The research presented herein is inductive. The author allowed the data from the literature and the interviews to first speak for itself before applying a theoretical lens.

The research steps were as follows:

1) To understand the *business practice as it currently stands*, the author first reviewed the practices of the ESCO industry through preliminary work for the ARSCP course research paper. For this thesis, the literature from the ARSCP was reviewed and triangulated with interviews for the ARSCP paper as well as the interviews conducted for this thesis. The little literature available on renewable energy contracting was reviewed for this thesis and interviews were conducted with experts who work for or with ESCOs, in order to triangulate the literature sources and to uncover different aspects of the business practice.

2) To *uncover which drivers have contributed to the emergence of this business practice and which factors are necessary for this business model to work*, a literature analysis on this topic was conducted and triangulated by interviews. Simultaneously, research was conducted on possible theoretical frameworks that could help structure and explain the data from the literature. From these sources, a number of variables were identified as important for ESCOs' success in integrating this business practice into their current business model. The variables that were identified can be grouped under the following four categories:

    a. Political
    b. Economic / Financial
    c. Technological
    d. Institutional

    Once these variables were found, interviewees were asked questions related to them in order to triangulate the information. From this data, recommendations were made for policymakers regarding how to make the policy environment more favourable to this business practice.

3) To *investigate the ways in which the ESCO industry in Ontario can best take advantage of this business practice*, a TOWS analysis was conducted. The data from the findings was first looked at through the lens of the SWOT analysis to uncover which of the ESCO industry's strengths and weaknesses, opportunities and threats, were related to the success of this business practice and how. Based on the SWOT findings, a TOWS analysis was conducted to determine how ESCOs could leverage these strengths and minimise these weaknesses in light of the threats and opportunities presented by renewable energy contracting. Recommendations were made to this effect.

2.3 Data collection Sources and Methods

This thesis was informed by the author's previous research paper submitted for the Applied Research in Sustainable Consumption and Production (ARSCP) course in April of 2011. This research provided some of the basic literature analysis on ESCOs in Canada and a number of interviews were conducted for the ARSCP paper, in order to answer the question of why ESCOs have been declining in Canada over the past few decades, especially in the industrial sector.

For this Master's thesis, literature in the form of peer-reviewed articles, newspaper articles, and websites were analyzed to understand the energy service context of Ontario, relevant policies on all three levels of government, and what the implications of these arrangements are for the expanded business model. The author also kept an eye on changes in the ESCO and renewable energy industries in Ontario through updates via online networks and attended relevant events. As examples, the author joined the Clean Tech and ESCO networks on LinkedIn, received updates regarding news at associations, such as the Ontario Solar Network and attended networking events such as Solar Drinks. In order to discover what this business model entails and how it came about, literature and websites on energy management were reviewed and interviews with energy management experts and renewable energy experts in Ontario were conducted. These interviews ranged from half an hour to two hours in length. They were semi-structured so the author could compare answers from all interviewees while also allowing for open questions that brought added insight.

In total, 19 experts were interviewed for this research paper. Five of these interviewees' are currently working for ESCOs' and four of the five are incorporating renewables in the services they provide. Interviewees who currently work for ESCOs and ESCO clients were asked for their insight on the drivers and constraints of the ESCO industry general and of this business practice in particular. High level managers of a renewable energy company, an energy management consulting firm, and of an environmental remediation company were also interviewed to shed light on potential and current ESCO competition and to explain their views on renewable energy trends in Ontario. Individuals who worked for the provincial government, former ESCO employees, local distribution companies and community organizations were interviewed to get a clearer picture of trends in the energy sector and in energy policies in Ontario and also to get an outsider's perspective on the ESCO industry. For the interview guide and list of interviewees, see Appendix A- Interview Guide and Appendix B- List of Interviewees.

The author compared data from transcribed interviews to trace the different views regarding issues affecting the ESCO industry and the expanded business model, and to determine where there was consensus on these issues. From these results, the author synthesized the preliminary findings, which were sent out to interviewees for feedback. The interviewees' comments on the preliminary findings were taken into consideration for the next iteration of the findings as well as for the analysis and discussion sections of the paper.

2.4 Limitations and Scope

This study is limited to the topic of ESCOs within the province of Ontario, but relevant federal policies are also discussed.

It is important to note that the Ontario energy system is split between the electricity sector and the natural gas sector for heating. While the heating sector is very important in the Canadian context, it constitutes a separate sector with its own related policies. Therefore, for the purposes of this thesis, only the electricity sector and its related policies will be looked at.

The trends discussed in the ESCO industry here are mostly limited to trends in the past 20 years. This paper looks at the ESCO industry as a whole. Individual cases from ESCOs in Ontario and trends common to the entire energy industry were used to inform this research, but the analysis and recommendations are appropriate for the industry level.

Although a number of interviews were conducted with individuals who formerly worked for or currently work for ESCOs that use components of this business practice, the author had difficulty getting a hold of clients for the said business model. As a result, the data and analysis are somewhat biased in favour of the ESCO's perspective. The author supplemented the clients' perspective wherever possible with support from the literature.

The analysis that is part of this research is limited to the selected analytical frameworks. Any insight that falls outside of the analytical frameworks is beyond the scope of this research, although modifications to the frameworks used here and alternative lenses are touched upon briefly in the Discussion section.

2.5 Anticipated Result & Intended Audience

The aim of this paper is to propose practical recommendations for ESCO managers and policymakers in the energy field, such that these firms may make better use of renewable energy contracting. It is hoped that the results of the analysis will create a clearer picture of what the expanded model looks like, what factors determine its success, and what further research is necessary to support this business practice.

3 Literature Analysis

3.1 The ESCO Industry Today

Current Business Model: What are ESCOs?

There are various definitions of the term *business model* in the literature. The definition chosen for the purposes of this study is taken from Amit and Zott: "A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities"(2001, p. 511). This definition is chosen because it is transactive and gives a clear sense of how firms create value (Zott, Amit, & Massa, 2011, p. 88). The traditional ESCO business model involves financing, implementing, verifying, and guaranteeing energy savings through various energy efficiency measures for buildings. For an overview of the ESCO model process, please see Figure 1.

The value of the ESCO model for clients is in the guarantee, leveraging, and financing of energy savings investments. ESCOs bring the expertise necessary to find and implement energy efficiency savings and leverage the high return savings to fund lower return savings. They are accountable for their energy savings predictions due to the guarantee that they can provide. They also make it possible for clients to upgrade facilities without having to pay high up-front costs. Although ESCOs make a profit from this endeavour, they maintain that client partnerships with them save clients money in the long run because ESCOs are able to buy energy efficiency equipment at a discounted price.

Energy performance contracting begins with an energy audit, in which the different amounts of energy used for different purposes are identified. The audit is used for baseline data, so that data on typical energy use can compared with predicted and actual energy savings from implemented energy efficiency measures. The initial energy audit is also used to identify energy savings opportunities, for which payback estimates are made.

The next step in the process is drawing up an energy performance contract (EPC), in which the following information is outlined: the project costs and how they will be paid, energy savings from the project, and a termination clause (Mozzo Jr., 2000, p. 17). Performance contracts range in length, generally from seven to twelve years, but can go up to a maximum of twenty years for the institutional sector (UNEP, 2009, p. 1). Commercial and private sector clients generally require paybacks lower than seven years.

The ESCO is then responsible for following this contract by implementing, maintaining, and verifying the energy efficiency changes. Implemented measures can include upgrading of HVAC systems, improving building envelopes, or use of sustainable materials and operations, among others. The measures taken are tailored to the facility's needs.

Savings that result from the project must be properly calculated and verified by the ESCO using appropriate measurement and verification (M&V) procedures. These procedures are necessary to monitor energy usage after energy efficiency measurements are in place and to adjust the baseline data appropriately for the conditions (such as climatic conditions that deviate from the norm) so that energy savings can be correctly calculated.

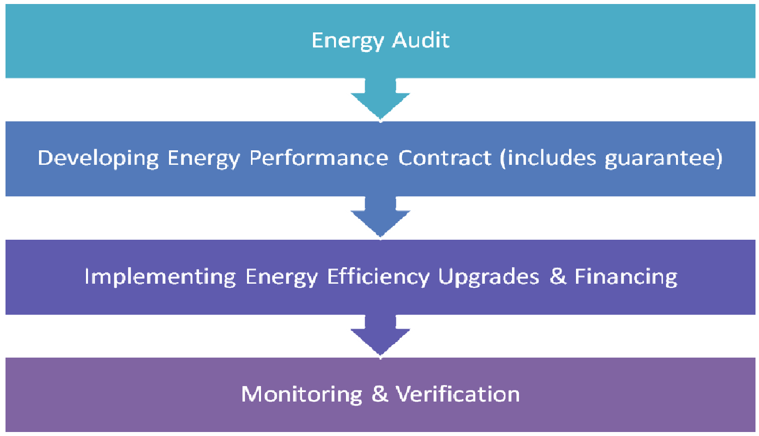

Figure 1-Overview of Energy Performance Contract Process

The two most typical financing arrangements are *shared savings* and *guaranteed savings*. For shared savings, the ESCO is allotted a fixed percentage of the energy savings for the duration of the project. Some of the shared savings are used to recover the project costs and to give the ESCO a profit on the project.

With a guaranteed savings arrangement, the ESCO is obligated to provide a certain amount of energy savings. Savings up to a certain number of years, as stipulated in the contract, belong to the ESCO. The term of the contract is calculated to cover project costs and to allow some profit for the ESCO. Once these savings are achieved or the contract is terminated, the remaining savings belong to the client (Natural Resources Canada, 2009). The ESCO must take responsibility for the entire project for the agreed upon time.

Another variation on the guaranteed savings agreement is to so-called "*chauffage*" agreement, in which the ESCO guarantees reduced energy costs and assumes responsibility for paying the energy bills, while receiving a percentage of the historical energy costs from the facility owners (Fraser, 1996, p. 10.42).

Guaranteed savings are more typical in North America, whereas shared savings are used more outside of North America. This may be because shared savings are usually predicted with increasing energy prices (Hansen, et al., 2009, p. 9) , and the decreased energy prices in the 1980s in North America probably made this model less viable when it was first used.

With both shared and guaranteed savings, there is the risk of under or over performance of the energy savings measures. If targeted savings go unmet, the ESCO must compensate the client, as written in the contract; in this case, an ESCO can be obligated to pay a penalty for underperformance (Mozzo Jr., 2000, p. 18). In the contract, it is also stated how extra, unpredicted savings are to be split between the ESCO and the client.

In order to finance projects, ESCOs usually approach a third party lender to get a loan to finance the projects. Since ESCOs are not paid right away, they must overborrow from financers (Shonder & Ashrae, 2010, p. 395), thus increasing the interest paid for the project and expanding the term of the EPC. To mitigate these effects, ESCOs often negotiate a payment towards the project that the client can make, *ancillary payments*, in order to shorten the borrowing costs for the ESCO which are eventually passed on to the client (Shonder & Ashrae, 2010, p. 395).

The research presented here addresses an expanded business model for ESCOs, which includes both the traditional performance contracting and the provision of renewable energy services as well. In this paper, "renewable energy contracting" refers to performance contracts that include renewables, such as solar PVs, or a separate service, where renewable energy projects that are usually built, owned, and operated by the ESCO.

Before delving into the drivers and constraints for the "expanded business model" in the Findings section of this paper, the drivers and constraints for the traditional business model are first discussed. This is done in order to give the reader a sense of how the author arrived at the analytical variables chosen to assess the expanded business model. Hence, the drivers and constraints for the traditional ESCO business model are discussed next.

ESCO Drivers

The ESCO drivers and constraints discussed in the following sections are based on the literature and on findings from the interviews conducted for the ARSCP research paper that was the starting point for this thesis.

In Canada, as in most countries, the deregulation of the energy market has contributed to the initial emergence of ESCOs. Strong government support in the form of large public sector contracts has also been essential for ESCOs to prosper (Hansen, et al., 2009, p. 234).

The ageing infrastructure of public institutions has also contributed to this development, as energy performance contracts provide a reasonable financing scheme for deferred maintenance. For the institutional[1] sector especially, EPC provides a viable option for upgrading facilities when these institutions do not have investment capital available (Brigham, 2011; ICF International & National Association of Energy Services Companies, 2007, p. 25).

In the past, the possibility for off-balance-sheet financing, in which payments for energy efficiency improvements through an ESCO were kept off the balance sheet for a client, this process was an incentive for industry to use ESCOs as well (Brigham, 2011). ESCOs found a way to make energy efficiency investments at a client facility without recording it on the client's balance sheet (Fraser, 1996, p. 10.42). This acted as a huge incentive for clients who wanted to decrease energy costs without having a balance sheet heavy on the liabilities side. However, once accounting rules changed due to the Enron scandal, this ceased to be a driver. ESCOs can still find legal ways of doing off balance sheet financing[2], but it is not as common as it once was.

Environmental concerns are now driving ESCOs, as they have benefitted from the push for sustainable forms of energy on the market (Okay & Akman, 2010, p. 2760). Since energy efficiency investments are one of the most cost effective ways to reduce greenhouse gas emissions (Miller & Spoolman, 2009, p. 401), ESCOs have a good case to make for being a sustainable business. Energy performance contracting has also been viewed as a cost-saving measure that can provide funds for investments in renewable energy (ICF International & National Association of Energy Services Companies, 2007, p. 23). There is some evidence

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[1] In the literature, the institutional sector is also referred to as the "MUSH" sector, an acronym for municipalities, universities, social boards, and hospitals

[2] For instance, some ESCOs can use a third party to receive the regular payments from the clients, which are then passed on to the ESCO only once ESCOs can prove the savings for the payment period.

that the institutional sector's push to "go green" has also caused many institutions to turn to ESCOs for energy savings (Lensink, 2011).

ESCO Constraints

The most common constraints for ESCOs around the world are presented in this section and their relevance to the Canadian context is discussed. These constraints fall under the categories of financial and market barriers; administrative and institutional challenges; lack of consumer awareness, trust and necessary skills; and verification issues.

Financial and Market Barriers

In most countries, it is generally difficult for ESCOs to get financing from local financing institutions for a host of reasons. Energy efficiency projects are viewed as risky because they are not *asset* based and hence collateral can be difficult to obtain in the case of a default on a loan (Vine, 2005, p. 693). The success of these investments can also be difficult to predict; there is the risk that projected savings will not be realised, in which case the project costs may not be paid back (Mozzo Jr., 2000, p. 17). Energy efficiency investments also compete with traditional investments, such as building power plants, and generally local financing institutions have little experience with financing energy efficiency projects (Vine, 2005, pp. 693-694).

To address this issue, the Efficiency Valuation Organization, which is also responsible for the International Performance Measurement and Verification Protocol discussed later, created the International Energy Efficiency Financing Protocol. This Protocol is intended to act as a blueprint for educating personnel at local financing institutions about the benefits and risks of financing energy savings-based projects (Efficiency Valuation Organization, 2009, p. 4).

In Canada, these financial barriers do not really exist in the same way. Although some financial tools were developed to facilitate the financing of ESCOs (Hansen, et al., 2009, p. 233), these are no longer really necessary, because most energy performance contracting is done by large firms that provide other services as well. Local financing institutions tend to lend money based on a *firm*'s financial characteristics, rather than an individual energy efficiency project's financial and technical characteristics (Natural Resources Canada, 1995). While this focus on the firm's characteristics was not helpful to the small ESCOs that existed in past decades, now that mostly larger, creditworthy firms are responsible for EPC in Canada, financing is not a significant barrier.

However, ESCOs do face other market barriers in North America, such as cheap electricity prices that make EPC a less attractive investment (Vine, 2005, p. 693). Ontario's electricity supply consists mainly of low-cost hydroelectric power (see section on Ontario's Electricity System) and nuclear power, which means that payback periods for energy efficiency investments are rather low compared to that of other jurisdictions. Further, having any sort of policies that would allow for increased electricity prices is very politically unpopular. A case in point would be the Clean Energy Benefit, which was a subsidy introduced by the current government to help ratepayers pay for increasing energy rates (Ontario.ca, 2010).

The requirement for low payback periods in industry exacerbates this challenge (ICF International & National Association of Energy Services Companies, 2007, p. 6). For potential industrial clients, energy efficiency investments compete with other capital investments, and the return on the former must be sufficiently high to justify taking priority over the latter. As previously discussed, most EPCs are about 7 years in length, and for private sector clients a two to three year payback would generally be required (Love, 2011).

High transaction costs for identifying, procuring, installing, operating and maintaining energy efficiency equipment and drawing up contracts are yet another market constraint for ESCOs in North America (Vine, 2005, p. 695).

<u>Institutional and Administrative Challenges</u>

There are a number of institutional challenges for ESCOs identified by Vine: some public procurement rules prevent the use of ESCOs, legal and regulatory frameworks are not always compatible with energy efficiency investments, measurement and verification (M&V) protocols are poorly understood, and there is little government support for EPC in the residential sector (Vine, 2005, p. 696). In Canada, there is actually some government support for EPC in the residential sector, but most EPC-related policies focus on the institutional sector. One challenge is that utility companies are often highly resistant to EPC activities because they fear decreased revenues (Vine, 2005, p. 696). Finally, the high transaction costs that ESCOs face are often the result of "burdensome administrative procedures that allow only very large projects to be carried out" (Vine, 2005, p. 695).

ESCOs in Canada are not strangers to these challenges; For instance, legal frameworks that force ESCOs to pay taxes on deferred revenue are a challenge (Johnson, 2011) and M&V protocols are only beginning to be understood.

<u>Lack of Consumer Awareness & Lack of Skills</u>

Consumers do not generally understand the opportunities for cost savings that ESCOs bring, and they also often have difficulty understanding how the process works (Hansen, et al., 2009, p. 13). Past ESCO project failures, excessive claims of success, inadequate audits, weak monitoring M&V procedures have also contributed to an untapped client base (Hansen, et al., 2009, p. 13).

According to some sources, there is currently also a shortage of specialised engineering and technical skills for implementing large-scale energy efficiency programs. ESCOs must compete with renewable energy firms and consulting firms for these specialists (ICF International & National Association of Energy Services Companies, 2007, p. 32).

Some educational programs regarding energy management and energy performance contracting do exist in Canada, such as the Building Energy Systems course at Seneca College in Ontario and the Building Sciences Program at Concordia University in Quebec (Johnson, 2011). However, these programs do not necessarily get enough exposure in the market (Brigham, 2011) and the ESCO industry would certainly benefit from having more of them, as long as they were to meet the high standards of current programs (Johnson, 2011).

<u>Difficulties with Verification</u>

Measurement and verification has historically been a problem for some ESCO projects in Canada that gave EPC a bad name (Fraser, 2011; Lensink, 2011). Measurement and verification (M&V) of savings is necessary to ensure that an appropriate baseline is established, this baseline is modified appropriately according to real conditions, and calculated savings are reasonable estimates. If proper M&V is not conducted, it can be difficult to ensure that the energy performance contract is fair.

To address the issue of improper M&V, the US Department of Energy provided the impetus for an International Performance Measurement and Verification Protocol to be created. This Verification Protocol aims "to increase investment in energy and water efficiency demand management and renewable energy projects around the world" (Efficiency Valuation Organization, 2010, p. 1). The Protocol provides a framework for measuring, computing, and reporting energy savings, especially used in EPCs (Efficiency Valuation Organization, 2007, p. 1). The Verification Protocol is well known in the industry and preliminary evidence suggests that it is effective as a set of guidelines for M&V procedures (Lensink, 2011).

Although there is a consensus on guidelines for M&V, the ESCO industry in Canada is still suffering from a negative reputation related to M&V procedures; some old stories of clients' negative experiences with inappropriate M&V procedures are still being told and adversely affecting people's perceptions of ESCOs (Johnson, 2011).

3.2 The Canadian Context

The ESCO Industry in Canada

Brief History

The following discussion is drawn from literature sources and from interviews conducted for the ARSCP research paper.

Canada was one of the earliest countries to have ESCOs, with its first established in 1982. Despite this, ESCOs in Canada seem to have declined in recent years. According to the Energy Services Association of Canada (ESA) President, around the year 2000, there were twenty to twenty-five companies doing energy performance contracting whereas today, there are only ten. In 2005, one study identified a total of only 5 (narrowly defined) ESCOs in Canada (Vine, 2005, p. 693), most of which were concentrated on the commercial and public sector (Hansen, et al., 2009, p. 233).

In the 1980s, there were a number of different players that started getting involved in EPC. Controls companies and utility companies were among the first, followed by independent engineering consultants. The initial drivers for the ESCO industry in Canada had been ageing infrastructure which needed appropriate financing, combined with the possibility for off-balance-sheet financing.

In essence, clients were allowed to keep their debt to the bank for financing ESCO projects "off the balance sheet". There was documented concern in the financial sector about this type of "creative accounting" as early as 1995 (Natural Resources Canada, 1995, p. 2) and with the Enron scandal, rules regarding creative accounting changed (Brigham, 2011). However, off-balance-sheet financing proved to be an enticing incentive for ESCO clients, especially those in the private sector who were concerned about debt on their balance sheets affecting their credit ratings.

Another driver in Canada was the ESCOs' open book approach. Canadian ESCOs learned a lesson from their American counterparts, who had had negative experiences with ESCOs that overstated capital costs and understated savings: to prevent this, Canadian companies tended to provide more transparent energy performance contracts with a breakdown of costs for clients.

In the early 1990s, ESCOs were still showing promise. The Canadian Association of Energy Service Companies (CAESCO) had been formed with the help of Ontario Hydro, which had started its own guaranteed performance program and wanted an association to mediate between the government and the ESCOs. By 1995, the program had ended, and with it CAESCO. Some reasons attributed to termination of CAESCO include the Association's effort to provide too many services, rather than specialising, the Association's decision to recommend and endorse particular businesses, and the fact that by 1995 the ESCO industry already had a larger profile and had less of a need for such an association.

Around this same time, many Canadian ESCOs were being bought out by large, American companies. In 2001, the total value of ESCO projects in Canada was in the range of $50 - 100 million USD, ranking Canada as having the 4th highest value of ESCO projects in the world. Yet this large value of ESCO projects was created by very few, large companies.

Canada was one of the only two countries in 2005 to predict that the number of ESCOs, which at the time was five, would decrease over the following five years (Vine, 2005, p. 694). In fact, the number of ESCOs remained the same in 2010 (Okay & Akman, 2010, p. 2764). Currently the major ESCO players in the Canadian market are Honeywell, Ameresco, and Johnson Controls. Together with Ainsworth, Direct Energy, MCW Custom Energy Solutions, Siemens and Trane, these companies represent over 90% of the EPC business in Canada (Energy Services Association of Canada, 2010). Most, if not all, of these companies are based in the United States and provide various services aside from energy performance contracting.

According to the literature, the main constraints for ESCOs in Canada are the lack of information for consumers, lack of qualified consultants and companies, and lack of government support and commitment (Vine, 2005, p. 701). This latter assertion is questionable because there have been a number of government programs established to support ESCOs. Perhaps the authors meant to refer to *inappropriate* government support, rather than a lack thereof, since these policies and programs have tended to work more for the institutional sector than the industrial sector, where efforts could have been more concentrated.

Other identified constraints include difficulty predicting savings due to demographic and operational changes throughout a project's lifetime. There is also a problem with incentives, in that public and private organizations that manage buildings usually charge fees calculated as a percentage of operational expenses, so with increased efficiency, these organizations have diminished profit margins (Hansen, et al., 2009, p. 234).

Energy Use and Energy Efficiency in Canada

Although Canada's electricity comes mostly from non-emitting sources, such as hydropower and nuclear power, Canada is one of the world's highest per capita emitters of greenhouse gases in part due to its resource-based economy.

Canada has a wealth of non-renewable resources and relies on energy-intensive industries, such as oil, gas, and coal production. It is not surprising, then, that Canada's economy is the third most energy intensive[3] and fourth most carbon intensive in the OECD (Liming, Haque, & Barg, 2008, p. 93). In fact, nearly 90% of all anthropogenic emissions in Canada are the

[3] Energy intensity refers to energy use per unit of economic input.

results of fossil fuel production and consumption (Liming, et al., 2008, p. 93). Other factors, such as Canada's size and climate also contribute to its high energy intensity (IEA, 2010a, p. 9).

However, in terms of electricity generation, Canada has quite a good standing: at present, 60% of Canada's electricity is generated through hydropower and other renewables, while 15% of its electricity is generated through nuclear power (IEA, 2010a, p. 11).

Still, Canada has long recognized the need for both energy efficiency gains and further shifting to renewable sources of energy since it is one of the world's highest per capita users of energy and emitters of greenhouse gases. There have been a range of policy initiatives on the federal, provincial and municipal levels established to address energy efficiency in the industrial, commercial, transportation, and residential sectors. Most federal energy efficiency initiatives are under the Office of Energy Efficiency, which was established under Natural Resources Canada in 1998.

Due to these and other initiatives, Canada has witnessed large energy efficiency improvements and a decrease in energy intensity, although these trends have not always been matched by an absolute decrease in energy use. Between 1990 and 2008, energy efficiency in Canada improved by 18% (Natural Resources Canada, 2010). Energy intensity activity has continued to decrease in recent years, at a ratio of 0.25 in 2008 (OECD, 2010).

Canada's total energy consumption has increased over the past two decades, from 6, 936.2 PJ in 1990 to 8,720.2 PJ in 2008 (Office of Energy Efficiency, 2010). Final demand for energy use totalled 7,649.8 PJ in 2009 (Statistics Canada, 2010). Although in recent years this number has seen more fluctuations, the more general trend is that of an increase in energy use since 1990.

This increased energy use translates into increased greenhouse gas (GHG) emissions as well, which increased from 397.2 MT CO_2eq. in 1990 to 487.8 MT CO_2eq. in 2008 (Office of Energy Efficiency, 2010). Between 1990 and 2007, GHG emissions increased by about 26% and in 2007 totalled 747 megatonnes of CO_2 eq. (Environment Canada, 2009). To keep this in perspective, although Canada is one of the highest per capita emitters of GHGs, its contribution to global GHG emissions totals 2% (Environment Canada, 2009).

Energy Efficiency Targets

The federal government's current target for greenhouse gas emissions is an absolute 20% reduction from 2006 levels by 2020 (Government of Canada, 2008, p. 2), half of which are expected to be reduced with the help of industrial regulations (Government of Canada, 2008, p. 4). The federal government has been criticized for these targets, which fall short of Canada's obligations under the Kyoto protocol. In order to meet its targets, the government has set the goals of implementing appropriate industrial regulations for GHG emissions, lowering emissions from vehicles and buildings and setting up a carbon emissions trading market (Government of Canada, 2008, p. 2).

There is little alignment between federal and provincial and among provincial level climate change mitigation strategies. Some critics, such as the Conference Board of Canada, have also criticized the "patchwork" of federal and provincial policies in place as an inefficient way to tackle climate change (Galloway, 2011). In British Columbia, for instance, the Climate Change Action Plan includes a carbon tax (British Columbia, 2008, p. 4), whereas Ontario's

Green Energy and Green Economy Act involves a feed-in tariff for electricity production from renewable energy sources.

The International Energy Agency (IEA) also recognizes the challenge of developing energy policies, since the provinces have jurisdiction over their own resources (IEA, 2010a, p. 9). The IEA therefore recommends that the Canadian government develop a coordinated climate change policy targeted at key sectors, and that it implement a "comprehensive national energy efficiency strategy"(IEA, 2010a, p. 13).

3.3 The Ontario Context

Ontario's electricity system has witnessed many changes, especially since its deregulation. The current system is a mix of government actors and regulated private actors. As a result, the system is complex and subject to a great deal of uncertainty. This has presented somewhat of a problem for private actors in the industry, such as ESCOs, which rely on a steady political environment in order to be able to make proper business decisions.

However, these challenges are countered by the numerous opportunities provided by the Ontario government. The government has ambitious goals set out in its Integrated Power System Plan, and the current government`s Long-Term Energy Plan to decrease peak load and invest in renewables. A key piece of legislation meant to support these plans is the Green Energy and Green Economy Act, which includes the feed-in tariff (FIT) program. As will be discussed at length in this thesis, the FIT program has been one of the key driving forces for renewable energy contracting.

Ontario's Electricity System

Ontario is home to a complex energy system, which has seen many changes in its century-long existence. Although both the electricity market and the natural gas market are both regulated by the Ontario Energy Board, these two markets otherwise operate separately. Both have been deregulated in recent decades, which has led to the current hybrid model of the electricity market with regulated private actors and government bodies. This future evolution of this model is uncertain, which makes it difficult for private energy industry actors to make long-term decisions.

The latest change in the electricity system, which was started in the early 1900s, was the transformation of the publicly owned system into an electricity market, thanks to the Energy Competition Act in 1998. One year later, the publicly owned Ontario Hydro was then reorganized into five entities (Government of Ontario, 2010, p. 5): Ontario Power Generation, the Ontario Hydro Services company (later named Hydro One), the Independent Electricity Market Operator, (renamed the Independent Electricity System Operator), the Electrical Safety Authority, and the Ontario Electricity Financial Corporation. (For a detailed look at the major actors in the Ontario electricity market, please see Appendix C- Ontario's Electricity System). These actors are interrelated and collectively are responsible for maintaining and planning for the Ontario electricity system.

As a result of its evolving energy system, Ontario is gaining a reputation for being a jurisdiction with unpredictable policy changes. It is difficult to say whether the electricity sector in Ontario will remain steady over time. There is a tension between the tightly regulated government bodies and privatization. The current hybrid model is a compromise and its future is uncertain, which can make it difficult for energy-related businesses such as

ESCOs to make well-informed business decisions regarding emerging opportunities. As will become clear in the analysis section of this paper, renewable energy contracting relies on steady and predictable government support at this time in order for this business practice to really grow.

Electricity Generation

Just over half (52%) of Ontario's electricity is generated through nuclear power, while hydropower and gas or oil make up 19% and 15% of generated electricity respectively. Coal has decreased over time to its current status as 8%, but wind and bioenergy added up to only 3% of total generation in 2010(Government of Ontario, 2010, pp. 18-19).

Of its 35000MW capacity, the bulk of electricity sources are nuclear (31%) and gas or oil (25%) followed by hydropower (22%) (Government of Ontario, 2010, p. 18).

Ontario Policy Context

The Integrated Power System Plan (IPSP)

The Ontario Power Authority (OPA) is the government body responsible for the medium and long-term planning of the Ontario electricity sector[4]. One of the OPA's responsibilities under the *Electricity Act of 1998* is to create the Integrated Power System Plan (IPSP) (OEB, 2008) informed by the Supply Mix Directive (OPA, 2010b) under the direction of the Minister of Energy. The IPSP sets out long-term goals and plans for the supply mix in order to maintain a "clean, reliable and affordable supply of electricity in the province over the next 20 years (Mourougane, 2008).

The first IPSP was proposed and submitted to the Ontario Energy Board for approval in 2007 and is currently undergoing revision, as it is mandated that the IPSP be reviewed every three years (OPA, 2010b). The IPSP of 2007 had set a number of ambitious goals for meeting Ontario's energy supply in 2025. The plan called for 45% of Ontario's electricity to be supplied from a combination of conservation and renewable sources, 8% from natural gas and 47% from nuclear power (OEB, 2008). According to the plan, all coal-fired plants are to be phased out by 2014. The total renewable energy target for 2025 is 15 700MW (Duncan, 2006, p. 2).

The current Ontario government has aligned its policies with the IPSP, as indicated by its Long-Term Energy Plan and by its legislated Green Energy and Green Economy Act, both of which are discussed below.

The Long-Term Energy Plan

Ontario's Long-Term Energy Plan, which was released by the government of Ontario in late 2010, delineates the investment plans for the supply for Ontario electricity sector based on projections of the demand over the next 20 years. This Plan is the current government's strategy to meet the goals set out by the IPSP. For a comparison of current electricity generation and projected electricity generation as set out in the Long-Term Energy Plan, please see Figure 2.

[4] see Appendix C- Ontario's Electricity System for a diagram of the OPA's relationship with the other energy actors in Ontario

The Plan bases investments on the medium-growth scenario, which sees electricity demand in Ontario growing 15% between 2010 and 2030 (Government of Ontario, 2010, p. 15). The Plan sets out a number of goals in order to be able to provide the needed 165 TWh in 2030 (Government of Ontario, 2010, p. 15). These plans include ceasing operation of all coal-fired plants by 2014, refurbishing 10 000MW of nuclear capacity, growing hydroelectric capacity by 9000MW, and adding 10 7000MW of renewable energy (excluding hydropower) by 2018 (Government of Ontario, 2010). Conservation makes up a large part of the plan as well, and targets have been set for reducing peak demand by 6300MW by 2025 (Government of Ontario, 2010, pp. 10, 20).

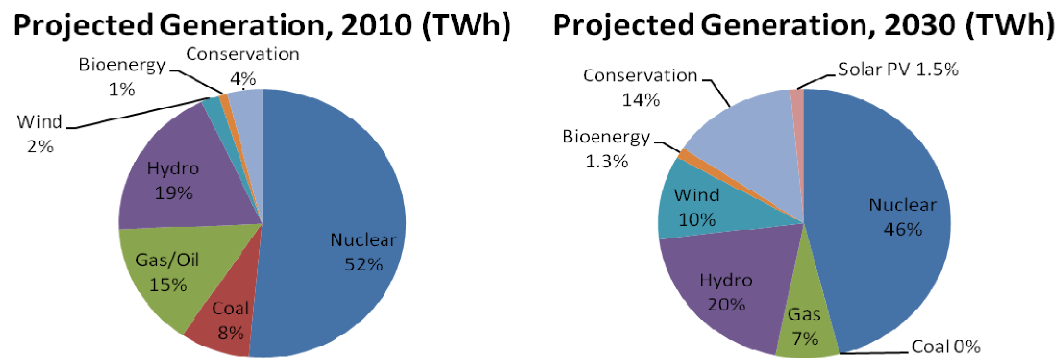

Figure 2- Long-Term Energy Plan Electricity Generation Goals

The Green Energy and Green Economy Act

Ontario's Green Energy and Green Economy Act came into force in May of 2009. The Act (known as the Green Energy Act for short) was created to expand Ontario's production of renewable energy, encourage energy conservation, and promote the creation of clean-energy jobs(Ministry of the Environment, 2010). This act established the feed-in-tariff program, created a new streamlined approvals process for renewable energy projects, and established domestic content requirements for wind and solar projects (CELA, 2009)[5].

The Feed-in Tariff Program

The feed-in tariff project offers stable prices under 20-year[6] contracts to electricity generators of renewable energy, who are paid through the Ontario Power Authority. The FIT program is divided into the regular FIT program for renewable energy projects over 10 kW and the "microFIT program" for projects 10kW or less. Renewable energy sources accepted under the FIT program are: biomass, biogas, landfill gas, wind (onshore and off-shore), solar photovoltaics (PVs), and waterpower. The FIT prices depend on the type and size of the project and its time of operation. They are designed to cover typical capital and operating

[5] Before the Green Energy Act, government support for renewables existed in the form of the Renewable Energy Standard Offer Program (RESOP), which was based on a request for proposals framework.

[6] Contracts are 20 years long for all forms of renewable energy under the FIT except for waterpower, which has a contract term of 40 years.

costs and provide a reasonable rate of return on the investment over the term of the contract (Ontario Power Authority, 2010a, 2010b), usually around 11% (Wang, 2010).

Since project costs vary according to the renewable resource, FIT prices range from a low of 10.3¢/kWh for landfill gas projects over 10MW to a high of 80.2¢/kWh for rooftop mounted solar PV projects under 10 kW (OPA, 2010a, p. 14). (For a selection of FIT program rates, please see: Appendix D- Ontario Feed-in Tariff Program: Selected Rates). There are also added price incentives for non-intermittent technologies operate during peak demand times and for FIT program projects that are owned by Aboriginal members or by community groups.

To ensure the goal of job creation, the FIT program includes a domestic content requirement for new wind and solar projects and the microFIT program requires domestic content for solar PV projects, all of which are meant to increase over time. The amount of domestic content required for solar FIT and microFIT projects increased to 60% in 2011(OPA, 2010a, p. 6). The domestic content requirement was inspired by other FIT programs, including that of Spain (Sustainable Prosperity, 2010) but it has been criticized by some foreign competitors, notably Japan, who filed a complaint with the World Trade Organization (Wang, 2010). This was followed by the EU request for WTO consultations with Canada as well (Gonzalez, 2011).

The FIT program has been criticised for being expensive, and the 80.2¢/kWh figure has been used often to prove this point, although projects that qualify for this rate only account for 34MW of projects online out of a grand total of 37000MW of installed electricity generation, (Environmental Commissioner of Ontario, 2011) so they have a negligible effect on electricity rates. An independent study by the Pembina Institute did a simulation and found that electricity prices are set to rise in the future at about the same rate, regardless of the supply mix, because of necessary infrastructure upgrades.

The FIT program has seen mixed success. As of writing, 75 solar PV projects, 7 bioenergy projects (OPA, 2011) and 800KW of wind projects (OPA, 2010c) are in commercial operation. Over 1500 MW of FIT wind projects are currently under development and construction (OPA, 2010c). The domestic content requirement will supposedly create 50 000 jobs in Ontario by the end of 2012, but there is some concern that the reported figure of over 13 000 jobs having been created or supported by the legislation as of yet is exaggerated (Greenberg, 2011). Further, many firms are hesitant to hire with an upcoming provincial election in October (D'Aliesio, 2011; Wallace, 2011), after which the FIT program may be cancelled.

Institutional Initiatives and Others

There are also a number of non-governmental initiatives that promote energy efficiency in Ontario and across Canada as well. For instance, the Canada Green Building Council launched the GREEN UP program, a building performance program to "provide tools, performance standards and resources to help building owners and operators understand, measure and compare on-going performance of their building portfolio" (CaGBC, 2011). The Real Property Association of Canada (REALpac) has also launched an initiative aimed at making gains in energy efficiency. REALpac has adopted the "20 by 15 target", where they aim to reduce consumption of energy in office buildings by 20 ekWh per square foot per year by 2015 (Jarvis, 2009).

ESCOs in the Ontario Context

ESCOs in Ontario that are engaging in renewable energy contracting are taking advantage of a favourable policy environment in Ontario that has its sights set on energy conservation and expansion of renewable electricity sources in the supply mix. However, the uncertainty surrounding the hybrid electricity model and surrounding the future of the FIT program in particular, make this a tricky policy context to navigate. As will be discussed in the analysis section, ESCOs will need to rely on their strengths and minimise their weaknesses to address this threat, among others.

4 Findings from Interviews

The findings in this section are synthesized from the nineteen interviews conducted for this thesis with ESCO and renewable energy experts. For a full list of interviewees, please see Appendix B- List of Interviewees.

4.1 The Evolution of ESCOs

Over the past couple of decades, the number of ESCOs in Ontario has declined, as smaller ESCOs that relied mostly on government incentives went out of business. Other factors that contributed to the decline of ESCOs include the use of overly complex contracts, the practice off balance sheet financing (which became especially problematic after the Enron scandal), and credibility issues due to unrealised savings from historical performance contracts. The ESCOs that survived tended to be larger companies that existed before performance contracting became popular, and that provided a number of other services and products. These firms generally focus their performance contracting activities in the institutional sector. The ESCOs that remain each have their own adapted business models and particular market niches, but a few key trends are common to most ESCOs currently in the Ontario market.

ESCOs were originally defined by their performance contract work, in which they provided clients with financing for building retrofits and guaranteed energy savings for clients. Although the guarantee is still part of the value proposition for ESCOs, it is not often used because clients are not always willing to pay the premium associated with having such a guarantee; generally, clients are satisfied with an informal guarantee. That is, if they trust the ESCO they are working with and they value the expertise of the particular employees of the ESCO they are working with, they do not feel the need to purchase a guarantee. Further, the value of the guarantee has been called into question due to the previously mentioned negative historical experiences with ESCOs. As a result, the industry is still dealing with the challenge of credibility.

In recent years, ESCOs have taken a more client-centered approach, adapting their performance contracts to better align with clients' needs, which fall outside of the traditional space of energy savings. For instance, a few interviewees mentioned the tailoring of performance contracts to leverage energy savings in order to fund clients' liabilities.

There has also been a larger shift in focus for ESCOs in Ontario from meeting clients' technological and financial needs, to incorporating more soft management as well. Clients have expressed an interest working with ESCOs who can treat them as partners, rather than solely as clients. This partnership signals a shift to having more influence over the client's long-term energy management practices through training and education. There is increased importance placed on the operation and maintenance of energy savings, as these have proven to be central to the success of energy savings programs. It is important to note that for at least one ESCO this is not a recent trend, as education and training have been an integral part of its business model from its inception.

There has also been some mention of benchmarking as a tool that could be used in the ESCO industry to compare the energy performance of buildings. However, not everyone agrees that this is ideal. Even though performance indicators can be used, such as the one used for REALpac's target (i.e. $ekWh/ft^2/yr$), performance cannot always be easily compared in buildings with different layouts that have different uses.

The Future of ESCOs
The ESCO industry has stabilized in the past decades, with the few, large players that remain. New opportunities for growth may be on the horizon, since many institutional clients are dealing with deficit reduction strategies within their current operating budgets. As one interviewee from an ESCO asserted, most institutional customers this year will have their operating budgets reduced by as much as 70%. Hence, ESCOs will be needed to fund energy efficiency work along with facility renewal projects.

This was confirmed by a former ESCO client, who stated that although some of the energy efficiency work ESCOs did previously is now being done in-house, there will still be a need to partner with ESCOs in order to complete the deep retrofits that need to be done.

4.2 What the Business Model Looks Like

Although a number of ESCOs in Ontario have started providing renewable energy equipment as one of their services for clients, this business practice is not a formal part of the current ESCO model. The combination of both investments in energy efficiency and renewables takes a number of forms. Renewables, such as solar PVs, can be included in performance contracts as one of the many facility improvement measures clients have to choose from. They are not often chosen, however, because the payback periods for the performance contract are stretched out by the renewable energy equipment, which requires much longer payback periods than energy efficiency investments.

The other arrangement that is often used is that clients ask for renewable energy projects separately from their performance contracts. In this case, ESCOs usually build, own, and operate the projects and the clients benefit from regular payments for the licensing of their roofs. Neither the ESCOs nor the client benefit from the environmental attributes (such as carbon credits), as these belong to the Ontario Power Authority, but the clients do benefit from having a very visible symbol of their commitment to reducing their environmental impact. This is especially important because large gains in energy efficiency in buildings often go unnoticed since they are much less visible by nature. There is currently a lot of interest from clients for renewables because of successful examples from other institutional clients and because of the government incentives in the form of the feed-in tariff (FIT) program.

Some ESCO firms also have separate departments that do large, utility-scale renewable electricity projects, such as solar and wind farms. These ESCO firms have the option of using their in-house expertise to help with performance contracts that include renewables, but usually departments that do large-scale renewable energy projects are completely separate from the departments that do energy performance contracting. For the purposes of this thesis, only the first two models above qualify as "renewable energy contracting". This last model of utility-scale generation is excluded from the analysis.

The types of renewables included in performance contracts tend to be geothermal systems or solar thermal units because these tend to have a low enough payback period to make their inclusion in a performance contract feasible. However, these forms of renewable energy are usually only included when government incentives for them are available. In terms of renewable forms of electricity, only solar PV projects have really been undertaken in recent years, and these are usually separate from performance contracts (i.e. they fall under the second category of renewable energy contracting). Other renewable forms of electricity, such as wind power and biogas are considered unsuitable because they high-yield sites for the former have been developed under the former Renewable Energy Standard Offer Program (RESOP), and the latter is impossible without a steady supply of biomass, which can be difficult to ensure.

Some interviewees see renewables as a natural extension of their performance contract work, mostly because reduced loads make it feasible for electricity from renewable sources to be integrated into a building. Other synergies between energy efficiency and renewables were also mentioned: namely that high-return energy efficiency measures can be leveraged to fund lower-return renewable energy projects, and that both are required for the transition to a post-oil economy.

Not everyone agreed on this, however, as some interviewees viewed renewable energy and energy efficiency investments as inherently incompatible: some interviewees cited the very different nature of supply side energy investments and demand-side conservation measures and also mentioned that the very different payback scenarios and timelines necessary for each make integrating them rather challenging, if not impossible. As previously stated in the literature review, FIT contracts for renewable energy are twenty years long, whereas energy performance contracts usually last about seven years. In terms of development time, renewable energy projects are developed in a few months, whereas performance contracts can take one or two years to be fully negotiated and drawn up.

Another interviewee made it clear that the two types of investments are viewed as separate in the minds of clients, and they compete with each other for capital. One interviewee stated that there are not really any synergies with the FIT program in place because, since this program pays for electricity flowing into the grid, generation becomes completely separate from the building's energy profile. Another interviewee took this idea further and suggested that there is no real case for making any actor other than utility companies responsible for supplying renewable energy to the grid. This interviewee maintained that having renewable energy equipment on buildings was only burdensome to building owners and provided no real benefits. The argument that utility companies should be responsible for renewable energy generation is related to the centralization debate. Generally, the utility-scale projects are seen as necessarily centralized, whereas projects initiated by various competing developers tend to become a more decentralized model. It remains to be seen, however, if a utility model could not also be decentralized if properly organized.

4.3 Drivers: Why Renewables?

The main reason most often cited for ESCOs starting to provide renewable energy equipment is that it is requested by clients. Renewable energy is a hot topic and it renders efforts towards better environmental performance more visible to outsiders. For clients seeking LEED certification, having a renewable energy supply can translate into LEED points. Renewable energy is hence seen as a marketing tool to better the clients' image. This is a relatively recent development, as renewables "weren't even on the radar" as potential investments one or two decades ago.

Institutional clients are also keen to benefit from regular cash flow from roof licensing payments for solar PV projects, which can be used to address clients' maintenance or other needs. Of course, the payback periods for performance contracts that included solar PVs would be prohibitively long for most clients without the feed-in tariff regime that is currently in place. The FIT program was cited by most interviewees as one of the main drivers for the current increase in demand for renewable energy contracting. For certain clients, incorporating renewable energy into their buildings is part of a larger vision, which includes local energy generation and distribution.

Generally, ESCOs have been approached to incorporate renewables by clients who already had relationships with the companies through previous experiences with performance contracting. However, the procurement process for renewable energy in the institutional sector is often a tendering process and when ESCO firms make proposals, they are often not the lowest cost solution that clients prefer.

It is not entirely surprising that ESCOs have branched out into providing renewable energy equipment, considering the competencies required for performance contracting. A few of the skills that ESCOs already have, which cross over into renewables are their experience with providing financing, their ability to manage risk, their knowledge regarding electrical engineering and their familiarity with energy-related government incentive programs. Since a number of ESCO firms are larger conglomerates, these firms also already usually have capacity in renewables.

That said, in order to include renewables in their business offerings to clients, ESCOs have had to find additional personnel to provide skills such as project management and installation, and may seek knowledge specific to load bearing for roofs, and supply chains for solar PV equipment.

4.4 Constraints

The main challenge associated with renewable energy services is profitability. As previously mentioned, the payback periods for installing renewable energy generation equipment are prohibitive without government support. Location also makes a large difference in the yield of renewable energy and therefore the return on investment. Whereas developers will automatically choose an area with higher yield for projects, ESCOs trying to do renewable energy contracting are restricted to the location of the buildings for which they are providing performance contracts. As a result, these may not be very profitable places to harness the renewable resource's energy.

Another challenge also mentioned by interviewees included procurement processes for institutional clients that favoured lowest-cost options, as explained in the previous section. The short time period required for renewable energy projects was stated as being incompatible with the longer time periods required for setting up performance contracts. This is especially true under a feed-in tariff regime, where applications to get access to the grid needed to be submitted very rapidly.

Grid capacity was actually cited as one of the main risks for ESCOs engaging in renewable energy projects. There has been some hesitation about starting renewable energy projects because there have been problems for applicants getting the required space on the grid for their projects.

Political risks were also often mentioned. Many interviewees made it clear that without a feed-in tariff in place or a similar piece of legislation, renewable energy projects would simply not be profitable. There was some concern about policy instability in Ontario in general and the possibility of the FIT program being cancelled after the upcoming provincial election. Interviewees stated that short decision-making time horizons for politicians were a problem for overall policy stability, although they conceded that this is a problem that is not unique to the ESCO industry. Another factor that was mentioned as a contributor to the political instability was the lack of alignment between provincial level and federal policies.

Technological risks, which are always apparent for emerging technologies, were also mentioned as a risk for this business model, especially since solar PV technology is still largely untested in Canada. The longevity of solar panels in the face of Canadian winters has yet to be proven. However, since ESCOs are risk managers, this was not considered a significant barrier.

Similarly, interviewees also expressed concern regarding roof maintenance and supply risks. Many clients are hesitant about using roof space for putting up solar PVs, for fear that there will be problems with roof maintenance later on. In terms of supply, prices for PV components can be somewhat volatile and this is especially a problem for firms in Ontario under the FIT regime, which has a strict domestic content requirement. This requirement makes it necessary for firms to use solar panels made in Ontario, which are more expensive than in other markets.

In using this business model, ESCOs have a number of competitors, including renewable energy developers, consulting companies, and traditional engineering firms. A couple of interviewees stated that it is possible for developers to encroach on ESCOs' traditional client base in the coming years, as they may start offering energy efficiency services once they can no longer take advantage of government incentives that allow them to profitably continue working in the renewable energy industry. One of the main problems for ESCOs with having these competitors and new entrants is that they are likely to face increased competition for skilled workers. It was noted by other interviewees that there are larger trends towards more holistic energy solutions, such as district energy, at least from the standpoint of larger customers, such as municipalities. In this respect, utility providers are in competition with ESCOs.

4.5 Policy

Although the Green Energy Act, the legislation responsible for the feed-in tariff (FIT), received mixed reviews from interviewees, most made it clear that the FIT program made extensive investment in renewables possible. Currently, there is uncertainty surrounding the future of the FIT, which could be cancelled in the upcoming election.

A few interviewees underscored the need for policy support for renewables by drawing comparisons with other energy industries. It was noted that both the coal and nuclear industries had received substantial subsidies when they were being developed (in the case of the latter, subsidies are still being received) and that the renewable energy industry deserves similar attention since it is in its infancy in Canada.

Other policies were also listed as possible support for energy investments in Ontario. One idea was to have more strict building codes, which could specify the incorporation of renewable energy in new buildings. Other suggestions included having a Renewable Portfolio Standard where a target is set for the amount of renewable energy produced, although this was considered to be inferior to a feed-in tariff because it would require payment for energy even when it is not being generated. Yet another idea was to have energy performance-based funding for publicly-funded institutions. Most interviewees stated that higher energy prices that reflected external costs associated with generating electricity would provide an incentive for both increased energy efficiency and investment in renewables. However, one interviewee adamantly stated that this would not be desirable from a ratepayer's point of view. In a response to this comment, one interviewee expressed a more long-term view of energy price policies, stating that promoting 'green' solutions to reduce environmental impact is an investment that reduces energy costs and translates into sustainable jobs the long-run.

Interviewees disagreed on appropriate policy measures but almost all of them seemed to agree that political stability was a prerequisite for any kind of energy investment. The lack of alignment in energy policy at the federal and provincial levels Canada was also mentioned as a barrier to further improvement of energy performance of buildings. One person suggested having standard carbon legislation across North America would address both of these issues. However, it was noted that if there is a shift towards such carbon legislation, the current FIT program or a similar policy will need to be adjusted in order to allow clients to keep the environmental attributes (such as carbon credits), otherwise there will be less of an incentive for clients to engage in this business proposition.

The ESCO industry is familiar with such political uncertainty and, according to many interviewees, the best way to deal with such uncertainty is to ensure that the business model functions without relying on any incentives. Other strategies include having a flexible model that adapts to different incentives in various jurisdictions. This is possible for firms that provide a range of products and services, and/or for firms that are present in a number of jurisdictions. Such a flexible model is facilitated by having multi-skilled employees, who are often regionally deployable.

5 Analysis & Discussion

5.1 PEST+I Assessment

Political

The current legislation that is in place in the form of a feed-in tariff is supportive of the business model because it makes investments in renewable energy economically feasible for ESCOs, developers, and other types of firms. However, the political uncertainty that is endemic to the Ontario electricity system and the lack of coordination with the federal government's energy policy make the political climate in Ontario less than ideal for this business model. Other policies that would make this business model attractive, such as increased electricity prices and building code requirements are either not on the radar of the current government or are politically unpopular options.

The proposed business model is not economically feasible without government support such as the current FIT program. This program is important not only because it provides firms with a reasonable return on investment for renewable energy projects, but also because its domestic content requirement provides the impetus for renewable energy technologies to be developed in Ontario, which should decrease the cost of production over the long term. Political support also lends socio-political legitimacy to decentralized renewable energy and the expanded business model, as will be discussed later on.

However, the future of this legislation is uncertain, since the program has faced a number of problems including grid capacity constraints, and ratepayer increases. There is an upcoming provincial election, and one of the leading candidates is proposing to end the program entirely because it has the unwanted effect of raising energy prices for ratepayers.

High electricity prices would have the supportive effect of providing an incentive for both reducing energy demand (such as through a performance contract), and investing in renewable energy generation. Unfortunately for proponents of the business model, one of the few energy policy points that all politicians in Ontario seem to agree on is that an increase in electricity prices is untenable because it is so politically unpopular. There is a historical reliance on cheap electricity prices because they fostered the growth of industry in Ontario and have continued supporting industry since then. As a result, ratepayers are accustomed to having very low electricity rates relative to those in other parts of the world.

Another supportive policy option would be the inclusion of renewable energy generation and more strict energy efficiency requirements in the building code, but this does not seem to be part of the general discourse on energy efficiency at this time in Ontario.

One of the prerequisites for investments and renewable energy generation is a stable political climate. Investors cannot make decisions regarding long-term energy investments without a sense of what the policy environment will be like in the long term. Ontario's policy practices, however, are anything but stable. The current semi-privatised electricity system in Ontario lends itself to regulatory uncertainty. The electricity system has seen a number of changes over the past number of decades, and with the tradition of successive governments overhauling the work of previous governments, the uncertainty is likely to continue. Further, the lack of alignment in provincial and Federal energy policies means that there is no overall direction given for Ontario's energy policies. If the federal government were to have an overarching system such as a cap and trade system for greenhouse gas emission credits, the policy climate would be much easier to predict for investors.

Economic

Having an energy performance contract which includes renewables is not economically feasible without some kind of government support at this time because the payback periods for investments in renewables such as solar PVs are quite long. When they are included in energy performance contracts, the length of the contract is stretched to the point that it is not considered an option by potential clients. Also, a number of clients have done separate renewable energy projects where the ESCOs build, own, and operate them, because they benefit from the revenue. However, they would not be able to enter into these types of contracts without the FIT program, which gives the ESCOs the incentive to be involved in such a project.

Production costs for renewable energy equipment, such as solar panels, are decreasing but not sufficiently rapidly to make investment in renewables attractive without some kind of government incentive.

Further, the electricity prices in Ontario are too low to be drivers for investment in renewables. Potential clients require a lower payback than renewable energy investments would allow considering current electricity prices. However, electricity prices are set to increase because of infrastructure renewal which needs to be addressed and paid for in the province. The costs of upgrading the system will inevitably be passed on to ratepayers over the next 15 years or so. Notwithstanding, this rate of increase is not likely to provide a sufficient incentive for investments in renewables.

The major drivers for the business model are numerous. Clients require energy efficiency investments and renewable energy generation for different reasons. The former is usually required as part of a facility renewal program, whereas the latter is mostly used as a marketing tool. This is a real economic driver; having a visible symbol of an organization's commitment to the environment in the form renewable energy generation brings enough new business for clients that it justifies the financial investment in renewables.

Social

Renewables hold marketing value for potential ESCO clients because climate change and renewable energy generation are getting a lot of media attention. If the discourse regarding these topics changes, there may be more or less interest in the business model as a potential solution for climate change mitigation. This presents a potential threat or opportunity for the business model.

Further, social pressures affect the business case for renewable energy contracting because they affect consumers' willingness to pay for electricity. If there is enough social pressure to accept higher rates because of the negative consequences of not doing so (such as adverse climate change effects), then removing electricity rate subsidies may become politically plausible. In this case, there would be more of an incentive to do renewable energy contracting because it would help clients save on electricity bills to a greater extent.

However, one of the reasons why peeling back electricity subsidies or increasing electricity rates is politically unpopular is that it disproportionately affects low-income households. Any policy that attempts to change electricity rates must take this into consideration.

Technological

The technologies for both energy efficiency investments and investments in renewable energy generation continue to evolve. Currently, the former provide a much higher return than the latter. As the technology develops for renewable energy generation, the costs of production are predicted to decrease, at which point the business model will become more economically feasible without government support.

Other technological factors that must be taken into consideration are grid capacity and the upgrading of the distribution system. Renewable electricity generation is by nature intermittent. This has implications for the electricity transmission and distribution system, which must be set up in order to accommodate sudden changes in voltage.

Such a change in the transmission and distribution system would require funding from the provincial government, would be regulated through the Ontario Energy board, and would be implemented by the local distribution companies. Hence, these technological upgrades are also complex political issues where many players are involved.

Institutional

The ESCO industry itself has achieved cognitive and sociopolitical legitimacy, but the expansion of the traditional performance contracting model to renewable energy contracting requires these two factors to be in place. This is because ESCOs engaging in this business practice would be redefining themselves as holistic energy solution providers. Such an expanded business model is emerging and variations exist from competing firms, such as utility providers, but it is not taken for granted by potential clients. Hence it has not achieved cognitive legitimacy.

Further, the expanded business model does not fit into existing norms, because in the public's view, energy conservation and renewable energy generation are seen as separate initiatives that are the responsibility of different actors. Energy conservation is viewed as something that can be done by governments, individual households, and businesses, but energy generation is viewed as the responsibility of utility companies. There is a deeper debate implicated here: different actors disagree on whether the energy system should keep the current centralised model, or whether it should shift towards a more decentralised generation and distribution system.

With more individuals and businesses getting involved in renewable energy generation through the feed-in tariff program, the perception regarding decentralised power sources is changing, but for now the idea of building owners investing in both energy efficiency measures and renewable energy generation is seen as an anomaly. It is not viewed as the emergence of a different business practice, or part of a larger shift towards a decentralised power model. Further, there is no overt recognition of this business model by governments, trade associations, or other institutions. Hence, the expansion of the traditional ESCO model has not yet achieved sociopolitical legitimacy. However, government incentive programs such as the feed-in-tariff do help legitimize the renewable energy industry and as such provide support for the emergence of business models such as the one discussed in this research.

The lack of socio-political legitimacy is further exacerbated by the fact that the ESCO industry is still facing a credibility problem. The historical negative experiences with ESCOs still affect their current reputation, and this by extension influences the perceptions of the business model.

Implications of PEST+I Factors for ESCOs

The required PEST+I factors are mostly in place but the economics of renewable energy contracting seem to be the major limiting factor and are in turn influenced by the other PEST+I factors. For instance, strong social pressures could increase ratepayers' willingness to pay for electricity, in which case higher electricity prices would be politically possible and the business case for renewable energy contracting would be strengthened. The business practice could work without a favourable political environment if such higher electricity prices or lower costs of production made it naturally profitable. Subsidies and incentives can serve the purpose of developing the industry (and the requisite technology) to the point that it will become profitable, but this would only be possible with a stable political environment.

Cognitive and sociopolitical legitimacy must be also engendered. Once the business model is understood and accepted as legitimate by different stakeholders, there may be more of a push for alignment of the PEST+I factors and the necessary policy support.

5.2 SWOT & TOWS Analysis

SWOT Analysis

Strengths weaknesses, opportunities, and threats of the ESCO industry in Ontario were drawn from the literature data and from the interview findings, and are discussed in this section. In the TOWS section that follows, there is an analysis of how the internal strengths and weaknesses interact with the external threats and opportunities, and how ESCOs can best manage these interactions to make the most of opportunities for renewable energy contracting.

Strengths

The ESCOs in Ontario that successfully remained in the industry over decades have been able to do so because of a number of strengths. These ESCOs have capitalized on their core competencies, which include financing for energy efficiency investments, risk management, the ability to leverage savings, and knowledge of building and operations.

Because ESCOs work with long-term contracts, they are accustomed to dealing with risk management. For instance, ESCOs are accustomed to dealing with construction risk, which they mitigate with proper insurance coverage. Guaranteed savings in performance contracts mean that ESCOs must be able to mitigate the risk of unrealised savings, which they do through proper planning, monitoring and verification, and ensuring through contracts that clients are compensated if the projected savings are not realised.

In order to provide guaranteed savings, ESCOs must also have extensive knowledge of building operations and management.

One of the main selling points for the ESCO business model is that they provide financing for the savings so theoretically a client can get better building performance without paying for it, because the savings pay for themselves. ESCOs' financing expertise is important because it makes the business model work, especially for clients who have difficulty paying the upfront costs involved in building retrofits and upgrades. Part of this financing ability comes from the ESCOs' experience with leveraging savings; ESCO firms are able to use higher-return investments (with lower paybacks) to finance lower-return investments and/or to fund other client needs. ESCOs are also able to provide better prices on energy efficiency equipment because they purchase large volumes of it, which helps compensate the client for the profit they take from the savings.

ESCOs are able to get better prices for equipment not only because they buy them in large quantities, but also because of their strong supplier relationships. In some cases, ESCOs are their own suppliers. Indeed, it is understood that a number of ESCO firms began doing energy performance contracting in order to sell their own equipment.

In recent years, one of the main strengths that has allowed ESCOs in Ontario to continue doing business despite changes in government and client demands has been ESCOs' ability to adapt to client needs. Many of these firms have seen the importance of making changes in the way energy is managed within client organizations, and so have shifted their focus to client education. Others have attempted to align their performance contracting services with overall client needs, such as providing quality healthcare or education, or funding liabilities.

ESCOs have also proven to be adaptable in terms of taking advantage of policy opportunities. Like most successful firms, they ensure that their business model works without incentives, and have a diverse range of service offerings. They purposely "do not put all their eggs in one basket" as one interviewee put it, in order to ensure they remain flexible enough to always stay profitable and adapt to whatever policy opportunities arise.

As will be discussed in the TOWS section, these main skills and expertise that ESCOs offer clients for energy performance contracting are easily transferable to the expanded business practice. These strengths can help ESCOs take advantage of renewable energy opportunities while helping ESCOs to face threats related to the expanded business model.

Weaknesses

From the findings here, it is clear that these internal strengths are countered by ESCOs' weaknesses, which make the inclusion of renewable energy contracting in their business model a challenge.

ESCOs do face some challenges in terms of human resources. The performance contracting business competes with many other types of energy firms for personnel. The ESCO business requires quite a bit of specialized knowledge, but there are few programs available to provide a steady supply of potential employees. Further, in order to realign themselves with evolving client needs, ESCOs have had to bring in external expertise because they do not always have the necessary skills available to them.

Another weakness alluded to in the PEST+I analysis is the legitimacy factor. ESCOs are still facing a challenge with respect to credibility thanks to historical experiences that did not see realised savings. There is also the added difficulty that in the face of changing client needs, ESCOs are in the process of redefining themselves. As different ESCO firms branch out into providing a variety of services, and even the term ESCO is being reassessed, ESCOs in Ontario are establishing a new identity that is uncertain as of yet.

This can be both a weakness and an opportunity: just as there is difficulty in introducing an altered business model that does not yet have legitimacy, ESCOs can take this time of reflection to rebrand themselves using renewable energy contracting as a starting point.

Opportunities

Client demand, rising electricity prices, and related government policies have come together to create opportunities for renewable energy actors in Ontario.

Social concern for the environment has translated into increased demand from clients for more holistic energy solutions; clients have asked for renewable energy generation because it is "the right things to do" but mostly because it is a visible symbol of their environmental commitment to stakeholders, who are increasingly concerned about the environmental impact of these organizations. Having solar panels on rooftops is used as a marketing tool to improve these organizations' images, especially in light of pressure from the headquarters of multi-national corporations to reduce their environmental impact. Further, these efforts can count towards LEED certification points, which is similarly part of a 'green' marketing strategy.

There are other drivers as well that have contributed to the increased demand for energy solutions from clients. For institutional clients, deferred maintenance has provided an opportunity for ESCOs to provide a financial solution. Once clients are involved in the EPC process to deal with deferred maintenance, they are often also open to the idea of including renewable energy as part of their energy solutions. For school boards, the decision to have renewable electricity generation comes from a desire to showcase environmental stewardship and leadership. Renewable energy generation projects can also inspire sustainability curriculum.

Another driving force for clients to request solar PVs is the cash flow from the roof licensing payments, which are made possible by the feed-in tariff model; the prices paid for generating electricity from solar PVs that goes into the grid have been calculated to give developers a reasonable return on investment. Clients are compensated for allowing the use of their roof space through the receipt of roof licensing payments.

Projected energy price increases also provide an opportunity for the extended business model. Energy rates in Ontario will increase over the next couple of decades due to necessary maintenance and upgrades of the transmission and distribution systems. With the potential for more government subsidy support for renewable electricity generation, this increase may be even more pronounced. If energy prices do increase as predicted, and/or if they cease to be subsidized, increasing energy prices could act as a driver for both energy efficiency and renewable energy investments. That is, if cost savings from electricity bills are sufficiently high due to on-site renewable energy generation, it would be easier to make renewable electricity generation part of an energy performance contract.

The business practice would also be more profitable if the cost of production for renewable energy equipment decreases sufficiently. As technology in the field develops, this is quite likely.

Threats

There are a number of factors outside of the control of ESCOs, which threaten the feasibility of the expanded business model. These threats fall under a number of different categories and are related to the PEST+I factors discussed previously. Political risks, changes in consumer demand, supply and technological risks, economic barriers, and competitive factors all constitute threats to the renewable energy contracting model.

Political Risks

One of risks most often mentioned by interviewees was political risks. As mentioned in previous sections, supportive policies that are currently in place have the possibility of being cancelled, especially in the unstable policy climate in Ontario. The current feed-in tariff program, for instance, may be cancelled after the next provincial election. The program as it stands is still evolving and there have been challenges with its implementation. Organizations that have put in applications through the FIT program risk not getting connected to the grid due to capacity constraints and due to the OPA approvals process, as well as the program itself being cancelled.

Changes in Consumer Demand

There is a current wave of consumer demand for renewable electricity generation because of concern for the environment and policy support for renewables, as was discovered in the PEST+I analysis. Should public opinion change and environmental concerns fall lower on consumers' priority list (as they tend to do during economically challenging times), or should policy support decline, the business proposition will likely become less popular. Client perception matters and if there are negative experiences with renewable energy generation as there were in the early ESCO days, the business practice will likely fall out of favour with clients in this case as well.

Another threat regarding changes in consumer demand comes from backwards integration. Some institutional clients have created in-house ESCOs to replace the work done by external ESCOs, because they find this to be a less costly option. If more clients start to do the same, this could render "external" ESCOs irrelevant, in which case they would have to modify their business model to attract clients, perhaps through doing larger, so-called "deep retrofit" projects.

Funding from external sources also undermines ESCOs' relationships with these long-term clients. Institutional clients who turned to ESCOs for financing and expertise to upgrade their building systems have not required partnerships with ESCOs when they received direct funding for these upgrades. When funding is available, institutional clients do not see the advantage of leveraging savings if there are onerous contracts involved; they simply say it is not worth the trouble. Further, the procurement process for these institutional clients is one that favours low-cost options, rather than options that leverage savings.

Supply and Technological Risks

When it comes to suppliers for renewable energy equipment, such as PV panel and inverter providers, ESCOs do not have the same historical relationships with these suppliers as they do for those of energy efficiency equipment. As a result, when engaging in renewable energy contracting, ESCOs face the threat of price competition with other actors that do have strong relationships with suppliers. Solar PV prices are also quite volatile, a factor which would be somewhat mitigated by long-term arrangements with steady and reliable suppliers.

Economic Barriers

One of the factors that affects the financial case of the business practice is external energy prices. As was already discussed, energy prices are predicted to increase over the coming decades in Ontario, especially due to growing infrastructure needs. However, the trajectory of energy prices is uncertain because eliminating price subsidies is very politically unpopular. Hence, it is conceivable that energy prices may remain stable or increase at a slower rate due to government subsidies. This would undermine the success of this business practice because in this case, as it would render it less profitable.

Competitive Factors

The threats related to competition are numerous and include rivalry among competitors, and new entrants and potential substitutes.

Although a number of ESCOs have started doing renewable energy contracting, there is little resistance from competing ESCOs that are not engaging in this business practice; they seem to have little interest in it. However, if more ESCOs start seriously considering this model, they will be competing with many other firms for skilled workers. Within the renewable energy field there is a skill shortage already, and with the potential for new entrants, this is likely to be intensified for ESCOs implementing this new business model.

There are a number of potential new entrants who may begin to use this business practice, or are already using a similar or related business model. The threat of new entrants is significant because there are many players in the energy market in Ontario. Over the past number of decades, different types of firms have diversified in their energy management services, while others have specialized. Currently there are a number of competitors in the renewable energy market, such as renewable energy developers, utility providers, and even community groups that wish to own renewable energy projects. Consulting companies and traditional engineering firms have started to provide energy management services (in terms of energy audits, finding energy efficiency opportunities, and so on), and have also had requests to look at the feasibility of including renewable energy generation in projects. In light of the political uncertainty surrounding the FIT program, some developers may consider branching out into energy efficiency services as a way to create revenue once there are no more government incentives. All of these actors are therefore new entrants or potential ones for this business model, which threaten ESCOs' profitability and access to key suppliers, and increases competition for skilled workers.

The same threats for new entrants are apparent for potential substitutes in the market. Since the business model offers holistic energy management solutions, which is a very broad category, there are a number of potential substitutes for renewable energy contracting. One of these is larger-scale energy management solutions, such as designing new carbon neutral subdivisions. Integrated technological solutions, such as district heating systems, or utility-scale renewable energy projects may compete with this new ESCO business model as well. Over time, different strategies for reducing the carbon footprint of organizations and institutions will be compared, and it may be discovered that there are more effective substitutes for this business practice.

Table 3- Summary of SWOT Analysis Findings

SWOT Analysis		
SWOT Model Description		**SWOT Findings for ESCOs Engaging in Renewable Energy Contracting**
Internal	Strengths	S1. Financing expertise S2. Ability to adapt to changing clients' needs S3. Flexible business model to help take advantage of emerging opportunities S4. Risk management expertise S5. Knowledge of energy industry and incentives S6. Knowledge of buildings and operations S7. Leveraging of Savings S8. Strong client relationships S9. Better pricing for energy efficiency equipment S10. Strong supplier relationships
	Weaknesses	W1. Competition for skilled workers W2. Credibility issues W3. ESCOs still redefining themselves
External	Opportunities	O1. Increased demand for renewables from clients (*image* and *visibility* as drivers) O2. Policy opportunities: FIT program O3. Technological improvements lowering the cost of production O4. Rebranding opportunity
	Threats	T1. Political risks (policy changes due to change in government, grid access) T2. Changes in consumer demand T3. Supply risks T4. Technological risks T5. Economic barriers T6. Competitive forces: new entrants & substitutes

TOWS Analysis

Strengths-Opportunities

The alignment between client demands for renewable energy and supportive government policies has provided ESCOs with the opportunity to engage in renewable energy contracting. ESCOs are prepared to take advantage of such an opportunity thanks to their knowledge base, skills and client relationships.

Ontario's feed-in tariff program has proven to be a valuable opportunity for ESCOs using the business proposition presented in this research because it has allowed renewable electricity generation to provide a reasonable return on investment. This opportunity has garnered interest from clients, who like the idea of having renewable energy generated on their buildings for the reasons discussed above.

ESCOs' financing and risk management expertise, knowledge of buildings and their operation, and ability to leverage savings make them ideal candidates for taking on renewable energy contracting opportunities. Financing is one of the main challenges associated with renewable energy because, just as with energy efficiency investments, it requires up-front costs, which are paid back over a stretch of time. ESCOs are experts in providing the up-front capital and expertise for implementing energy efficiency measures and getting profit from the savings. They could do the same for renewable energy if electricity prices were high enough to provide reasonable savings. Alternatively, ESCOs could pay for the up-front expenses and make a profit from the FIT revenues for generating electricity into the grid.

The financial case for renewables differs from that of energy efficiency because the former has a much longer payback period (and lower rate of return) than the latter. However, in this case, ESCOs can use their ability to leverage savings. Since ESCOs normally have the capacity to use savings from high-return investments to address other client needs, which usually have a much lower return, they can use this technique to allow energy efficiency savings to fund investments in renewable energy generation.

The ESCO industry`s risk management expertise is also easily transferable to renewable energy generation. Both energy efficiency and renewable energy share similar construction and contract risks, which ESCOs are accustomed to dealing with. The risks involved in using renewable energy equipment are higher than that for energy efficiency because the technology is still relatively new and untested, but ESCOs already have the experience and skills necessary to address these challenges.

Much of the knowledge that ESCOs possess is also an advantage for renewable energy contracting. ESCOs generally have in-house expertise regarding electrical systems and building design, which can be transferred to renewable energy. For instance, knowledge regarding electrical systems is very important when installing solar PVs. ESCOs are also familiar with energy-related policies and incentives that are advantageous for their clients, so they already belong to some of the networks necessary for keeping up-to-date with developments in renewable energy policies.

Part of the success of ESCOs that are still in the industry in Ontario can be attributed to their strong relationships with clients, especially in the institutional sector. These relationships are good starting points for promoting renewable energy contracting because renewable energy generation can be included as an option when clients are doing energy retrofits or infrastructure renewal. Further, in terms of solar PVs, ESCO clients tend to be larger institutional clients, which often have larger roof space suitable for installing solar PVs.

Finally, ESCOs are able to provide value for their clients for many reasons, but especially because they are able to get better prices for energy efficiency equipment due to the large volume of their purchases. The same strategy could be used to provide clients with less expensive renewable energy equipment, although ESCOs would have to establish stronger links with renewable energy equipment manufacturers for this to happen.

To sum up, ESCOs can use their strengths to take advantage of opportunities by:

1. Using their knowledge and skills regarding risk, financing, buildings and incentives to provided renewable energy contracting under the FIT regime.

2. Promote renewable energy contracting to existing clients, as ESCOs have strong relationships with them already.

Strengths-Threats

In order to successfully do renewable energy contracting, ESCOs can use their risk management experience to manage the supply and technology threats involved. ESCOs are already accustomed to mitigating construction and contract risks with appropriate insurance measures. This is especially useful for renewable energy contracting, because renewable energy technologies are largely untested in Canada. ESCOs' experience with risk management puts them ahead of competitors without a core competency in this area.

As for the political risks involved, ESCOs can continue to use their flexibility strategies, which allow them to adapt to different incentives in various jurisdictions, such as having multi-skilled employee who are often regionally deployable and providing a wide range of service offerings.

In order to address the threat that new entrants and substitutes pose in terms of competition for key suppliers, ESCOs can strengthen their relationships with renewable energy equipment suppliers, just as they did with suppliers of energy efficiency equipment. This would allow ESCOs to access longer-term contracts with key suppliers that would be more stable in the face of volatile prices for renewable energy equipment.

To conclude, ESCOs can use their strengths to minimise threats for the expanded business model by:

1. Using their risk management skills to mitigate technological and supply risks.

2. Continuing to use their flexible business model to deal with political uncertainty.

3. Forming stronger linkages with renewable energy equipment firms in order to stay ahead of new entrants.

<u>Weaknesses-Opportunities</u>

In order to take full advantage of the opportunities for renewable energy contracting, ESCOs must find a way to address a few key weaknesses.

One of the major ones is that ESCOs are missing a few key skill sets to take advantage of this opportunity. Since the ESCOs are specialized in energy efficiency rather than electricity generation, they have had to hire experts from outside for their project management skills and solar PV knowledge. This is a good tactic to help address this weakness.

ESCOs are still struggling to re-establish their credibility among potential clients due to negative historical experiences. This may make it more difficult for ESCOs offering an expanded business model. On the other hand, it may facilitate the process of having ESCOs rebrand themselves.

ESCOs can take this opportunity to re-establish their reputations and identities as reliable companies that provide a number of key, holistic energy solutions. Among these is renewable energy contracting, which, with the right marketing and promotion, can gain legitimacy as a business practice. The concept of renewable energy contracting can also give ESCOs a needed starting point from which to promote their new brand identities.

The major tactics that ESCOs can use to minimize their weaknesses in light of the emerging opportunities are to:

1. Bring on renewable energy experts to take advantage of this emerging business model.

2. Take advantage of this stage of identify formation to re-establish ESCO credibility and to gain legitimacy for renewable energy contracting.

Weaknesses-Threats

ESCOs will likely find it increasingly difficult to compete with new entrants that do renewable energy contracting if they are looking for the same skilled workers. One tactic to help alleviate this challenge is to form linkages with educational institutions that offer programs specializing in renewable energy services. This would give ESCOs a direct link to an employee base. Educational institutions would also help lend credibility and sociopolitical legitimacy to the new business practice because they could promote it within their own networks.

The fact that ESCOs are in the process of rebranding themselves also presents a challenge in terms of competition because ESCOs need a clear message and business model to promote in order to compete with new entrants and attract skilled workers. Clients will be looking for firms with a clear value proposition in order to be able to compare their offerings with those of new entrants, and potential employees will be looking for the same because they will be assessing whether the firms they want to work for have a future in the industry and can sustain permanent positions.

To provide a clear value proposition for clients and to ensure potential employees that ESCOs are a type of firm that will last well into the future, it is advisable for ESCOs to formulate and implement a clear branding strategy after deciding exactly how they would like to position themselves in the market.

To review, in order to address both these weaknesses and threats at once, ESCOs can:

1. Form linkages with educational institutions to establish an employee base for renewables and to lend credibility to this new business practice.

2. Create a clear branding strategy to attract the necessary skilled workers and to provide a clear alternative to the value proposition presented by new entrants.

Table 4-TOWS Matrix-Summary of Analysis

	S-Strengths	**W-Weaknesses**
	S1. Financing S2. Adaptability to client needs S3. Flexible business model to help take advantage of emerging opportunities S4. Risk management S5. Knowledge of energy industry and incentives S6. Knowledge of buildings & operations S7. Leveraging of Savings S8. Strong client relationships S9. Better pricing for EE equipment S10. Strong supplier relationships	W1. Competition for skilled workers W2. Credibility issues W3. ESCOs still defining themselves
O-Opportunities O1. Demand for renewables from clients: O2. Policy: FIT program O3. Technology improvements lowering cost of production for renewables O4. Rebranding opportunity	SO: Strengths-Opportunities • Using their knowledge and skills regarding risk, financing, buildings and incentives to provided renewable energy contracting under the FIT regime. (O1, O2, S1, S2, S3, S4, S5, S6, S7) • Promote renewable energy contracting to existing clients (O1, O2, S8)	WO: Weaknesses-Opportunities • ESCOs need to bring on renewable energy experts to take advantage of opportunities (O1, O2,W1) • ESCOs can take advantage of identity formation to re-establish credibility and promote renewable energy contracting. (O4, W2, W3)
T-Threats T1. Political risks T2. Changes in consumer demand T3. Supply risks T4. Technological risks T5. Economic barrier T6. Competitive forces: substitutes & new entrants	ST: Strengths-Threats • ESCOs can use their risk management skills to mitigate technological and supply risks (T3, T4, S4) • ESCOs can continue using their flexible business model to deal with political uncertainty (T1, S3) • Form stronger linkages with renewable energy equipment suppliers in order to stay ahead of new entrants and competitors (T6, S9, S10)	WT: Weaknesses-Threats • ESCOs require renewables expertise to compete with substitutes and new entrants (T6, W1, W2), so they can form linkages with educational institutions to establish employee base for renewables and to lend credibility to new business practice. • Create clear branding strategy to attract the necessary skilled workers and to provide a clear alternative to new entrants. (T6, W1, W2, W3)

5.3 Discussion

Validity & Relevance of Results

This analysis is based on both a literature review and on findings from interviews. Results are therefore less reliable where they relate to the clients' perspective, as very few interviews were conducted with clients using the relevant business model.

The results of this analysis are mostly applicable to the Ontario context, but the analytical frameworks used here may prove to be helpful to determine the feasibility of this business model in other places and contexts. This study may also be useful as a comparative tool for research based in locations other than Ontario.

The PEST+I and TOWS frameworks are appropriate for answering the research question because they examine both the internal and external factors that influence the success of the expanded business model. One criticism of the PEST+I model could be that it is missing environmental and legal factors, which would be considered in a full PESTEL analysis (as opposed to a PEST+I analysis). The PESTEL analysis was not used because the PEST factors were the ones found to be important in the literature review. Relevant legal considerations were assessed under the Political category, but it would be instructive for further research on this subject to address legal considerations separately. Also, the criticism that environmental factors should be assessed is a valid one. The business model is indeed reliant on natural resources and on the public's perception of the business model's relevance as a solution to the environmental problems of resource scarcity and climate change. Although the business model's interaction with the environment is addressed indirectly through supplier considerations and social factors, it is recommended that environmental factors be looked at separately in further studies on this research topic.

The TOWS analysis is a useful tool for deriving tactics and strategies that can help organizations maximize strengths and minimize weaknesses in the face of opportunities and threats. It has a shortcoming in that it does not look specifically at competitive factors. The Five Forces Model was used partially to inform the "threats" section of the SWOT analysis, but the author feels that that Porter's Five Forces model may be a useful complement to the SWOT and TOWS analyses once the expanded business model is used for a longer period of time and the competitive factors are easier to discern and assess.

The research question regarding what conditions are necessary to make the expanded business model work has been answered, but the more fundamental question remains unanswered: Is this business model part of the solution for mitigating climate change and establishing a supply of renewable energy to meet Ontario's energy goals? It may be that this is not the most effective way to address the issue of reducing greenhouse gas emissions. Other solutions from the private and public sector, such as district heating, must be compared with this business model to see what solutions are most effective.

Further Research

The results of the analysis can be expanded with further research. The qualitative analysis here can be complemented by quantitative research that assesses which specific financial parameters are needed for the two types of renewable energy contracting to be reasonably profitable. For instance, calculations regarding return on investment can be made once additional financial data (such as interest rates, cost of production for renewable technologies, and the rate of return required by ESCOs) is made more readily available by the ESCO industry.

It would also be instructive for researchers to look at the consequences that an integrated Ontario energy system and set of policies (that includes both electricity and natural gas for heating) would have on this business model. Another interesting variable would be the influence of smart grid developments on the business model and its sociopolitical legitimacy.

As previously mentioned, it would be a valuable exercise to shed some light on larger-scale solutions at the community level and compare their efficacy with that of this business model. Other similar solutions must be looked at and compared to see whether buildings are the appropriate scale for renewable energy generation and energy efficiency initiatives.

5.4 Recommendations

The recommendations for policymakers are drawn mostly from the PEST+I analysis, but also take direction from the related external opportunities and threats assessed under the TOWS analysis. The author has also supplemented these recommendations with her own analysis of the situation.

Recommendations for Policymakers

In order to address the political challenges discussed in this thesis, it is recommended that provincial policymakers take these steps:

1. Develop a long-term policy strategy to ensure policy stability.
2. Combine the policies for electricity and natural gas in Ontario, in order to incentivize more holistic energy solutions.
3. Collaborate with policymakers at the national level to develop aligned policies that allow for a predictable and stable policy environment, which is more conducive to holistic energy solutions.

To address the economic difficulties ESCOs face in incorporating renewable energy contracting, the following is recommended:

4. Continue to support this emerging industry with incentives such as the FIT program in order to make renewable energy contracting economically viable.
5. Explore policy options for reducing electricity subsidies to make electricity prices act as an incentive for energy efficiency and renewable energy generation investments.

Policymakers can assist in changing the public's mindset with regard to electricity prices and address one of the key social challenges by:

6. Ensuring that policies for reducing electricity subsidies or those that raise electricity prices to internalize externalities do not disproportionately affect lower-income households. Perhaps a system that uses tax returns to compensate lower-income

household, rather than policies such as the Clean Energy Benefit would be appropriate here.

To help along the development of renewable energy technology, policymakers can:

7. Ensure that policies such as the FIT program have built in mechanisms to incentivize technological developments[7].

In order to foster institutional legitimacy for renewable energy contracting, policymakers can:

8. Lend legitimacy to the expanded business model with supportive policies that incorporate an educational element.

Recommendations for ESCO Managers

For ESCO managers, the recommendations that follow are derived from both the PEST+I analysis and the TOWS analysis.

Recommendations Derived from PEST+I Analysis

While the PEST+I factors are mostly relevant for policymakers, ESCOs can still adapt to them and to some extent also influence them.

For instance, in order to adapt to the political uncertainty, ESCOs can:

1. Draw on their current flexible business model with diverse service offerings to ensure that the expanded business model works without government incentives. They can continue to remain flexible enough to benefit from new opportunities as they arise. ESCOs may find that renewable energy contracting is not a viable option without government support, and so must ensure that their ESCO model remains profitable without renewable energy contracting.
2. Lobby for predictable energy policies that incentivize both energy efficiency and renewable energy investments, such as climate policies.

For creating a more favourable economic or financial environment for renewable energy contracting, ESCOs can:

3. Create strong links with renewable energy equipment suppliers, just as they did with energy efficiency equipment suppliers.

In order to foster cognitive legitimacy, ESCOs can:

4. Educate clients and potential clients about how renewables can be integrated into the ESCO business model, so that cognitive legitimacy can be achieved.
5. Develop and promote a consistent definition and model of renewable energy contracting.
6. Promote the business model through trade associations and high profile cases.

[7] An example of this would be a digression policy, such as the one used in the German feed-in tariff program, in which

To achieve sociopolitical legitimacy, ESCOs can:

7. Form links with educational institutions

Recommendations Derived from TOWS Analysis

ESCOs can reinforce their strengths and minimize the weaknesses highlighted by this research in order to take on opportunities while hedging threats.

ESCOs can capitalize on their strengths to take advantage of renewable energy contracting opportunities by:

8. Continuing to observe and cater to evolving client needs.
9. Promoting renewable energy contracting within current client circles.
10. Using their knowledge and core skills to provide renewable energy contracting under the current FIT regime.
11. Bringing in renewable energy experts through links with educational institutions.

Weaknesses and threats can be minimized if ESCOs:

12. Develop relationships with renewable equipment suppliers early on and/or form tight linkages with departments in the firms that manufacture such equipment.
13. Foster partnerships with educational institutions to aid in finding skilled workers.
14. Take advantage of the current rebranding opportunity to re-establish ESCO credibility, promote renewable energy contracting, attract the necessary skilled workers, and provide a clear alternative to new entrants.

In addition, ESCOs can keep a watchful eye on developing threats and opportunities by:

15. Remaining vigilant regarding costs of production for renewable energy technologies (which are set to decrease).
16. Watch for energy policy developments in the government, especially concerning carbon policies.
17. Keeping abreast of developments in the NGO and institutional sector discourse on holistic energy solutions, in order to properly gage the risk of substitutes and the new entrants that would provide them.

6 Conclusion

As ESCOs have evolved with their service offerings over the past number of decades, so have the needs of their clients and the policy context in which ESCOs operate. The climate change crisis has created opportunities for cost effective mitigation strategies, such as reducing energy usage in buildings, and has necessitated the provision of renewable energy generation. ESCOs currently have the opportunity to take advantage of an expanded business model that addresses both of these needs: renewable energy contracting. This thesis has been an exploration of this business practice and what it means for the ESCO industry.

The first research question asked what renewable energy contracting currently looks like. Through interviews and a literature analysis, it was discovered that ESCOs have been involved in renewable energy generation in three ways:

1) Including renewable energy elements as one of many facility improvement measures in a performance contract.

2) Building, owning, and operating rooftop-mounted solar PV projects separately from performance contracts. With this arrangement, ESCOs receive income from the government for generation through the Ontario government's FIT program and clients receive roof licensing payments.

3) Having separate departments handle performance contracting and utility-scale renewable energy generation respectively.

Only the first two of these three options can truly be considered "renewable energy contracting", which is a natural extension of the current business model.

The second research question concerned the drivers which contributed to the emergence of renewable energy contracting. A number of factors were found to be relevant here, but the most important were economic, political, and driven by client demand. Clients have been asking for renewable energy generation for their buildings because of growing environmental concern regarding climate change, the advantages of having a visible symbol of their environmental commitment, and the economic incentive provided by the current feed-in tariff program in Ontario. Indeed the feed-in tariff program made this business practice profitable for both clients and ESCOs. While it was the main driving force for ESCOs to engage in this business practice, there were other reasons as well. Specifically, ESCOs benefited from transferable knowledge regarding buildings, risk management and financing. ESCOs also have the possibility of leveraging existing client relationships to try renewable energy contracting.

The third and fourth research questions were answered with the help of a PEST+I analysis and a TOWS analysis. Observations regarding the external factors that make a business environment conducive to this business practice were drawn from the PEST+I factors, as well as from the opportunities and threats in the TOWS analysis. It was found that economic, political and competitive factors were the most significant. Renewable energy contracting can only be a viable option financially if costs of production are low enough or there are sufficient government incentives to maintain a reasonable payback period for clients. Competition for renewable energy contracting is emerging due to substitutes, and new entrants: companies that traditionally focus on other services, such as engineering consulting or renewable energy development have started to branch out or may in the future branch out into energy efficiency services. Substitutes for renewable energy contracting are also emerging, such as district heating, and other holistic energy solutions.

In order to address these challenges, recommendations for policymakers and ESCO managers were proposed. Most recommendations for policymakers focused on providing economic incentives for renewable energy investments, ensuring policy stability and policy alignment with other levels of government, and allowing electricity prices to more closely resemble their true costs. ESCOs were encouraged to keep an eye out on developments in the competition and policy circles, to form stronger linkages with educational institutions and renewable energy equipment suppliers, and to promote renewable energy contracting in order to increase the business practice's legitimacy and chances of success.

The ESCO industry in Ontario has proven to be robust in the face of changing policy conditions, and industry expansion and contraction. If the ESCO industry takes a good look at the emerging opportunities in the renewable energy market, and continues to evolve with changing client needs, it will continue to prosper.

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9 Appendix A- Interview Guide

General (For all interviewees)

General Questions

1. What do you think is the biggest challenge facing ESCOs in Ontario today?
2. Do you see energy efficiency investments and investments in renewables as competing with each other, or are there synergies between the two?

The Proposed Business Model-Current Situation

3. Have you seen evidence of this new business model, which combines financing and expertise for both energy efficiency and renewables equipment in Ontario or elsewhere?
4. If so, why do you think this new business model (ESCOs + Renewables) is emerging?
5. Do you know of any other type of companies (other than ESCOs) that have started using this business model or a similar one?
6. What conditions make this business model attractive to buyers?
7. Do you know of other companies/regions where this business model is used?

The Proposed Business Model- Opportunities, Risks, and Challenges

8. What core competencies would ESCOs need to make this business model work?
9. What are the main risks for ESCOs using this business model?

The Policy Context

10. Is this business model reliant on government support, or can it work independently of supportive policies?
11. What are examples of supportive policies that would help this business model flourish?
12. How do you think ESCOs can adapt their business model to make it resilient in the face of changing policies?

Further Research:

13. Is there anything you would like to add?
14. Is there anyone else you recommend that I talk to for this thesis research?
15. Do you have any questions?

For ESCOs & ESCO Associations

1. Has this business model would increase the number of potential industrial clients for ESCOs?
    a. Why/why not?
2. Did your firm already have the capacity necessary to offer renewable energy services or did you need to hire new personnel/new skills sets?
3. When did your firm start offering renewable energy services?
    a. Why?

4. How do you reconcile long-term EPC projects and short-term renewable projects? Do you have separate teams working on these, or are renewables included in one energy performance contract?

For Renewable Energy Companies

1. What types of renewables would be best for this business model?
    a. Why?
2. What are the risks involved in developing renewable energy projects?
3. What other types of companies are involved in renewables (aside from infrastructure firms, and renewable energy developers?)
4. What level of return do you get for different types of renewable electricity sources (solar/wind/biogas/etc.)?
5. What policies do you think are most effective for encouraging investments in renewable energy?

For Policy Experts

1. What policies do you think are most effective for encouraging energy efficiency investments?
2. What policies do you think are most effective for encouraging investments in renewable energy?
3. Do you believe Ontario's current energy efficiency targets will have an effect on ESCOs? On Renewable energy companies?
4. What is your opinion of Ontario's current energy policies?
5. What do you think the future holds for the FIT program?

10 Appendix B- List of Interviewees

Interviewees for this thesis

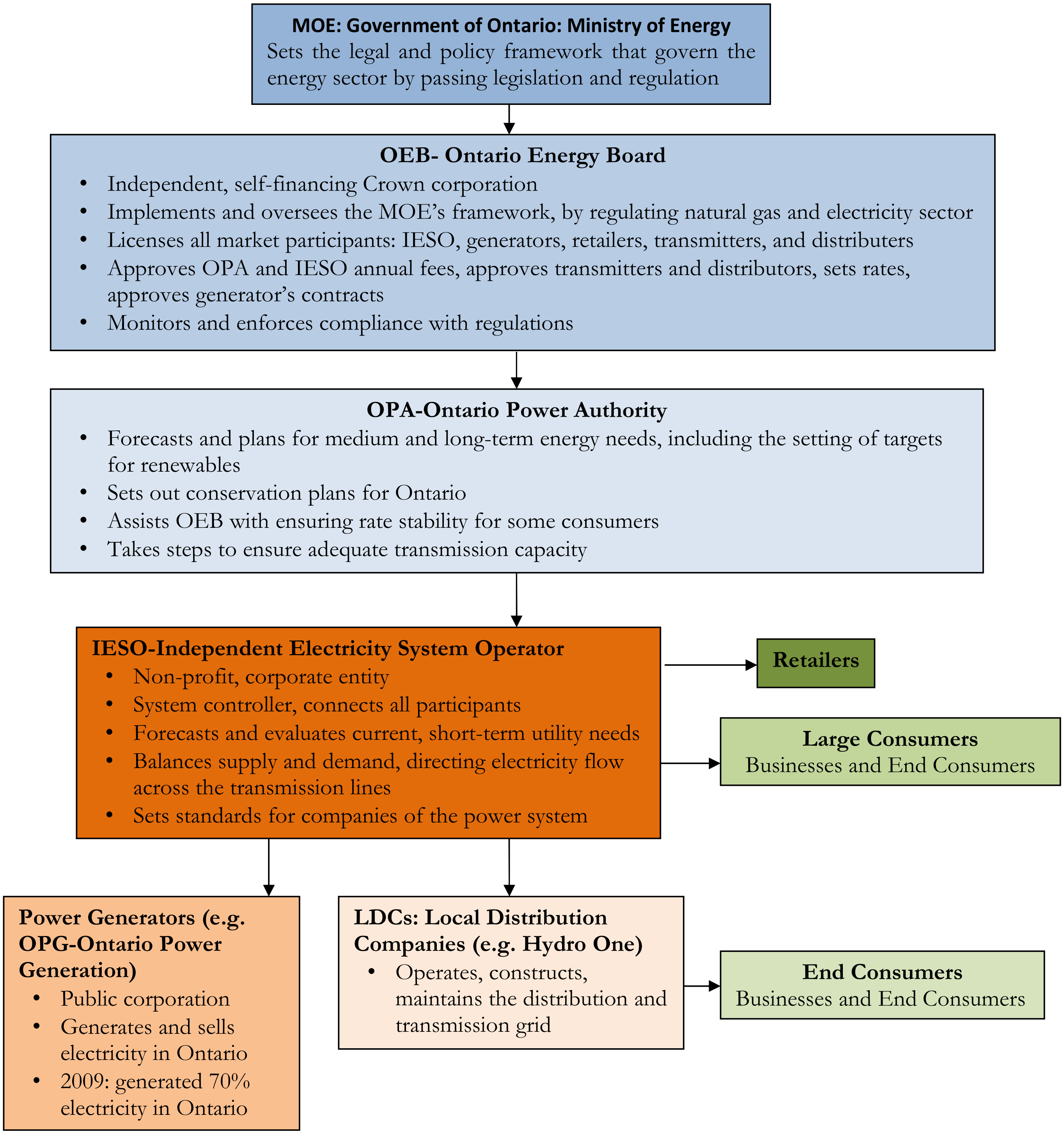
Name	Company	Position
Helen Reeve	Ameresco Canada**	Project Manager
Mario Iusi	Ameresco Canada**	President
John Barros	Mainstream Renewable Power	Project Development Manager
Samira Viswanathan	Renewable Energy Facilitation Office (Ministry of Energy and Infrastructure)	Senior Project Advisor (Government of Ontario)
*Peter Love	Energy Services Association of Canada	President
*Marion Fraser	CAESCO; Fraser and Company	Former President of CAESCO President of Fraser and Company
*Pierre Chantraine	DuPont	Former Manager of Energy and Environmental Affairs
Morrigan Hayes	Corix Utilities	Project Manager
Kristopher Stevens	Ontario Sustainable Energy Association (OSEA)	Executive Director
Guillaume Lavallée	Ecosystem**	Construction Manager
Joe Bilé	Toronto Hydro	Manager, CDM Program Delivery and Business Development
Jack Teevens	Siemens**	Director of Building Automation, Building Technologies Division, Siemens Canada Ltd.
George Canetti	Better Buildings Partnership (City of Toronto)	Project Manager
Ian Howard	Johnson Controls**	Renewable Energy Solutions Leader
Edwin Lim	Pinchin Environmental	Senior VP, Sustainability & Building Sciences
Sheila Penny	Toronto District School Board	Director of Strategic Building and Renewal
Ian Jarvis	Enerlife Management Consulting	President
Michael Carson	Ottawa-Carlton District School Board	Superintendent of Facilities
Anthony Da Silva	Ameresco Canada**	Chief Operating Officer

*indicates that interview was conducted with the same interviewee once for ARSCP research paper and later for thesis as well
**denotes an ESCO

Interviewees for ARSCP Research Paper

Name	Company	Position
Dean Brigham	Terra Energy Management Services, formerly at Honeywell	Energy Performance Consultant; Former employee of Honeywell
Martin Lensink	CEM Engineering	Principal-in-Charge
Gary Johnson	Quest Leadership Services; Seneca College	President, Quest Leadership Services; Professor, Seneca College

11 Appendix C- Ontario's Electricity System



12 Appendix D- Ontario Feed-in Tariff Program: Selected Rates

Renewable Fuel	Size of Project	Contract Price
Biomass	>10MW	13.0
Biomass	≤ 10MW	13.8
Solar PV, rooftop	>500 kW	53.9
Solar PV, rooftop	≤10kW	80.2
Solar PV, ground-mounted	≤10kW	64.2
Landfill Gas	>10MW	10.3
Wind, on-shore	Any size	13.5
Wind, off-shore	Any size	19.0

Source: Feed-in Tariff Program: Program Overview