

**Assessment of ISO 14001:2015, Environmental Management System Standard:
A Conformance Strategy for Select Canadian Electrical Utilities**

By

Kimya Walcott

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Department of Environment and Geography
University of Manitoba
Winnipeg

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Abstract

Increased public concern regarding anthropogenic pollutants resulted in an environmental movement where governments created a regulatory regime to minimize the pollution caused by organizations. This evolution created an environment whereby in order to remain competitive, some organizations strived to adopt sustainable business practices. One such example is the global adoption of Environmental Management Systems (EMSs). The International Organization for Standardization's (ISO) 14001 EMS standard is the most adopted EMS standard in the world.

The ISO 14001 standard was revised in 2015 and organizations interested in transitioning to the revised version have until September 2018 to become compliant. Organizations that have externally registered their ISO 14001 EMS, that fail to meet the September 2018 deadline, will lose their external registration.

Canadian electrical utilities must maintain an ISO 14001 EMS in order to participate in the Canadian Electrical Association's Sustainable Electricity Program. The goal of this research is to provide a comprehensive examination of the intent of the new ISO 14001 Standard and to develop a conformance strategy suitable for adoption by select Canadian electrical utilities.

This research identified eight thematic changes that represent fundamental changes to the old Standard; the most significant changes relate to Life Cycle Perspectives and Out Sourced Processes, Environmental Performance Monitoring and Evaluation, and Strategic and Integrated Environmental Management. These eight significant thematic changes were used as the basis for the development of the gap analysis and subsequent conformance strategy.

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List of Acronyms

BSI	British Standards Institute
CBT	Computer-Based Training
CEA	Canadian Electricity Association
CEPA	Canadian Environmental Protection Act
CQI	Chartered Quality Institute
CSA	Canadian Standards Association
EMS	Environmental Management Systems
EH&S	Environmental Health & Safety
GDP	Gross Domestic Product
ISO	International Organization for Standardization
MSS	Management System Standards
MMA&E	Monitored, Measured, Analyzed and Evaluated
NGO	Non-Governmental Organization
PDCA	Plan, Do, Check, Act
PUB	Public Utility Board
STC	Significant Thematic Change
SME	Subject Matter Expert
TC	Technical Committee
SAGE	Strategic Advisory Group on the Environment

CHAPTER 1- INTRODUCTION

1.1 Preamble

The cumulative anthropogenic environmental impacts of organizations have become more of a concern in light of recent issues such as climate change, water pollution, increased waste production, and diminished natural resources. The increased public concern regarding anthropogenic pollutants resulted in an environmental movement where governments created an environmental regulatory regime to minimize the pollution caused by organizations. This evolution created an environment whereby, in order to remain competitive, some organizations are now concerned with the triple- bottom- line and are now striving to adopt sustainable business practices over purely economically profitable practices. One such example is the increasing global adoption of Environmental Management Systems (EMSs).

Organizations have voluntarily and involuntarily adopted an EMS for a number of reasons. Reasons include: mitigating their environmental impacts; ensuring compliance with the growing number of environmental regulations; remaining competitive and increasing profits; and improving their corporate reputation. This is contrary to the prior business philosophy where it was believed that pursuing environmental goals was antithetical to sound business strategy and a violation of the fiduciary duty of managers to shareholders (Melnyk, Sroufe & Calantone, 2002).

1.2 Background

The following section examines EMS concepts that are important in order to gain an understanding of the intent of an EMS. It also examines historical and current factors that have impacted the direction and adoption of an EMS. An examination of the background information included in this chapter also provided context for this research and identified questions that needed to be further examined in order to maximize the value of this research for the clients (See Chapter three for details on clients).

1. 2. 1 Environmental Management Systems

An EMS is meant to cover the "totality of all things a company or organization does to manage its environmental affairs, and monitor its effects on the environment" (Ibbotson & Phyper, 1996).

An EMS can also be described as “a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency by establishing a framework that helps an organization achieve its environmental goals through consistent review, evaluation, and improvement of its environmental performance” (United States Environmental Protection Agency (EPA), 2016). The basic elements of an EMS can include:

- Reviewing the organization's environmental goals
- Analyzing its environmental impacts and legal requirements
- Setting environmental objectives and targets to reduce environmental impacts and comply with legal requirements
- Establishing programs to meet these objectives and targets
- Monitoring and measuring progress in achieving the objectives
- Ensuring employees' environmental awareness and competence

- Reviewing progress of the EMS and making improvements (United States EPA, 2016)

1. 2. 2 Evolution of EMS Models

The start of the EMS era in North America can be traced to the development of the pollution prevention programs of the 1970s and voluntary codes of environmental conduct in the 1980s (Sumits & Morrison, 2001). As these programs evolved, they started to focus on emerging concepts such as due diligence, regulatory compliance and operating efficiencies through improved waste management efforts.

A number of different EMS models emerged as a result of the new era of environmental consciousness, and even though they are based on similar concepts, the complexities involved in the design and implementation are varied. Examples of early EMS models include the Responsible Care® program; Strategies for Today's Environmental Partnership (STEP) program; British Standard 7750 (BS 7750); French Standard AFNOR X30-200; and the European Union's Eco-Management and Audit Scheme (EMAS) (Bass, 2015).

With the advent of globalization, there was a need to harmonize EMS standards and the Strategic Advisory Group on the Environment (SAGE), which was formed during preparations for the Earth Summit in 1991, was tasked with this responsibility. SAGE was a collaboration between the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). The primary goals of creating a harmonized and globally recognized standard were to alleviate “conflicts between corporate and government imposed environmental management initiatives, as well as to provide an objective means of validating corporate

commitments and claims of responsible environmental practices” (Global Environmental Management Initiative (GEMI) , 1996; Starkey, 1996; Bass , 2015).

The product of this collaboration was the ISO 14001 EMS standard. The intent of ISO 14001 was to provide a framework that could be applicable across all governments, corporations, trade boarders, and industries (GEMI, 1996; Starkey, 1996).

1. 2. 3 The ISO 14000 Family

ISO is a standards institution located in Geneva, Switzerland. It was founded in 1947, as a private, non - governmental international standards body. It is composed of a representative from each of its 163 member countries. Canada is represented by the Standards Council of Canada (SCC) (ISO, 2017a). The goal of ISO is to bring forward international harmonization and development of standards. To date, ISO has developed more than 19,000 different standards (Frost, 2012).

The ISO 14000 family of standards provides organizations of all kinds with practical tools to manage their environmental responsibilities. They “reflect international consensus on good environmental and business practices that can be applied by organizations all over the world in their specific context” (ISO, 2009). The ISO 14000 family of standards includes but is not limited to standards related to environmental management systems, audits, communications, labeling, environmental assessments, life cycle analysis, and environmental challenges such as climate change (ISO, 2009). See Appendix A for a complete listing and overview of the ISO 14000 series of standards.

ISO 14001: Environmental Management System Standard

The most widely used global standard for EMS is the ISO 14001 Standard (the Standard). The Standard provides organizations of any type, size, or geographic location with a systematic framework to support environmental protection (ISO/TC 207/SC 1, 2013). The Standard is based on the Plan-Do-Check-Act (PDCA) methodology, which is also called the Deming model. The steps involved in the PDCA methodology are as follows:

- Plan: establish objectives and processes necessary to deliver results in accordance with the organization's policy;
- Do: implement the processes;
- Check: monitor and measure processes against environmental policy, objectives, targets, legal and other requirements, and report the results; and
- Act: take actions to continually improve performance of the environmental management system (CSA, 2004, p.7).

Overall, the Standard is viewed as concise and well constructed. It is praised for providing a framework that organizations can adapt to fit their needs rather than providing rigid requirements that dictate environmental performance expectations. It is this flexibility that has made the Standard a popular choice for organizations. Since its publication in 1996, the Standard has been adopted by over 300, 000 organizations worldwide (ISO, 2014). Many organizations, specifically in Europe and the United States, have made adoption of the Standard a requirement for doing business. Though the Standard continues to be a popular choice, its value and ability to achieve its intended outcomes continues to be questioned.

- **Research Question (1):** *What are the motivations for voluntary adoption of the Standard?*
- **Research Question (2):** *Does adoption of the Standard result in overall business and/or environmental performance improvements?*
- **Research Question (3):** *What are some of the recommended factors for the successful implementation of an ISO 14001 compliant EMS?*

1. 2. 4 Options for Demonstrating Conformance to ISO 14001

Organizations who claim to have an ISO 14001 compliant EMS must demonstrate that they have assessed their conformance to the Standard (conformity assessment). ISO allows organizations to perform this conformity assessment by:

1. Self - Declaration: Organizations seek confirmation of their conformance through self-determination;
2. Second - Party Audits: Organizations seek confirmation of their conformance by parties having an interest in the organization; and
3. Third-Party Audits: Organizations seek confirmation of their self-declaration by a party external to the organization (CSA, 2004, p.15).

An organization that performs third-party audits also has the option to externally register their EMS. External registration requires a third-party surveillance audit every year and a third-party re-registration audit every three years; these audits must be performed by an accredited organization. External registration is therefore a costly endeavour. The decision to obtain

external registration (Registration) is usually influenced by factors external to the organization such as regulatory bodies, financial institutions, suppliers, customers, parent companies and buyers. However, despite the high cost, in the absence of external coercive pressures, more organizations are choosing to incur the additional cost in order to obtain a Registration. The research suggests organizations are choosing the costly route of Registration for several reasons; one of them being that they will incur additional benefits that cannot be achieved by selecting another conformity assessment option. However, there are several EMS experts who have questioned whether external registration provides any additional benefits.

- **Research Question (4):** *Is there sufficient justification for Canadian electrical utilities to externally register their EMS? Sub-question: Have registered EMSs resulted in any additional benefits to organizations?*

1. 2. 5 ISO 14001 Revision Process

ISO standards undergo a mandatory review every five years to establish if a revision is required to keep it current and relevant for the marketplace (ISO, 2017b). As discussed in Chapter one, ISO 14001:2004 was reviewed and a new version of the Standard was published in 2015 (ISO 14001:2015¹).

The revision process was coordinated by the ISO 14001:2015 International Working Group and included consultations with industries and the consideration of recommendations submitted by several international technical advisory committees (TACs). In order to better inform the revision process, the responsible committee (ISO/TC 207/SC 1) established an ad-hoc group to

¹Hereafter ISO 14001 will be referred to as ‘the Standard’, ISO14001:2004 will be referred to as ‘the old Standard’ and ISO 14001:2015 will be referred to as ‘the new Standard’.

administer a continual improvement survey (the survey). The survey was used to gain an understanding of ‘user’ perspectives in relation to EMS standards (ISO/TC 207/SC 1, 2013). Survey responses were submitted by several regions across the world (Figure 1). Respondents were classified as user organizations, non-user organizations and non-user individuals.

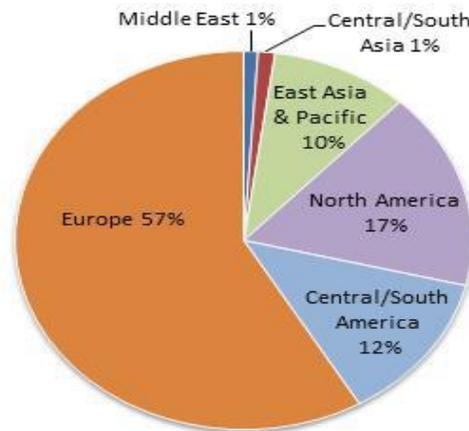


Figure 1: Region and Size of Organization of Survey Respondents (ISO/TC 207/SC 1, 2013)

The survey asked participants to identify the extent to which a revision of the Standard should strengthen attention to 19 future environmental management challenges identified in the ISO/TC 207/SC 1 *Future Challenges of EMS and ISO 14001 Report*. The future challenges identified in the Future Challenges Report included pollution prevention, eco-efficiency, life cycle thinking, precautionary approach, value chain, polluter pay approach, environmentally sound technologies and services, transparency, purchasing, product design, accountability, external communication strategy, stakeholder identification, product - services system, and marketing and sales.

Though more organizations are choosing to adopt ISO standards, ISO standards have garnered criticism because organizations have experienced difficulty when trying to adopt and integrate

multiple standards; this is due to both formatting and content differences between ISO's management system standards (MSSs). In response to this problem, ISO developed a new High Level Structure (HLS), referred to as Annex SL. Annex SL provides a generic framework for MSSs by identifying a common language and format, as well as definitions and headings, for all of ISO's MSSs. This framework should permit better integration of multiple ISO standards. The ISO 14001 revision followed the structure of Annex SL. Annex SL is discussed further in Chapter four.

A total of 3 iterations of the Standard were released for public review prior to its final publication in September 2015. ISO describes the 2015 version of the Standard as bringing the Standard into the 21st century with the focus being on continual improvement, alignment with other management systems standards, and consideration of the challenges identified in the *Future Challenges of EMS and ISO 14001 Report*.

- **Research Question (5):** *What are the significant differences between the old and new Standard?*

CHAPTER 2 - RESEARCH DEVELOPMENT

2.1 Research Problem

As discussed, in the last several years organizations have experienced significant pressure from governments, non-governmental organizations (NGOs), the financial sector and other private sector entities to adopt an EMS. This pressure has come from these three facts: governments have integrated EMS requirements into regulations; financial institutions have made EMS certification a part of the evaluation criteria for granting loans (Moretz, 2000); and organizations have required EMS adoption from their suppliers, subsidiaries and contractors. In continuing with this trend, Canadian electrical utilities must adopt an ISO 14001 compliant EMS in order to participate in the Canadian Electricity Association (CEA) Sustainable Electricity Program (CEA, 2017) and remain a member of the CEA².

As mentioned, organizations interested in transitioning to the new Standard have until September 2018 to become compliant. CEA members must therefore transition to the new Standard by September 2018 or risk losing their membership status and all the benefits that come with a CEA membership.

The new Standard contains both structural and fundamental changes. A preliminary review of existing literature found that due to the non-prescriptive nature of the Standard (as occurred with the old Standard), there are already inconsistencies in the interpretation of the fundamental changes. Organizations interested in maintaining their ISO 14001 EMS will first have to devote

² Hereafter, the collective term CEA Members will be used to refer to participants in the Canadian Electricity Association Sustainable Electricity Program.

resources to ensuring that their interpretation of the new Standard is correct. This may involve providing additional training for staff and/or hiring consultants to help with the interpretation and subsequent interpretation of the new Standard. The success of an organization's EMS has been attributed to whether or not the adopting organizations had a complete and correct understanding of the intent of the Standard prior to its implementation (Terziovski, Samson & Dow, 1996). This will provide a challenge for organizations that are interested in transitioning and specifically to those already working with limited resources (financial and human).

The challenges associated with transitioning from the old to the new Standard are compounded by the fact that due to the recentness of the new Standard, there is insufficient research published to date that addresses the implications of the changes on organizations who have adopted the Standard. Also, official guidance documents that accompanied the old Standard, such as the CSA's *ISO 14001 Essentials: A Practical Guide to Implementing the ISO 14000 Standards*, have not yet been published for the new Standard.

At the core of this research problem is the fact that the onus is on Canadian electrical utilities to transition to the new Standard prior to September 2018 in order to remain eligible for CEA membership. They will also need to ensure that they fully understand the intent and implications of the new Standard in order to have a successful transition that results in the implementation of a value-added EMS.

2.2 Research Goal

The goal of this research is to provide a comprehensive examination of the intent of the new Standard in order to develop a conformance strategy suitable for adoption by select Canadian electrical utilities. Specifically, the conformance strategy will provide environmental decision-makers employed by these organizations with a real-world, plain language application guide that can be used to assist with their transition process.

2.3 Research Objectives

This research is comprised of three primary objectives. Objectives are performed in sequential order as each objective is designed to inform the next.

Objective 1

Perform an examination of the following research questions:

1. What are the motivations for voluntary adoption of the Standard?
2. Does adoption of the Standard result in overall business and/or environmental performance improvements?
3. What are some of the recommended factors for the successful implementation of the Standard?
4. Is there sufficient justification for utilities to externally register their EMS?
Sub-question: Have registered EMSs resulted in any additional benefits to companies?
5. What are the significant differences between the old and new Standard?

Objective 2

Perform a gap analysis in order to define the current state of the EMS of select Canadian electrical utilities so that a comparison can be made between current EMS practices and the requirements in the new Standard (the target state).

Objective 3

Use the results from objectives 1 and 2 to develop a conformance strategy that can be used by select Canadian electrical utilities to successfully transition to the new Standard.

2.4 Research Scope

2.4.1 ISO 14001:2015 EMS Standard

This research does not look at the totality of the new Standard nor does it provide an itemized list of changes. Instead, it is focused on the significant changes included in the new Standard. A change is considered significant if it requires a fundamental change in the organizations' core business processes, employee culture, and/or identity as a corporate citizen.

2.4.2 Canadian Electrical Utilities

The organizations included in the scope of this research are all Canadian electrical utility providers ³with either a registered or self-declared ISO 14001:2004 compliant EMS who have all committed to transition to the new Standard. A total of seven utilities across Canada are included in the scope of this research. The 7 utilities are a representative sample of Canadian electrical utilities as they include utilities from 7 out of the 10 provinces. Six out of the 7 utilities are

³ Hereafter, the collective term utilities will be used to refer to all Canadian electrical utilities included in the scope of this research.

members of the CEA which represent 20 percent of the total CEA corporate utility membership. The 7 utilities also account for approximately 41 percent of the total installed electricity generation capacity in Canada (Natural Resources Canada, 2016).

CHAPTER 3 - CLIENTS AND IMPORTANCE

3. 1 Environmental Impacts Associated with Canadian Electrical Utilities

The Canadian electricity sector is comprised of a mix of different power generating technologies. Electrical generating technologies include coal, oil, natural gas, hydro, nuclear, wind, and biomass (Figure 2). While hydro power accounts for the largest source of electricity (59.3%) overall, it is not the main source of electricity for provinces such as Nova Scotia, Saskatchewan and Alberta, who attribute most of the electricity generation to coal. The generation mix across provinces is a function of the resources available in each province (Natural Resources Canada, 2016). The 7 utilities included in this research utilize all the sources of power identified in Figure 2, and are responsible for the generation, transmission and distribution of electricity.

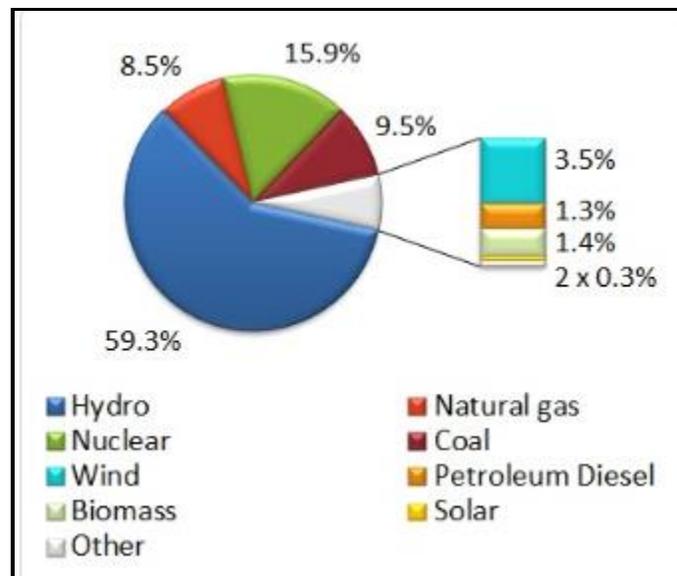


Figure 2. Canada's electricity generation mix, 2014 (Natural Resources Canada, 2016)

The electricity sector is known for casting a widespread and significant environmental footprint, as each type of electricity generating technology is responsible for varying degrees of environment impacts. The electricity sector is a very large contributor to nearly all adverse impacts related to air emissions. Impacts include smog, acid rain and global warming, which is caused by the high volumes of nitrogen oxide, sulphur dioxide and carbon dioxide that are emitted as a result of electricity generation (Environment and Climate Change Canada, 2013). Electricity generation is also responsible for a large percentage of mercury emissions in Canada. While some technologies such as hydro power are touted as "green" or "clean energy", the construction and operation of hydro dams and transmission and distribution lines also has a devastating effect on water, land and species.

3.2 Canadian Electricity Generation Dilemma

The ability to produce and access electricity contributes significantly to quality of life as well as economic performance measures such as gross domestic product (GDP). According to the National Energy Board (NEB) (2016), demand for energy grew by 1.3 % annually from 1990 to 2013 and they predict that there will be further 0.7% annual growth in demand from 2014 to 2040. Figure 3 provides an overview on the sectors that have contributed and will contribute to the growth in energy demand.

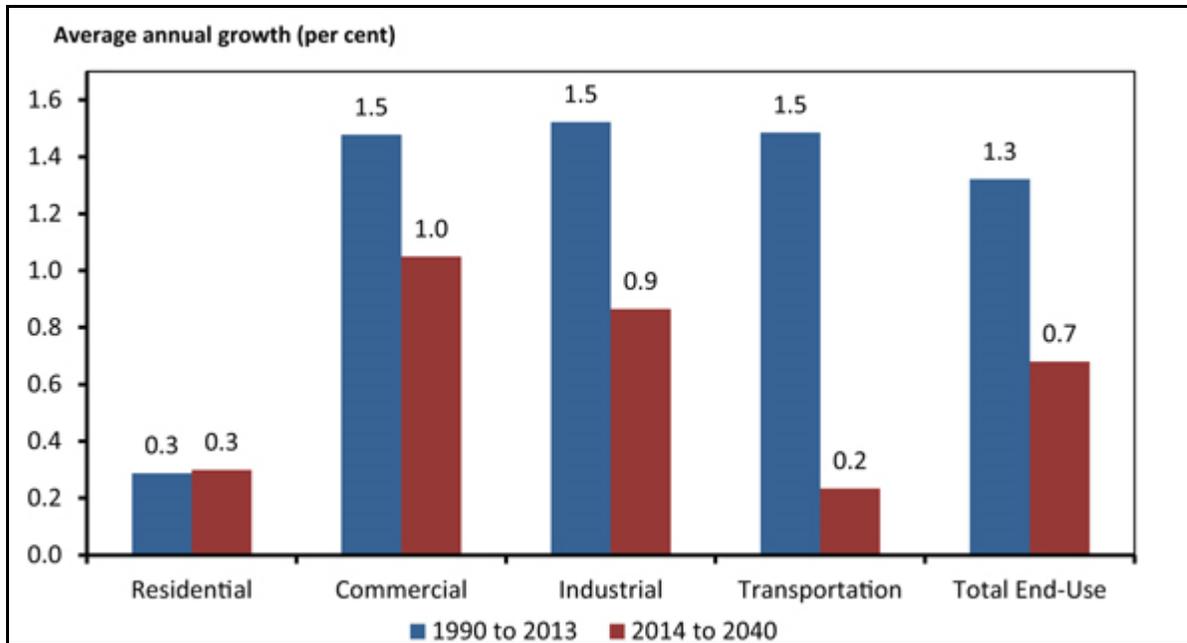


Figure 3. Historical and Projected Growth in End-Use Energy Demand by Sector (National Energy Board, 2016)

While Canadian utilities are tasked with the responsibility of meeting the growing demand for electricity, governments are imposing stricter environmental controls through legislation and signing onto international commitments such as the Kyoto Protocol and Paris Agreement. In response to these opposing demands, Canadian electrical utilities must find ways to continue to evolve and implement initiatives that will allow them to meet these new environmental objectives while providing an increased supply of reliable and reasonably priced electricity (CEA, 2005, p.15). Many organizations, including Canadian electrical utilities, view the adoption of an EMS as an important tool for being able to meet these demands.

CHAPTER 4 - RESEARCH METHOD

4.1 Structure of the Study

The presentation of this research is organized into seven chapters. The first chapter includes introductory and background information that provided context and justification for the research goal and objectives (preliminary phase). The introductory and background research included a global review of significant aspects associated with an EMS. Questions identified during this preliminary phase formed the basis of the research questions examined in Objective 1. The second chapter includes an overview of the research problem, goals and objectives. The third chapter includes an overview on the clients that this research is designed to assist and demonstrates how the research goals and objectives were designed to fit the needs of the clients. Chapter four summarizes the research methodology used. The fifth chapter includes a literature review that was used to examine the questions identified during the preliminary phase and identify the questions that formed the basis for the gap analysis. Chapter six provides a report on the gap analysis results, and Chapter seven incorporates the conclusions made during the literature review and the gap analysis results to present a conformance strategy. Chapter eight summarizes the results of the research objectives and also provides some overall closing remarks.

4.2 Research Design

This research is founded on an exploratory qualitative case study approach, where the ultimate objective is to develop an ISO 14001:2015 conformance strategy for utilities. This type of case study was selected because it can be used to explore situations in which the intervention being

evaluated has no clear, single set of outcomes (Yin, 2003). In addition, Geertz's notion of thick description was espoused as a method for searching out and explaining findings in order to develop a conformance strategy that considered the complexities of organizational life (Geertz, 1973). The use of thick description was appropriate as it was important to understand the context behind the culture of the operating environments of the utilities in order to develop a conformance strategy that would be meaningful and useful to them.

4.2.1 Research Steps

This research was conducted in four consecutive steps in fulfillment of the three primary research objectives:

Step One - Background Research

The first step involved an introduction to EMSs and included a global review of the ISO 14001 concepts and processes that are important for gaining an understanding of the intent of an EMS. It also included a review of historical and current factors that have impacted the direction and adoption of an EMS. The information collected during this step was used to identify questions that needed to be resolved in order to produce a conformance strategy that would be effective, practical, suitable, and flexible enough for consideration by multiple utilities.

Step Two - Literature Review

A literature review is a standard qualitative data collection technique. It was used to examine the following questions (identified during step 1) and provided an opportunity to gain an understanding of the broad context of an EMS in order to construct a well-supported theoretical

framework that could ultimately be used to develop a conformance strategy relevant to the utilities:

1. *What are the motivations for voluntary adoption of the Standard?*

This included a review of the desired results of adopting the Standard.

2. *Does adoption of the Standard result in overall business and/or environmental performance improvements?*

This included a review of performance results achieved by those who have adopted the Standard as well as an examination of the “schools of thought” that exist in the literature regarding the likelihood of achieving performance improvements.

3. *What are some of the recommended factors for the successful implementation of the Standard?*

This included a review of operational and cultural best practices implemented by organizations that have successfully implemented an ISO 14001 EMS, and overall lessons learnt by adopters of the Standard. Success is defined as deriving tangible net benefit(s).

4. *Is there sufficient justification for utilities to externally register their EMS?*

This included a comparison of performance between organizations that have externally registered their EMS and those who have not. It also includes a review of the existing “drivers” or “pressures” for external registration. Sub-question: *Have externally registered EMSs resulted in any additional benefits to organizations?*

5. *What are the significant differences between ISO 14001:2004 and ISO 14001:2015?*

This included a review of the structural and substantive difference between the new and old Standard. Each section of the new Standard was compared against the corresponding section(s) in the old Standard (i.e. side by side comparison).

A qualitative text analysis was then performed to identify themes in the “enhanced” and “new” changes, i.e., Significant Thematic Changes (STC). This method was selected because it provided the flexibility to synthesize and evaluate the changes according to the primary objectives of this research (De Joussineau, 2012). A detailed analysis of the requirements and intent of each emerging STC was then performed. The requirements identified were then used to develop the questions for the gap analysis.

Literature was sourced using databases such as ScienceDirect, Wiley Online Library and Google Scholar. Types of literature reviewed included peer reviewed scientific journals such as Environmental Management, Environmental Quality Management and Cleaner Production; official reports from government bodies; academic theses; ISO publications, books on EMSs; and mass/popular media reports. The search words were “Environmental Management Systems,” “ISO 14001,” “ISO 14001:2015,” “ISO 14001Implementation,” “ISO 14001 Barriers,” and “ISO 14001 Strategies.” There have been numerous studies performed about the ISO 14001 Standard; however, little research was found on the interpretation of the new Standard. Most of the literature on the interpretation of the new Standard was sourced from consulting companies that perform ISO 14001 audits such as the British Standards Institution (BSI),

PricewaterhouseCoopers (PwC) and SAI Global, or agencies responsible for quality standards such as the Chartered Quality Institute (CQI) and the Canadian Standards Association (CSA).

Step three - Gap Analysis

The third step involved conducting a gap analysis. The gap analysis was completed by one representative from each of the seven utilities. All representatives were extremely familiar with the concept of an EMS and are directly involved in the maintenance of the EMS within their utility. Participants were selected because of their attendance at an annual utility meeting where the focus is on environmental management. This meeting was selected as the best forum to conduct the gap analysis as prior knowledge of the status of the utilities EMS was important for completing the gap analysis; the utility representatives are senior staff members responsible for environmental initiatives within their utilities. The gap analysis methodology was developed using the data obtained from the literature review, specifically research question 5.

The use of a gap analysis was appropriate for this research as it is generally used to find the differences between actual performance and performance that is desired. In this case, the actual performance was the current state of the utilities' EMS and the desired performance was conformance with the new Standard (the target state) (Kewl Consulting, 2014).

Participants were provided with a gap analysis hand book (the handbook) to record their responses (See Appendix B). The hand book, which was developed by the author, consisted of thirty-three “yes” or “no” questions grouped under a STC heading. The handbook also included a corresponding document that provided clarification on the interpretation and the intent of each of the STCs (See Tables 5 - 12). This provided an immediate reference for those who were not

as familiar with the changes in the new Standard, and it also ensured that participants had a consistent understanding of what each question was asking. In an effort to promote openness in the responses provided, participants were told that results would be analyzed and presented as an overall consensus and pseudo-numbers (1-7) would be used in place of utilities when reporting individual findings. Responses to “yes” and “no” questions were quantitatively analyzed to provide a measure of the “degree of conformance”. The “degree of conformance” with each STC was derived by dividing the total number of “yes” (conformance) responses by the total number of questions related to that specific STC and multiplying by 100. A 100 percent “degree of conformance” rating means that their utility is in full conformance with the requirements under a particular STC. The STCs with the lowest percentages would be considered to have the biggest gaps in conformance.

To incorporate a qualitative factor into the gap analysis process, participants were asked to assign a rating to each STC that best reflects their confidence with their organization’s “degree of conformance” to the new requirements. This included an instinctive measure of the amount of effort required by their utility to achieve conformance with each STC. This measure was included to allow utilities to look beyond the questions being asked and to perform an overall assessment based on their perspective. This can also be referred to as a “gut check”. The confidence rating criteria is outlined in Table 1. A rating of 1 represents the lowest “confidence with degree of conformance”, while 5 represents the highest.

CONFIDENCE WITH DEGREE OF CONFORMANCE				
1	2	3	4	5
<ul style="list-style-type: none"> • Major non-conformance(s) (NC) are evident • No process exists 	<ul style="list-style-type: none"> • Chronic minor NCs • Systemic NCs • Process requires significant updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Potential NCs • Process requires moderate to minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is Probable • Process requires minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is evident • No updates to processes required

Table 1: Ratings Criteria used to Measure Confidence with Degree of Conformance

Finally, participants were asked to think about the questions they provided a "yes" response to (indicating conformance) and provide an example of a business process, products or services that demonstrated conformance with this new requirement outlined in the gap analysis questions.

Step four - Conformance Strategy Development

The fourth step involved synthesizing all that was learned in the previous three steps in order to develop a conformance strategy suitable and flexible enough for consideration by all the utilities.

The primary objective of the conformance strategy was to bridge the gap between ISO 14001 theory and real-world business practices by:

1. Identifying actions (in plain language) that need to be taken to address gaps in conformance.
2. Creating efficiencies by identifying existing business processes of other utilities that can be used to demonstrate conformance with new requirements.

3. Identifying business practices based on the author's experience and knowledge that can be used to demonstrate conformance with the new requirements.
4. Recommending a completion schedule suitable for meeting the September 2018 conformance deadline.

The conformance strategy included the following 3 components:

1. ISO 14001 Registration Decision Flow Chart
2. Conformance Guides
3. Transition Time-line

The conformance guides are presented in a table format for easy application at an operational level. The conformance guides identify:

- the utilities that need to take action to demonstrate conformance with a particular requirement;
- the action that must be taken in order to demonstrate conformance with a particular requirement;
- tips based on the authors experience and knowledge of the utility section that outline more detailed action that can be taken to demonstrate conformance with a particular requirement; and
- best practices and current initiatives used by utilities to demonstrate conformance.

4.2.2 Overview of Research Design

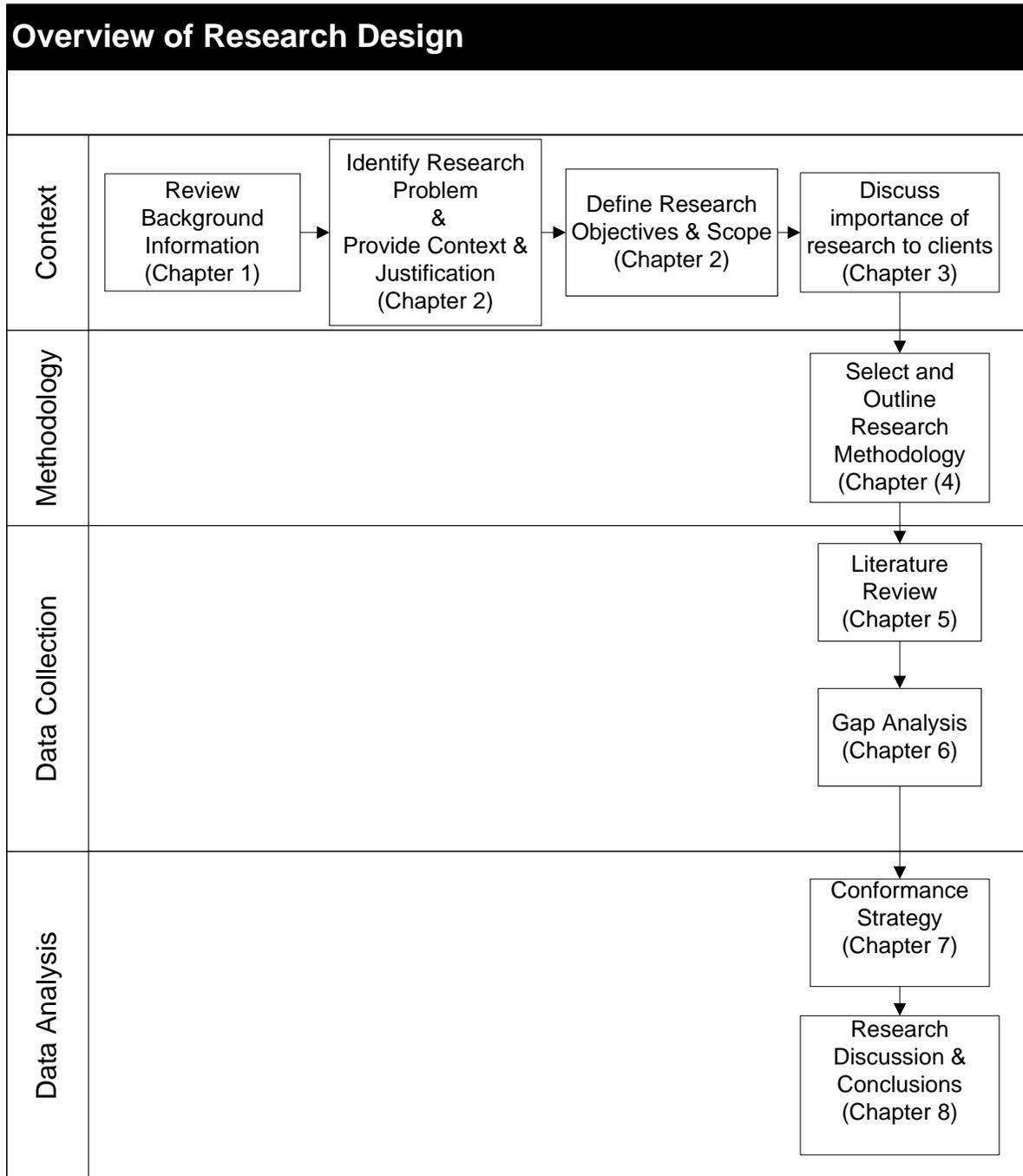


Figure 4. Overview of Research Design

CHAPTER 5 - LITERATURE REVIEW

The results of the literature review were used to develop the questions used during the gap analysis and introduced the theories that were applied during the development of the conformance strategy.

5.1 Research question (1): *What are the motivations for voluntary adoption of the Standard?*

This question is being examined to develop a conformance strategy that does not lose sight of the motivations behind an organization's decision to adopt an EMS. Motivations can be interpreted as the driving forces behind the initial decision of an organization to adopt an ISO 14001 EMS. This could include coercive motivator (i.e., pressures) from regulators, customers, suppliers or the cultural values that exist within an organization's operating environment (Powell & Dimaggio, 1991). In the case of the utilities, a significant external coercive motivator would be that in order to become and remain a member of the CEA, utilities must maintain an ISO 14001 compliant EMS.

However, motivations can also include the performance results organizations hope to achieve after EMS implementation. It is this perceived value of EMS implementation that is more pertinent to this research because based on the author's observations, an organization's EMS tends to be driven by the external coercive motivators and not by internal performance motivators. This misplaced focus has a tendency to result in an EMS of questionable value.

The question of internal motivating factors was also of interest to ISO, who thought they could improve the value derived by adopting the Standard if they understood the motivations for

Standard adoption. ISO surveyed its users to gain an understanding of the perceived value of implementing the Standard from both an environmental and business management perspective. The survey was distributed in 2013 in 11 different languages through national member bodies, and they received close to 5 000 responses from 110 countries. The survey asked participants to rate the value of the Standard for environmental and business management in their organizations. Environmental management benefits included improved legal compliance, environmental performance, management commitment, employee engagement, stakeholder satisfaction, communication with stakeholders, and supplier environmental performance. Business management benefits included improved compliance with stakeholder requirements, public image, ability to meet strategic objectives, integration with business management system(s), competitive advantage, and financial performance (ISO /TC 207/SC 1, 2013) (See Figures 5 & 6).

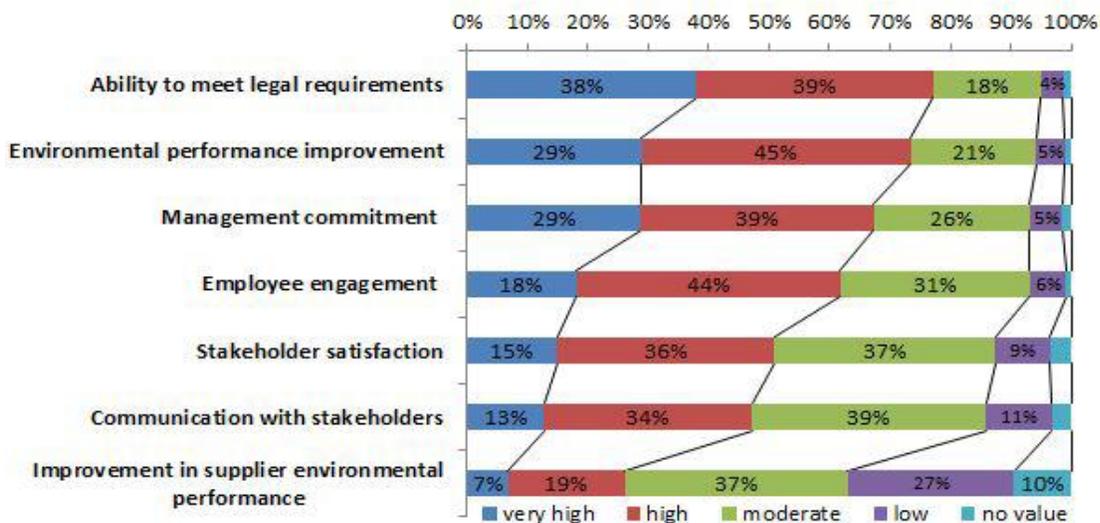


Figure 5. Value of ISO 14001 for Environmental Management (ISO/TC/207/SC 1, 2013)

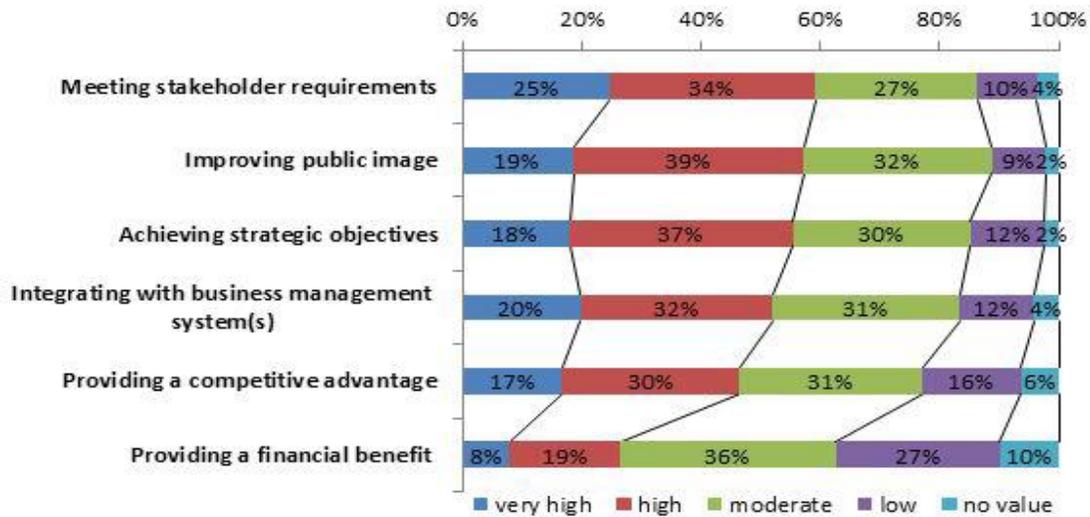


Figure 6. Value of ISO 14001 for Business Management (ISO/TC/207/SC 1, 2013)

The motivations for adopting the Standard have also been examined extensively from an academic standpoint, and the ISO survey results align with some of the findings made by academia. A number of studies point to overall business improvements related to human resources in terms of capacity building. Employee learning and acquisition of skills is thought to occur as a result of the requirement to disseminate environmental information to all facets of an organization and the regular surveillance of the EMS (Rondinelli and Vastag, 2000; Heras-Saizarbitoria & Landin, 2011; Guest and Teplitzky, 2010). Cascio (1994) claims that adoption of the Standard assists in the “harmonization and simplification of an organization’s environmental management practices by providing a coherent framework, which in turn reduces the need for multiple registrations, permits, and requirements under different national or local regulations”. Tung, Baird & Schoch (2014) also make the theoretical assertion that “at the most basic level, an EMS can assist organizations in developing their organizational goals so as to ensure compliance with environmental regulations”. In terms of environmental performance improvements, Wagner

(2008) asserts that the adoption of an EMS promotes environmental process innovations, which make an organization more likely to achieve their environmental targets at a reduced cost.

Several motivators for Standard adoption have been identified in the existing literature. It is important to consider these motivators when developing a conformance strategy because one of the mistakes that organizations make when implementing an EMS is they fail to systematically assess the potential benefits of the EMS (Hamschmidt & Dyllick, 2001). It is recommended that in addition to establishing objectives and targets related to monitoring and measuring environmental performance, utilities should establish overall EMS performance objectives that consider their initial motivators for Standard adoption.

5.2 Research question 2: Does adoption of the Standard result in overall business and/or environmental performance improvements?

The Standard has been accepted worldwide as a tool that can be used by organizations to improve environmental performance, prevent pollution, meet compliance obligations, and help organizations gain a competitive advantage. These results are achieved through the systematic identification and management of environmental aspects and impacts (Martins da Fonseca, 2015, p. 39). However, as the Standard increased in popularity, so did its critics who questioned the overall value of implementing the Standard, and more specifically, its claim of improved environmental and business performance.

Several empirical studies have been conducted on the relationship between EMS adoption and overall business and environmental performance. De Vries, Bauramoglu & Van der Wiele (2012)

reviewed 34 empirical studies on this topic; they found that 16 out of the 34 studies found a positive relationship between EMS adoption and the organizations' environmental performance. Additional studies such as Phan & Baird (2015) examined the environmental performance of various industries across Australia, including the utility industry. Their results suggest that there is the perception of improved environmental performance when organizations take a systematic and whole-hearted approach in developing a comprehensive EMS. Several other studies support the notion that an organization's environmental performance is positively affected by the presence of an EMS (Melnik et al 2002; Tung, Baird & Schoch 2014; Ann, Zailani & Wahid, 2006; Florida & Davidson, 2001; National Database on Environmental Management Systems (NDEMS), 2003).

On the other hand, there are also several studies that have concluded that the existence of an EMS has little to no effect on an organization's environmental performance (Darnall & Sides, 2008). Barla (2007) examined the effect of the Standard adoption on the environmental performance of Quebec's pulp and paper industry and found that overall, there was no significant difference in the environmental performance of those who had adopted the Standard when compared to those who had not. Hertin, Berkout, Wagner & Tyteca (2008) studied the environmental performance of European companies in five industrial sectors and found that environmental performance worsened after EMS implementation in 36% of companies and remained unchanged in 4%. The impact of EMS adoption on the Australian agricultural sector was also studied, and the findings suggested that the adoption of EMS practices would be unlikely to result in environmental improvements and the study recommended more effective policy options such as funding for land management practices (Cary & Roberts, 2011).

These results corroborate the findings of other studies that have concluded that based on the existing literature, results pertaining to the relationship between the Standard adoption and overall business and environmental performance are inconclusive (Amores- Salvado, Martin-de Castro & Navas - Lopez, 2015). Phan & Baird (2015) attribute these mixed and inconclusive findings to the way in which EMSs and environmental performance have been operationalized in prior studies.

Given the flexible and non-prescriptive nature of the Standard, and the variability in operating practices, cultural environments and environmental impacts of the organizations included in the different studies, it is not surprising that the results are inconclusive. However, it should be noted that findings also demonstrate that it is possible to achieve overall business and environmental performance benefits as a result of Standard adoption, which suggest that there are other variables that should be accounted for when studying the relationship between EMS adoption and performance. It also suggests that there is value in investigating the practices of the organizations that have experienced improvements.

5. 3 Research question 3: What are some of the recommended factors for the successful implementation of an ISO 14001 compliant EMS?

This question was identified in Chapter one during the background research as being important for identifying best practices that can be incorporated when developing the conformance strategy and for proactively identifying solutions to common errors made when implementing an EMS.

The conclusions made in Question two of this literature review also stress the importance of examining this question.

Now that the motivating factors have been identified, it is important for organizations to identify strategies for ensuring that they achieve the results that motivated them to adopt the Standard.

One way of doing this is to identify the best practices (variables) of organizations that have reported improvements in business and environmental performance following adoption of the Standard.

Internal Motivators

There are several studies that discuss the variables that have contributed to the improvements in performance after EMS adoption. Multiple studies have highlighted the critical role of internal motivators in the success of an EMS (Darnell, Gallagher, Richard, Andrews & Amaral, 2000; Zutshi & Sohal, 2004; Commission for Environmental Cooperation, 2005). Internal motivators can include management involvement and commitment and employee empowerment. Darnell et al., (2000) highlighted that the successful implementation of the EMS was only possible after gaining the full support of management; this support came after management became involved in the design of the EMS. The internal culture of an organization is usually directed by the tone at the top; the tone is set by the level of importance management designates to environmental matters. Setting a tone that environmental matters are important can be achieved by incorporating environmental performance into the corporate vision statement and the strategic goals of the organization; having management participate in the development and promulgation of corporate environmental goals; and making a senior manager responsible for the overall

management of environmental matters, thereby creating a high-level position that mid-level managers can work towards by demonstrating their commitment to the EMS. It also provides an opportunity to build coalitions between managers in an effort to give weight to environmental matters during the decision- making process (Camm, Drezner, Lachman & Resetar, 2001).

Employee Involvement

In addition to management involvement and commitment, employee awareness of environmental matters and involvement in the environmental decision-making process also plays a role in the success of the EMS (Boiral, 2007; Darnall et al., 2000; Melnyk et al., 2003; Morrow and Rondinelli, 2002; de Vries et al. 2012). As a result of the structure of the Standard, a large number of organizations has given responsibility for maintaining the EMS to either a single individual or to an “EMS team” (Balzarova & Castka, 2008; Boiral, 2007, p.138). For the most part, this tends to result in an EMS that is managed in isolation from all other business processes; that was not readily accepted by those not directly involved in its implementation; and that was not viewed as contributing to the value of the organization (Boiral, 2007; Darnall et al.,2000; Morrow & Rondinelli, 2002; Rondinelli & Vastag, 2000). The same research showed that when employees were provided with an opportunity to be part of the EMS design process, such as providing input in identifying the organization’s environmental aspects and impacts, they were better able to understand how the EMS helped in managing the risk of the organization and were able to see the value it provided to the organization. Direct involvement in designing EMS processes also allowed employees to gain a sense of ownership over the EMS and they were therefore more accepting and accommodating when asked to implement EMS processes.

Employee involvement can be encouraged through the use of cross functional committees and working groups (Balzarova & Castka, 2008; Oliveira & Pinheiro, 2008).

Integration of the EMS

The involvement of employees outside of the "EMS team" is linked to the idea of decentralizing environmental management by integrating it with core business processes. Efficiencies and synergies can be created by integrating the EMS with core business systems (Delmas, 2001) such as Financial, Health & Safety, Human Resources, Purchasing, and Information Technology. Oliveira & Pinheiro (2008) asserts that integration of the EMS with the Human Resources system can lead to the systematic identification of training requirements to promote environmental education; the improved recruitment and selection of qualified environmental professionals; and a performance management policy linked to employees by competencies focused on environmental management that creates incentives for improved environmental performance.

Coordination of External Pressures

Organizations were more likely to be dissatisfied with the results of their EMS when they translated external pressures such as new legislation or registrar audit recommendations in a manner meant to appease the external pressures instead of adding value to the organization (Balzarova & Castka, 2008). Additionally, Wade (2002) & Gotzamani (2005) acknowledges that this is a common mistake made when maintaining a management system and recommends that organizations expand their vision for the management system by looking beyond the compliance

paradigm. In these situations, the EMS can be described as being ritualistic and documentary as they only focus on maintaining their certification rather than improving organizational processes and performance (Boiral, 2007).

Avoidance of Unnecessary Administrative Burdens

As alluded to above, one of the symptoms of an EMS that is not designed with organizational processes and performance in mind is an EMS that requires maintenance of an unreasonable amount of paperwork. This results in the perception that an EMS is merely an administrative burden rather than an effective tool for managing environmental risk. Several studies have pointed out that this is another common mistake made by organizations that are focused on maintaining certification and by organizations that were too literal in their interpretation of the Standard (Hillary, 1999). Balzarova & Castka (2008) point out that one of the reasons for this is that non-conformances related to "document control" is the easiest for auditors to identify ("low hanging fruit"). They also identified that in most situations, the importance of these "document control" non-conformances was often marginal for organizational success.

Implementation of a Change Management Process

The shortcomings associated with an organization's inability to effectively translate new and/or changing requirements from external pressures such as auditors, regulators, and consumers can be linked to the lack of a change management process to deal with environmental matters.

Empirical studies have demonstrated that the level of effort put into change management processes was positively related to the perceived environmental performance of organizations (Ronnenberg, Graham & Mahmoodi, 2011). The development of a formal change management

process would allow organizations to respond thoughtfully to coercive and normative pressures, and it would allow them to develop a culture that anticipated change rather than succumbing to it (Phan & Baird, 2015; Khanna & Anton, 2002).

Use of Creativity and Innovation

The lack of a formal change management process brings attention to the fact that innovation has been highlighted in the research as being important for the success of an EMS. Khanna and Anton (2002) point out that firms that are more innovative as indicated by their Research & Development expenditures were more likely to find less costly solutions to environmental issues and tended to more readily adopt a comprehensive EMS. Amores-Salvado et al. (2015) asserts that the environmental and economic success of an EMS is dependent on the complementary relationship between an organization's environmental innovation capabilities and its EMS. Along the same vein, Camm et al. (2001) recognizes that "a successfully implemented EMS will motivate managers and other employees to approach environmental related decisions as creative and persistent change agents".

Ongoing Stakeholder Engagement

Additionally, the ability to establish long-term relationships with stakeholders such as neighbouring communities, environmental advocacy groups, potential investors, regulators, consumers and non-governmental organizations (NGOs) was identified as another variable that positively impacts the relationship between EMS implementation and the organization's performance (Phan & Baird, 2015; Delmas, 2001). Delmas (2001) asserts that the involvement of stakeholders in the design of a firm's EMS results in valuable organizational capabilities/learning and a "trust" in the effectiveness of the organizations' EMS on the part of the stakeholders. This

would allow the organization to gain a competitive advantage as competitors would be unable to mimic these results.

As environmental matters continue to be a staple in the media and more studies confirm the devastating effects of pollution on the environment, stakeholders are becoming more widespread and demanding that organizations be held accountable for their actions. In response to this demand, many regulators have made stakeholder consultations a requirement for large projects. While this is a positive initiative on the part of regulators, this approach is reactionary and can lead to feelings of resentment on the part of the stakeholders, as they believe they are being consulted as a result of the organizations being “forced” by regulators. This dynamic does not lead to the feeling of "trust" described by Delmas (2001). In order to achieve the organizational learning and "trust" that Delmas (2001) describes organizations need to be proactive in their stakeholder engagement strategies, and the engagement needs to be ongoing. Delmas and Toffel (2004) recommend that organizations engage in regular communication, consultation and collaboration with relevant stakeholders by hosting regular environmental forums and establishing advisory panels.

Conclusion

It is not a given that Standard adoption will result in any benefits, tangible or otherwise. The onus is on organizations to research and employ strategies that will assist them in obtaining value from their EMS. An examination of this research question demonstrates that there are a number of actions an organization can take to improve their chances of implementing an EMS that adds value to the organization. Actions include involving top management and employees (outside of the EMS team) involved in the design of the EMS; decentralizing the EMS by integrating with

other core business processes; translating external pressures in a manner that adds value to the organization; avoiding the trap of excessive and unnecessary document control procedures that add marginal value to the organization at best; establishing an official change management process for dealing with environmental and EMS matters; approaching environmental related decisions with creativity and innovation; and engaging stakeholders in a manner that establishes a sense of “trust”.

5. 4 Research question 4: *Is there sufficient justification for utilities to obtain third-party certification?*

As discussed in Chapter 1, ISO 14001 compliant organizations must perform conformity assessments. They can demonstrate this by: (1) Making a self - declaration or self-determination; (2) Conducting second - party audits; and (3) Conducting third-party audits. A growing number of organizations are choosing to perform third-party audits in order to obtain Registration. The organization performing the third-party audits that declares whether the EMS is compliant or not is referred to as a Registrar. Registrars must be accredited by the ISO member body in their country. Registration is a costly endeavour and is usually influenced by factors external to the organization such as demands made by regulatory bodies, financial institutions, suppliers, customers, parent companies and buyers. However, in light of the cost, it is becoming more evident that in the absence of coercive pressures, more and more organizations are choosing to incur the additional cost of Registration. The annual survey conducted by ISO reported that 319, 324 Registrations were issued in 2015 (ISO, 2015a).

In order to maintain their Registration, these 319, 324 organizations will have to update their EMS to conform to the new Standard. Due to the additional cost and resources required to maintain a Registration, some organizations that have voluntarily obtained Registration, may question its value. This includes the utilities that are part of the scope of this research, as there is currently no requirement for Canadian electrical utilities to obtain Registration. This question is included in this research as this has proven to be a difficult decision for utilities to make.

As more organizations are choosing to incur the high cost of Registration, there is a growing body of research that has examined whether this is money “well spent”. Melnyk et al (2003) distributed 5, 000 surveys to professional associations in America to study whether their organizations derived any tangible benefits from having a Registration. The study concluded that organizations that had gone through the Registration process experienced a greater impact on corporate performance than organizations that had not gone through the process. A number of empirical studies conducted at a facility level also reported improved environmental and operational performance as a result of Registration. This included reports on the Ford Motor Company and IBM (Wilson, 2001; Balta & Woodside, 1999; Morrow & Rondinelli, 2002). Morrow & Rondinelli (2002) conducted an in-depth case study of five German energy and gas organizations with Registrations, and while they reported significant improvements in other areas such as regulatory compliance and EMS awareness, only one out of five stated that they had experienced any improvements in actual environmental performance. King & Lenox (2001) studied 16, 782 American manufacturers and found that most of the organizations that had Registrations were already under great scrutiny; therefore, the results of Registration were negligible.

There are also several critics of the Registration process who assert that the main reason for obtaining Registration is to enhance the public image of the organization and perhaps gain a competitive advantage. However, even this position is called into question by Paulraj & Jong (2010), who studied the reaction of the US stock market immediately following 140 announcements of Registration. They reported that the announcements had a negative impact on stock performance, thereby reducing shareholder wealth. This calls into question the perception that Registration enhanced an organization's public image, as the studies show that the value associated with Registration by those external to an organization is not guaranteed to be favourable. Paulraj & Jong (2010) suggest that further public and stakeholder education on the value of Registration and overall environmental betterment efforts are required.

Another issue that calls into question the value of Registration is the credibility of the Registration process. It is alleged that the conformity assessment process is not "uniformly applied using consistent criteria" (ISO/TC 207/SC 1, 2013, p.9). The ISO TC 207/SC 1 Study Group (2013) also highlights the following flaws in the Registration process: (1) The processes for determining Registration audit quality, which includes evaluating the competency and impartiality of auditors and auditing protocols lacks rigor; (2) There is disparity in audit results as Registrars apply varying criteria to classify a nonconformity, an opportunity for improvement, or a recommendation; and (3) Some organizations have continued to be Registered while failing to report any improvement in environmental performance or while having known regulatory violations (p. 9). In addition to these flaws, there is also an inherent conflict of interest associated with the business relationship that exists between the Registrar and the Registered organization.

Namely, if the Registrars withdrew an organization's registration for failing to conform to the Standard, that Registrar would lose the income generated by that organization's Registration.

Also, while some of the existing literature points to improvements in performance, it does not point to the fact that these improvements are as a result of internal process improvements made by the organization, and not by the Registrars. The question becomes whether any of the improvements could or would have been made without the input of a Registrar or without their participation in the process.

The existing literature is inconclusive about whether organizations with Registrations perform better than organizations without Registrations, and there is also the issue of the credibility of the Registration process that needs to be addressed. It is therefore evident that the decision to obtain Registration is not straight forward, and an organization cannot assume that they will experience additional benefits as a direct result of Registration. The decision to obtain Registration must therefore be made on a case by case basis. This research provides a logical evaluation process that can be used to decide whether or not to continue with or obtain Registration as part of the conformance strategy.

5.5 Research question 5: What are the differences between ISO 14001:2004 and ISO 14001:2015?

5.5.1 Structural changes

ISO has published 21, 133 international standards and standard type documents to date; they cover a wide range of topics from quality and environment to information security and safety. Despite sharing common elements, these management system standards (MSS) were developed with different structures, which resulted in inconsistent understanding and inefficiencies when organizations tried to implement multiple MSSs. A new HLS referred to as Annex SL was developed to address these inconsistencies and streamline the integration of multiple MSS. The HLS provides an identical structure, a core text, and common terms and definitions that can be used as a framework to develop generic MSS (ISO, 2012).

Table 2 outlines the numbered sections of the HLS - the specific requirements of each MSS will be found within these sections.

Clause No.	Title
1	Scope
2	Normative References
3	Terms and Definitions
4	Context of the Organization
5	Leadership
6	Planning
7	Support
8	Operation
9	Performance Evaluation
10	Improvement

Table 2: Annex SL (ISO, 2012)

The 2015 revision of the Standard was written using Annex SL. Table 3 provides a structural comparison between ISO 14001:2015 and ISO 14001: 2004. A review of Table 3 provided a means to readily identify changes to the Standard.

ISO 14001: 2015		14001:2004	
Clause Title	Clause No.	Clause No.	Clause Title
Introduction			Introduction
Scope	1	1	Scope
Normative references	2	2	Normative references
Terms and definitions	3	3	Terms and definitions
Context of the organization (title only)	4		
		4	Environmental management system requirements (title only)
Understanding the organization and its context	4.1		
Understanding the needs and expectations of interested parties	4.2		
Determining the scope of the environmental management system	4.3	4.1	General requirements
Environmental management system	4.4	4.1	General requirements
Leadership (title only)	5		
Leadership and commitment	5.1		
Environmental policy	5.2	4.2	Environmental policy
Organizational roles, responsibilities and authorities	5.3	4.4.1	Resources, roles, responsibility and authority
Planning (title only)	6	4.3	
Actions to address risk and opportunities (title only)	6.1		
General	6.1.1		
Environmental aspects	6.1.2	4.3.1	Environmental aspects
Compliance obligations	6.1.3	4.3.2	Legal and other requirements
Planning action	6.1.4		
Environmental objectives and planning to achieve (title only)	6.2		
Environmental objectives	6.2.1	4.3.3	Objectives, targets and programme(s)
Planning actions to achieve environmental objectives	6.2.2		
Support (title only)	7	4.4	Implementation and operation (title only)
Resources (title only)	7.1	4.4.1	Resources, roles, responsibility and authority
Competence	7.2	4.4.2	Competence, training and awareness
Awareness	7.3		
Communication (title only)	7.4		
General	7.4.1	4.4.3	Communication
Internal communication	7.4.2		
External communication	7.4.3		
Documented information (title only)	7.5	4.4.4	Documentation
General	7.5.1		
Creating and updating	7.5.2	4.4.5	Control of documents

ISO 14001: 2015		14001:2004	
Clause Title	Clause No.	Clause No.	Clause Title
		4.5. 4	Control of records
Control of documented information	7.5.3	4.4.5	Control of documents
		4.5.4	Control of records
Operation (title only)	8	4.4	Implementation and operation (title only)
Operational planning and control	8.1	4.4.6	Operational control
Emergency preparedness and response	8.2	4.4.7	Emergency preparedness and response
Performance evaluation (title only)	9	4.5	Checking (title only)
Monitoring, measurement, analysis and evaluation (title only)	9.1	4.5.1	Monitoring and measurement
General	9.1.1		
Evaluation of compliance	9.1.2	4.5.2	Evaluation of compliance
Internal audit (title only)	9.2	4.5.5	Internal audit
General	9.2.1		
Internal audit programme	9.2.2		
Management review	9.3	4.6	Management review
Improvement (title only)	10		
General	10.1		
Nonconformity and corrective action	10.2	4.5.3	Nonconformity, corrective action and preventive action
Continual improvement	10.3		
Guidance on the use of this International Standard	Annex A	Annex A	Guidance on the use of this International Standard
Correspondence between ISO 14001:2015 and ISO 14001:2004	Annex B		
		Annex B	Correspondence between ISO 14001:2004 and ISO 9001:2008
Bibliography			Bibliography
Alphabetical index of terms			

Table 3: Correspondence between ISO 14001:2004 and ISO 14001:2015 (ISO 14001, 2015, p.32)

5.5.1.1 Relationship between PDCA and Annex SL

MSSs are based on the Plan-Do-Check-Act (PDCA) concept discussed in Chapter one. The PDCA approach provides an iterative process that can be used by organizations to achieve continual improvement (ISO 14001, 2015, p.vii). One of the noticeable differences in Annex SL was that the connection to the PDCA model was not as obvious as it was in the old Standard. ISO realized that the PDCA concept was integral to the EMS and was able to demonstrate that if

certain clauses in the new Standard are grouped accordingly, the PDCA concept still provides the basis for the new Standard (See Figure 7).

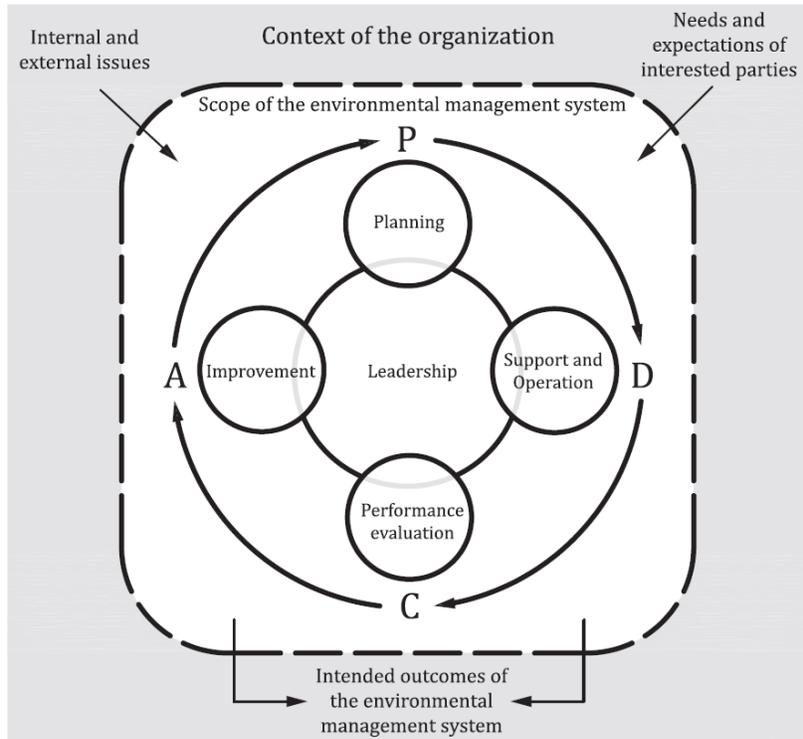


Figure 7: Relationship between PDCA and Annex SL

5.5.2 Clause by Clause Comparison of the Old and New Standard

This section identifies and discusses “new”, “enhanced” and “unchanged” requirements in the new Standard. The following key can be used to categorize the differences between the old and new Standard:

- **Green** - the requirement is “unchanged”. It is the same as it was in the old Standard.
- **Orange**- the requirement existed in the old Standard but has been "enhanced" in the new Standard.
- **Red** -the requirement is "new" as it did not exist in the old Standard.

1. **Clause 4: Context of the organization:**

ISO 14001:2004	ISO 14001:2015
	(4.1) Understanding the organization and its context
	(4.2) Understanding the needs and expectations of interested parties
4.1 General Requirements	(4.3) Determining the scope of the environmental management system
4.1 General Requirements	(4.4) Environmental Management System

This is a new clause. Organizations are now required to explicitly determine external and internal issues that are relevant to their purpose and that affect their ability to deliver the intended outcomes of their EMS. Issues that must be considered include the needs and expectations of interested parties and their compliance obligations. The intent is to provide a “high-level conceptual understanding of the important issues that can affect, either positively or negatively, the way the organization manages its environmental responsibilities” (ISO 14001, 2015, p.20). The key to the successful implementation of this clause is to ensure there is an understanding of the context in which the term “issues” is used and how it applies to the organization; who or what constitutes an interested party; and what the sources are of compliance obligations.

The term issues is used in a broad sense. BSI (2015) makes an interesting connection between issues and the old Standard’s concept of preventive action. BSI asserts that an examination of “issues” should go beyond those that would have previously been the subject of “preventive action”. Furthermore, Annex A in the new Standard provides the following examples of “issues”:

- a) Environmental conditions related to climate, air quality, water quality, land use, existing contamination, natural resource availability, and biodiversity
- b) External cultural, social, political, legal, regulatory, financial, technological, economic, and competitive circumstances
- c) Internal characteristics or conditions of the organization such as its activities, products and services, strategic direction, culture, and capabilities (ISO 14001, 2015, p. 20)

The consideration of "interested parties" has been enhanced in the new Standard. The definition of an "interested party" has been expanded; it is now defined as a person or organization that can affect, be affected by, or perceive itself to be affected by the organization's decisions or activities; therefore, all that is required is the perception of being affected. Examples of interested parties include customers, communities, suppliers, regulators, NGOs, investors, and employees (ISO 14001, 2015, p.20). After all relevant "interested parties" have been identified, the organization is required to go a step further and determine the relevant expressed "needs and expectations" of their "interested parties".

"Needs and expectations" that an organization is required to meet include those that have been incorporated into regulations and those that it voluntarily chooses to comply with; these now become part of the organization's compliance obligations. Consideration of these "needs and expectations", "compliance obligations" and "environmental conditions" provides input to the development of the "context of the organization", which becomes the foundation for building the EMS.

The requirement to determine the scope of the EMS is not new; however, when determining the scope, organizations must now consider the “context of the organization” in combination with other factors such as their organizational structure and functions; physical boundaries; and activities, products, and services. The scope must also be made available to interested parties if the organization asserts that it is in conformance with the Standard. The intent of the scope of the EMS is to define the physical and organizational boundaries to which the environmental management system applies (ISO 14001, 2015, p. 21).

The new Standard gives an organization the freedom and flexibility to define its EMS boundaries. However, there are two important questions that an organization should ask itself when defining its EMS boundaries: 1) whether its authority and ability to control or influence extends to the areas being considered and 2) whether the defined boundaries call into question the credibility of the entire EMS by being too limited.

2. **Clause 5: Leadership**

ISO 14001:2004	ISO 14001:2015
	(5) Leadership
	(5.1) Leadership and commitment
(4.2) Environmental policy	(5.2) Environmental policy
(4.4.1) Resources, roles, responsibility and authority	(5.3) Organizational roles, responsibilities and authorities

The revision of ISO 14001 aims to integrate the organization’s EMS into the core organizational strategy (Cooper, 2015). One of the approaches ISO has taken to achieve this objective is to enhance the involvement of top management. References to top management responsibilities were sparse and scattered throughout various sections in the old Standard. This is a new clause

that outlines specific responsibilities that top management should be either personally involved in or direct. The option to be personally involved or to direct means that top management is able to delegate responsibility for actions associated with fulfilling these requirements; however, accountability for achieving the desired results is retained by top management (ISO 14001, 2015, p.21).

New leadership responsibilities include: a) taking accountability for the effectiveness of the EMS; b) ensuring that the environmental policy and environmental objectives are established and are compatible with the strategic direction and the context of the organization; c) ensuring the integration of the EMS requirements into the organization's business processes; d) ensuring that the resources needed for the EMS are available; e) communicating the importance of effective environmental management and of conforming to the EMS requirements; f) ensuring that the EMS achieves its intended outcomes; g) directing and supporting persons to contribute to the effectiveness of the EMS; h) promoting continual improvement; and i) supporting other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility (ISO 14001:2015, p.7).

The intent of this clause is for top management to demonstrate proactive leadership and commitment with respect to the EMS, which should ultimately result in an EMS that is more integrated into business processes and is factored into strategic level planning.

3. Clause 6: Planning

ISO 14001:2004	ISO 14001:2015
	(6) Planning (title only)
	(6.1) Actions to address risk and opportunities (title only)
	(6.1.1) General
(4.3.1) Environmental aspects	(6.1.2) Environmental aspects
(4.3.2) Legal and other requirements	(6.1.3) Compliance obligations
	(6.1.4) Planning action
(4.3.3) Objectives, targets and program(s)	(6.2) Environmental objectives and planning to achieve (title only)
	(6.2.1) Environmental objectives
	(6.2.2) Planning actions to achieve environmental objectives

This clause covers specific factors that should be incorporated in the planning process for the EMS to achieve its intended outcomes to continually improve and prevent external factors from negatively impacting the performance of the organization. It is evident in this clause that the new Standard is asking for a more risk-based approach to be incorporated when planning the objectives of the EMS.

Actions to address risk and opportunities (6.1): This is a new sub-clause. Consideration of “risk and opportunities” is viewed by the new Standard as critical for creating an EMS that achieves its intended outcomes and at the same time is considered robust, reliable and credible (ISO 14001, 2015, p.22). The expectation is that the identified “risks and opportunities” should be used for planning actions to establish environmental objectives and to control those aspects of operations that can result in adverse environmental impacts and other undesired effects (ISO 14004, 2016, p.21). The new Standard defines “risks and opportunities” as adverse effects

(threats) and potential beneficial effects (opportunities) (ISO 14001, 2015, p.4). Sources of “risk and opportunities” include the “context of the organization”, i.e. the needs and expectations of interested parties, compliance obligations, environmental conditions, environmental aspects, and other external and internal “issues” that can have an impact on the EMS. This clause also explicitly requires that the organization identify potential emergency situations that can have an impact on the environment.

Environmental Aspects (6.1.2): The concept of environmental aspects existed in the old Standard. Organizations are required to determine the environmental aspects of their activities, products and services that they can control and/or influence, and the related environmental impacts (ISO 14001, 2015, p 9). This is not a new requirement; however, the requirement is enhanced as the new Standard requires that this determination be made using a “life cycle” perspective. “Life cycle” stages that can be considered include acquisition, design, production, transportation/delivery, use, end-of-life treatment, and final disposal of an organization’s products or services (ISO 14004, 2016, p.24). In determining environmental aspects, planned future changes, abnormal operating conditions, and emergency situations that are reasonable for an organization to predict must be taken into account (ISO 14001, 2015, p.9). Organizations are still required to determine which of these aspects have or can have a significant environmental impact, using established criteria. The determination of significant environmental aspects is another component of the Standard that calls for risk-based thinking. More often than not, it is simply not feasible for organizations to apply the same level of effort in addressing every environmental aspect; determining significant environmental aspects allows organizations to

identify their greatest risk areas in order to determine where control or improvement is needed and to set priorities for management action (ISO 14004, 2016, p23; ISO 14004, 2016, p.23).

Compliance Obligations (6.1.3): The identification and documentation of compliance obligations is not a new requirement; in the old Standard, compliance obligations were referred to as legal and other requirements. Organizations should be aware that this clause has been enhanced, and they must now go beyond simply identifying compliance organizations. Organizations must now establish a process for ensuring access to and communicating compliance obligations associated with environmental aspects to the relevant functions within and external to the organization. Compliance obligations can result from government bodies, regulatory agencies, industry associations, and contracts and agreements. Organizations are also responsible for maintaining a process to identify and account for new or changing compliance obligations (ISO 14001, 2015, p 9).

Planning Action (6.1.4): The requirement to plan to take action to meet the intended outcomes of the EMS has been enhanced. It has been expanded to include planning for new concepts. In this sub-clause, the new Standard requires that organizations plan to take actions to address all the factors that have been previously discussed, which includes its risks and opportunities, environmental aspects, and compliance obligations. These actions should be integrated into the organization's EMS and associated business processes. Planning actions should be appropriate to the nature and scale of the risk factor that is being addressed and should consider technological options and feasibilities, and the organizations' financial, operational and business requirements. Planning actions can include establishing an environmental objective, developing a procedure or new policy, developing a new training program, or implementing new IT controls (ISO 14001,

2014, p. 10 & 25). The planning process will be an ongoing endeavour throughout the life of the EMS as an organization must continually account for changing circumstances and assess the effectiveness of the planning actions selected. Corrective action must be taken to address any planning actions that did not achieve their intended results.

Environmental Objectives (6.2): The requirement to establish environmental objectives was also part of the old Standard. However, when establishing environmental objectives, in addition to considering the environmental policy, significant environmental aspects, and compliance obligations, organizations must also consider the elements identified when developing the context of the organization (clause 4) and the risk and opportunities (clause 6). Annex A in the new Standard reminds organizations about the role of top management in establishing environmental objectives. As discussed in Clause 5, top management bears accountability for establishing environmental objectives that are compatible with the strategic direction and the context of the organization. Annex A in the new Standard also provides some insight on establishing environmental objectives at relevant functions and levels within the organization, i.e., they can be established at the strategic, tactical and operational levels. The established environmental objectives should also be measurable if practicable (ISO 14001, 2015, p. 26).

While the use of the term “if practicable” acknowledges that it may not always be feasible to measure an environmental objective, this does not take away from the need to monitor all environmental objectives to determine whether or not an organization has been successful in achieving its environmental objectives. This means that organizations will have to establish indicators that can be used to assess the success of their environmental objectives. In an effort to

support the achievement of the environmental objectives, the organization must outline a plan for their achievement. This plan should include reference to what steps will be taken; what resources will be required; who will be responsible, and when it will be completed. These planning steps are equivalent to the environmental program requirements in sub-clause 4.3.3 of the old Standard. Additionally, organizations are now required to communicate their environmental objectives to persons within their control or influence that have the ability to affect the achievement of the environmental objectives (ISO 14001, 2015, p. 10).

4. **Clause 7: Support**

ISO 14001:2004	ISO 14001:2015
(4.4) Implementation and operation (title only)	(7) Support (title only)
(4.4.1) Resources, roles, responsibility and authority	(7.1) Resources (title only)
(4.4.2) Competence, training and awareness	(7.2) Competence
	(7.3) Awareness
(4.4.3) Communication	(7.4) Communication (title only)
	(7.4.1) General
	(7.4.2) Internal communication
(7.5) Documentation	(7.4.3) External communication
	(7.5) Documented information (title only)
	(7.5.1) General
(4.4.5) Control of documents	(7.5.2) Creating and updating
(4.5.4) Control of records	
(4.4.5) Control of documents	(7.5.3) Control of documented information
(4.5.4) Control of records	

Competence (7.2): While most of the requirements in this clause are not new, the concept of competence has been revised and expanded. The new Standard places more emphasis on ensuring that person(s) performing work under the organization’s control are competent as opposed to trained. The new Standard recognizes that competence is a broader term and a trained

worker does not necessarily translate to a competent employee. The CQI (2015) points out that in the new Standard, competence needs to be considered in terms of a person's ability to "impact the organization's environmental performance" as opposed to the narrower concept in the old Standard which was, "its ability to cause significant environmental impacts."

Awareness (7.3): The concept of "awareness" is not new; however, it has been enhanced in the new Standard. There is now an explicit requirement to make persons performing work under the organization's control aware of a number of elements that can affect the performance of the EMS. This requirement includes the organization's environmental policy; the environmental impacts associated with their work; and the implications of not conforming to EMS requirements and not fulfilling the organization's compliance obligations.

It is important to note the use of the term people performing work "under its control" in sub-clauses 7.2 and 7.3. The use of this term requires that in addition to the organization's employees, organizations must also incorporate contractors and workers performing outsourced functions when identifying competency and awareness requirements (ISO 14001, 2015, p. 11).

Communication (7.4): The requirement to communicate information relating to an organization's EMS is not new; however, it has been enhanced. Organizations are now required to establish an explicit strategy for both internal and external communication. This strategy needs to include information related to what, when, with whom, and how it will communicate. When developing this strategy, organizations must take their compliance obligations into account and ensure that the information provided is credible. The strategy must ensure that communication remains a two-way process, in and out of the organization (ISO 14001, 2015, p. 11, 12 & 27).

Documented information (7.5): The term “documented information” is used several times throughout the new Standard; it is now used more broadly and is meant to replace the terms “documentation” and “records” used in the old Standard. The new Standard addresses the administrative burden felt by organizations as a result of the extensive documentation requirements in the old Standard by giving them more control to determine the extent of documentation needed to demonstrate that their EMS is suitable, adequate and effective (14001Academy, 2016, p.15). The extent of documented information that an organization requires will vary depending on the size, sector and complexity of the organization (ISO 14001, 2015, p12). However, while there is greater flexibility, the new Standard still requires that specific documented information be maintained; Table 4 identifies the required documented information. “Organizations may choose to maintain additional documented information for purposes of transparency, accountability, continuity, consistency, training, or ease in auditing” (ISO 14001, 2015, p.27). Another noteworthy change is that documented information required by the new Standard and required by an organization's EMS can be integrated with other management systems; this information no longer needs to be in the form of a dedicated manual (ISO 14001, 2015, p.27).

Documented Information	ISO 14001:2015 Clause
Scope of the Environmental Management System	4.3
Environmental Policy	5.2
Risks and Opportunities that Need to be Addressed	6.1.1
Procedure for Identification and Evaluation of Environmental Aspects (including criteria for determining the significance)	6.1.2
Compliance Obligations Record	6.1.3
Environmental Objectives and Plans for Achieving Them	6.2.1
Competence Records	7.2
Evidence of Communication	7.4
Operational Control Procedures	8.1
Procedure for Emergency Preparedness and Response	8.2
Monitoring Performance Information 9.1.1	9.1.1
Calibration Records for Monitoring & Measurement Equipment	9.1.1
Internal Audit Program and Results	9.2.2
Management Review Results	9.3
Nonconformities and Corrective Action	10.2

Table 4. List of Documented Information Required by the New Standard
(ISO14001 Academy, 2016, p. 2 & 3)

5. **Clause 8: Operation:**

ISO 14001:2004	ISO 14001:2015
(4.4) Implementation and operation (title only)	(8) Operation (title only)
(4.4.6) Operational control	(8.1) Operational planning and control
(4.6.7) Emergency preparedness and response	(8.2) Emergency preparedness and response

(8.1) Operational planning and control: This clause requires organizations to plan, implement and control those processes that it has previously identified as necessary in order to, “meet the commitments of its environmental policy, achieve its environmental objectives, and manage its significant environmental aspects, compliance obligations and risks and opportunities” (ISO 14004, 2016, p. 39). The requirement to assess an organization’s activities and determine the operational controls needed in order to mitigate any adverse impacts associated with these activities is not new; however, the new Standard expands this requirement. Organizations must now increase the scope of this assessment and determine controls necessary to mitigate any adverse impacts associated with planned changes, outsourced processes, and the life cycle of its goods and services (ISO 14001, 2015, 28)

Emergency preparedness and response (8.2): The requirement to establish, implement and maintain processes to prepare for emergency situations is not new; however, this sub-clause is more prescriptive in terms of identifying required actions for emergency preparedness planning. It also incorporates the need to account for the potential emergency situations identified when determining its “risk and opportunities” (sub-clause 6.1.1). There is now also an explicit requirement to provide relevant information and training related to emergency preparedness and

response to relevant interested parties, including persons working under its control (ISO 14001, 2015, p. 14).

6. Clause 9: Performance Evaluation

ISO 14001:2004	ISO 14001:2015
(4.5) Checking (title only)	(9) Performance evaluation (title only)
(4.5.1) Monitoring and measurement	(9.1) Monitoring, measurement, analysis and evaluation (title only)
	(9.1.1) General
(4.5.2) Evaluation of compliance	(9.1.2) Evaluation of compliance
(4.5.5) Internal audit	(9.2) Internal audit (title only)
	(9.2.1) General
	(9.2.2) Internal audit programme
(4.6) Management review	(9.3) Management review

Monitoring, measurement, analysis and evaluation (9.1): The requirement to monitor and measure the performance of the EMS is not new; however, it has been enhanced. This clause requires an organization to establish a “systematic approach for monitoring, measuring, analyzing and evaluating its environmental performance on a regular basis” (ISO 14004, 2016, p. 42). When determining what needs to be monitored and measured, an organization should take its environmental objectives, significant environmental aspects, compliance obligations and operational controls into account. “The results of monitoring and measurement have to be reliable, reproducible and traceable, in order to generate a consistent set of data that can be analyzed, in order to permit the evaluation of conformance with pre-established requirements” (CQI, 2015, p. 28)

Evaluation of compliance (9.1.2): The need to perform compliance evaluations is not a new requirement; however, it has been enhanced. Organizations must now determine the frequency of their compliance evaluations, and at some point, they must evaluate compliance with all of their compliance obligations. The new Standard allows for variations in the frequency of the compliance evaluations “depending on the importance of the requirement, variations in operating conditions, changes in compliance obligations and the organization’s past performance (ISO 14001, 2015, p. 30).

Internal audit (9.2): Procedural requirements for internal audits are relatively unchanged in the new Standard; yet, there are two noteworthy revisions: 1) In the old Standard, the objective of internal audits was to determine whether the EMS is conforming to requirements, and it is effectively implemented and maintained. In the new Standard, the objective of an internal audit is to provide information needed for others to make this determination; and 2) Internal audit results should be communicated to ‘relevant management’ not ‘management’ (QCI, 2015, p.30). This means that audit results should be communicated to those who are best able to address audit findings.

Management review (9.3): The requirement to perform a management review is not new; however, the new Standard requires organizations to perform a more comprehensive management review. Top management should be more involved in the management review process as there needs to be more decision making and analysis of key performance areas during management review. For example, decisions regarding opportunities to integrate the EMS with other business processes, implications for the strategic direction of the organization, and the need for changes in resources must be made during management review (ISO 14001, 2015, p. 15).

7. Clause 10: Improvement

ISO 14001:2004	ISO 14001:2015
	(10) Improvement (title only)
	(10.1) General
(4.5.3) Nonconformity, corrective action and preventive action	(10.2) Nonconformity and corrective action
	(10.3) Continual improvement

The key concepts identified in this clause are not new; however, in the new Standard the requirements are more explicit. This clause emphasizes a shift from focusing efforts on improvement of the EMS to improving environmental performance. In order to demonstrate continual improvement of their environmental performance, organizations must proactively identify opportunities for improvement.

While the term “preventive action” has been removed, the concept remains implicitly embedded in more detailed “corrective action” requirements (BSI, 2015 p. 8). BSI (2015) also provides the following holistic summary of the intent of the changes included in this clause: “organizations must now extend the concept of continual improvement to ensure that the suitability and adequacy of the EMS as well as its effectiveness are considered in the light of enhanced environmental performance”. This refers to the fact that organizations need to work towards improving environmental performance in addition to EMS performance.

Annex A of the new Standard recommended that organizations interpret the Standard from a holistic or systems perspective rather than interpret each clause of the new Standard in isolation from the other clauses because of the interrelationships that exist between them. These interrelationships were evident upon completion of the literature review and themes related to

changes emerged. The objective of this research calls for the focus to be on significant changes; therefore, only the significant thematic changes (STCs) were examined in more details. The STCs are as follows:

1. Context of the Organization
2. The Role of Top Management
3. Life Cycle Perspective and Outsourced Processes
4. Risk and Opportunities
5. Environmental Performance Monitoring and Evaluation
6. Evaluation of Compliance
7. Strategic and Integrated Environmental Management
8. Communication

6.1 Assessment of Significant Thematic Changes

Further examination of the eight STCs was required in order to better understand the details and intent of the requirements. A more detailed examination was also required in order to present each STC using a systems approach as opposed to clause by clause approach.

The examination of each STC is presented in a table format in order to provide a practical application of the information at the operational level. The format selected allows the utilities to use this information as a reference and training guide, and it also allows them to focus on the significant changes using a more holistic systems approach. The requirements identified in Tables 5 -12 were sourced from ISO 14001, 2015.

1. STC 1: Context of the Organization

Requirements

4. Context of the Organization

4.1 Understanding the organization and its context

- Determine external and internal issues that are:
 - ✓ Relevant to purpose
 - ✓ Influential in achieving the intended outcome of EMS

4. Context of the Organization

4.2 Understanding needs and expectations of interested parties (IPs)

- Determine:
 - ✓ What interested parties are relevant to EMS
 - ✓ Which relevant needs and expectations exist for the interested parties
 - ✓ Which of these needs and expectations become compliance obligations

Intent

- The intent is to provide a high-level understanding of important issues that can positively and negatively affect the way the organization manages environmental responsibilities. The context of the organization must be understood on a strategic level, and the relevant needs and expectations of interested parties must also be understood in order to establish the scope of the EMS (Petursson, 2013). This clause is linked to Clause 6 as issues identified can result in risks and opportunities.
 - Two step filtering process: 1. Determine relevant interested parties; and 2. Determine needs and expectations relevant to the EMS.
 - Organizations are not required to proactively obtain needs and expectations. However, interested parties must be afforded the opportunity to disclose their needs and expectations.
 - Organizations must now consider issues previously viewed as outside the scope of the EMS:
 - ✓ Environmental conditions that can affect purpose (drought predictions)
 - ✓ External socioeconomic (currency devaluation)
 - ✓ Changing regulations (climate change)
 - ✓ Changing circumstances (increased construction)
 - Organizations must think about the environment's impact on them in addition to the impact they have on the environment.

Table 5. Requirements and Intent of STC: Context of the Organization

2. STC 2: The Role of Top Management

Requirements
5 Leadership
5.1 Leadership and commitment
<ul style="list-style-type: none">• Top management shall demonstrate leadership and commitment by:<ul style="list-style-type: none">✓ Taking accountability for effectiveness of the EMS✓ Ensuring policy and objectives compatible with strategy and context are established✓ Ensuring EMS is integrated with core business processes✓ Ensuring resources are provided✓ Communicating the importance of EMS / performance✓ Ensuring the EMS meets intended outcomes✓ Directing and supporting people to help the EMS be effective✓ Promoting continual improvement✓ Supporting other management roles
Intent
<ul style="list-style-type: none">• The intent is for the organization's leadership to promote environmental management within the organization. The EMS should be linked to the strategic direction of the organization and not held at arm's length by leadership (PwC, 2015). Top management should demonstrate an understanding of the "context" in which the organization operates (issues identified in Clause four). Top management should also promote the integration of the EMS with other business processes (ISO 14004, 2016).○ Increased accountability of leadership. Top management should be either personally involved or provide direction. Responsibilities can be delegated but top management retains accountability.

Table 6. Requirements and Intent of STC: The Role of Top Management

3. STC 3: Life Cycle Perspective and Outsourced Processes

Requirements

Planning

6.1 Actions to address risk and opportunities

6.1.2 Environmental Aspects

- The organization shall determine:
 - ✓ Environmental aspects of its activities, products and services that it can control and influence
 - ✓ Environmental impacts, considering a life-cycle perspective

8 Operation

8.1 Operational planning and control

- The organization shall ensure outsourced processes are controlled or influenced
- Consistent with a life-cycle perspective, the organization shall establish controls to ensure environmental requirements are addressed in the design, development and procurement processes (where appropriate)

Intent

- The intent is for organizations to extend their control and influence and consider the life cycle stages of its activities, products and services, including their outsourced processes when designing its EMS.
 - A detailed life cycle analysis is not required.
 - It is up to the organization to determine the extent of control it has or wishes to take.
 - An outsourced process is included if it is within the scope of the EMS; is integral to the organizations functioning, is required to achieve the intended outcome of the EMS, places liability for conforming on the organization, or is perceived as being carried out by the organization.
 - The type and extent of control shall be defined within the EMS and will depend on the risk and opportunities, environmental aspects and compliance obligations, and will depend on the competence of the provider, the significant environmental activities, and the potential to disrupt the organization's ability to meet intended outcomes of the EMS.
 - Life cycle stages can include raw material acquisition, design, production, transportation, use, end of life treatment, and disposal.

Table 7. Examination of STC: Life Cycle Perspective and Outsourced Processes

4. STC 4: Risk and Opportunities

Requirements

6 Planning

6.1 Actions to address risk and opportunities

6.1.1 General

- Have processes for determining risks and opportunities that need to be addressed related to:
 - ✓ Context
 - ✓ Need and expectations of interested parties
 - ✓ Scope, including potential emergency situations
 - ✓ Environmental aspects
 - ✓ Compliance obligations
 - ✓ Environmental conditions

Intent

- The intent is to proactively identify risks that threaten the intended outcome of the EMS and can cause negative environmental impacts. Opportunities that can be leveraged to provide a beneficial effect should also be considered. The intent is to plan to ensure the organization is able to achieve intended outcomes of its EMS, to prevent/reduce undesired effects, and to achieve continual improvement.
 - Sources of risks include compliance obligations and issues as well as those arising from the organizations general context.
 - Risks and opportunities provide inputs to planning actions and objectives.

Table 8. Requirements and Intent of STC: Risk and Opportunities

5. Environmental Performance Monitoring and Evaluation

Requirements		
Planning 6.2 Environmental objectives and planning to achieve them 6.2.1 Environmental objectives	6 Planning 6.2 Environmental objectives and planning to achieve them 6.2.2 Planning actions to achieve environmental objectives	9 Performance Evaluation 9.1 Monitoring, measurement, analysis and evaluation 9.3 Management review
<ul style="list-style-type: none"> • Establish objectives at relevant functions and levels taking into account SEAs, compliance obligations and risks and opportunities. 	<ul style="list-style-type: none"> • The organization shall determine how results will be evaluated, including indicators for monitoring progress toward achievement of environmental objectives. 	<ul style="list-style-type: none"> • The organization shall determine the criteria against which the organization will evaluate its environmental performance and appropriate indicators. • The organization shall evaluate its environmental performance and effectiveness of the EMS.
Intent		
<ul style="list-style-type: none"> • The intent is to shift the focus from improving the EMS to improving environmental performance. <ul style="list-style-type: none"> ○ Environmental objectives can be established at strategic, tactical or operational levels. ○ An objective is not needed for each SEA; however, they should be a high priority. ○ Indicators should be established to evaluate the achievement of measurable environmental objectives. ○ Measures can be quantitative or qualitative. ○ The analysis and evaluation of environmental performance should be reliable, reproducible and enable the organization to report trends. 		

Table 9. Requirements and Intent of STC: Environmental Performance Monitoring and Evaluation

6. Evaluation of Compliance

Requirements
9 Performance Evaluation
9.1 Monitoring, measurement, analysis and evaluation
9.1.2 Evaluation of compliance
<ul style="list-style-type: none">• The organization shall:<ul style="list-style-type: none">✓ Establish, implement and maintain the process(es) needed to evaluate fulfilment of its compliance obligations✓ Determine the frequency that compliance will be evaluated✓ Maintain knowledge and understanding of its compliance status
Intent
<ul style="list-style-type: none">• The intent is to not only evaluate compliance but to also specify exactly how compliance is to be evaluated and recorded.<ul style="list-style-type: none">○ All compliance obligations need to be evaluated periodically; frequency and timing can vary.

Table 10. Requirements and Intent of STC: Evaluation of Compliance

7. Strategic and Integrated Environmental Management

Requirements			
5.1 Leadership and commitment	6.2.2 Planning actions to achieve environmental objectives	6.1.4 Planning action	9.3 Management review
<ul style="list-style-type: none"> • The environmental policy and objectives should be compatible with the strategic direction of the organization. • Top management should ensure the integration of the EMS requirements into the organization's business processes. 	<ul style="list-style-type: none"> • The organization shall consider how actions to achieve environmental objectives can be integrated into the organization's business processes. 	<ul style="list-style-type: none"> • The organization shall plan how to integrate and implement the planning actions into its EMS or other business processes. 	<ul style="list-style-type: none"> • Outputs from management review shall include implications for the strategic direction of the organization, and opportunities to improve integration of the EMS with other business processes.
Intent			
<ul style="list-style-type: none"> • The intent is to link the EMS to the strategic direction of the organization and to identify opportunities to integrate the EMS with other business processes. 			
<ul style="list-style-type: none"> ○ Organizations need to evaluate the environmental issues that have implications on the broader organizational goals. 	<ul style="list-style-type: none"> ○ Some planning actions are better addressed through other management systems, e.g. occupational health and safety, business continuity, and human resources 		

Table 11. Requirements and Intent of STC: Strategic and Integrated Environmental

8. Communication

Requirements	
7.4 Communication	9 Performance evaluation 9.1 Monitoring, measurement, analysis and evaluation 9.1.1 General
<ul style="list-style-type: none"> • The organization shall establish, implement and maintain the process(es) needed for internal and external communications relevant to the environmental management system • Information communicated should enable persons doing work under the organization's control to contribute to continual improvement of the EMS and environmental performance. 	<ul style="list-style-type: none"> • The organization shall communicate relevant environmental performance information both internally and externally. This should be identified in its communication procedures and should be in line with its compliance obligations.
Intent	
<ul style="list-style-type: none"> • The intent is for organizations to develop a formal strategy for external and internal communication. 	
<ul style="list-style-type: none"> ○ Organizations must proactively consider the need for external reporting on environmental issues and should create a process that allows for a more thoughtful review of its environmental data. ○ The decision to communicate externally is retained by the organization. ○ Develop a process for persons working under the organization's control to make suggestions on improving the EMS. 	<ul style="list-style-type: none"> ○ The need and expectations of interested parties should be referred to when deciding on performance data that should be communicated.

Table 12. Requirements and Intent of STC: Communication

CHAPTER 6 - GAP ANALYSIS

6.1 Gap Analysis Questions

The new requirements under each of the STCs were converted to questions that provided the framework for the gap analysis.

1. Context of the Organization

- Has the organization undertaken a review to determine fully the external and internal issues that are relevant to establishing the context of the organization?
- Has the organization undertaken a review to identify relevant interested parties?
- Has the organization determined the relevant needs and expectations of these interested parties?
- Has the organization determined which needs and expectations they will adopt as compliance obligations?
- Has top management demonstrated its commitment to ensuring that the environmental objectives are established and are compatible with the strategic direction and the context of the organization?

2. The Role of Top Management

- Has top management demonstrated its commitment to ensuring the integration of the EMS requirements into the organization's business processes?
- Has top management taken accountability for the effectiveness of the EMS?
- Has top management demonstrated a commitment to communicating the importance of effective environmental management?

3. Life Cycle Perspective and Outsourced Processes

- Has the organization considered a life cycle perspective when determining environmental aspects of activities, products and services?
- Has the organization considered a life cycle perspective where appropriate when procuring products and services? (Consider: *Are there specific environmental requirements associated with these processes?*)
- Has the organization considered a life cycle perspective where appropriate when designing products and services? (Consider: *Are there specific environmental requirements associated with these processes?*)
- Has the organization determined the type and extent of control required for its outsourced processes?
- Has the organization determined the type and extent of communication it will have with external providers and contractors regarding environmental requirements?

4. Risk and Opportunities

- Does the organization follow a process that determines risks?
- Does the organization follow a process that determines opportunities?
- Has the organization established an action plan to address the identified risks?
- Has the organization established an action plan to address the identified opportunities?

5. Environmental Performance Monitoring and Evaluation

- Has the organization determined the areas of its operation that need to be monitored, measured, analyzed and evaluated in order to gauge and continually improve its environmental performance?
- Have indicators been established to evaluate the achievement of environmental objectives?
- Have indicators been established to evaluate the effectiveness of the EMS?
- Are methods used for evaluation of environmental performance reproducible?

6. Evaluation of Compliance

- Has the organization specified how compliance is to be evaluated and recorded?
- Has the organization determined the frequency of its compliance evaluations?
- Has the organization implemented a process to maintain knowledge and understanding of its compliance status?

7. Strategic and Integrated Environmental

- Has the organization evaluated the environmental issues and conditions that have the potential to impact the broader organizational goals and objectives?
- Are the environmental objectives compatible with the strategic direction of the organization?
- Has the organization been proactive in integrating EMS requirements into other more suitable business processes?

- Do the outputs from management reviews explicitly include implications for the strategic direction?
- Do the outputs from management reviews explicitly include opportunities to improve integration of the EMS with other business processes?

8. Communication

- Has the organization developed an internal communication strategy, i.e. has it determined what, when, with whom and how it will communicate?
- Has the organization developed an external communication strategy, i.e. has it developed strategies for strengthening communication and ensuring information is communicated consistently and to the appropriate employees.

6.2 Gap Analysis Results

The gap analysis provided a number of quantitative and qualitative measurements meant to provide an indication of the conformance status of the utilities. These measurements, the responses identified in Tables 13-20, and the colour coded summary dashboard (Table 21) can all be used to provide regular updates on the status of a utilities transition process.

The following measurements can be derived from an analysis of results presented in Tables 13-21:

Quantitative

- ***Individual degree of conformance for each STC***: A measure of a utility's degree of conformance with each STC. Derived by dividing the total number of "yes" (conformance) responses by the total number of questions related to that specific STC and multiplying by 100. The STCs with the lowest percentages would be considered to have the biggest gaps in conformance
- ***Overall individual degree of conformance average***: A measure of a utility's degree of conformance with all 8 STCs. Derived by adding all the *individual degree of conformance for each STC* scores and dividing by the total number of STCs.
- ***Group degree of conformance average with each STC***: A measure of all the utilities' degree of conformance with each STC. Derived by adding all the *individual degree of conformance average* scores for each STC and dividing by the total number of participants.

- ***Overall group degree of conformance***: A measure of all the utilities' degree of conformance with all 8 STCs. Derived by adding all the *group degree of conformance average scores* and dividing by the total number of STCs.

Qualitative

- ***Individual confidence in degree of conformance average***: An instinctive measure of the amount of effort required by a utility to achieve conformance with all STCs. Utilities were asked to assign a score of 1 to 5 for each STC; a score of 1 represented the greatest amount of work as this reflected that there were no processes already in place that could be adapted to meet the new requirements.
- ***Group confidence in degree of conformance average***: A measure of the group's average in their confidence in the degree of conformance with all STCs.

6.2.1 Detailed Gap Analysis Results by STC

1. CONTEXT OF THE ORGANIZATION	Utility							
	1	2	3	4	5	6	7	
1. Has the organization undertaken a review to determine fully the external and internal issues that are relevant to establishing the context of the organization?	No	No	Yes	Yes	Yes	No	No	
2. Has the organization identified the 'environmental conditions' being affected by or capable of affecting the organization?	Yes	Yes	Yes	Yes	Yes	No	Yes	
3. Has the organization undertaken a review to identify relevant interested parties?	No	No	Yes	Yes	Yes	No	No	
4. Has the organization determined the relevant needs and expectations of these interested parties?	Yes	No	No	Yes	Yes	No	No	
5. Has the organization determined which needs and expectations they will adopt as compliance obligations?	No	Yes	No	No	No	Yes	No	
Overall Score by Utility	40%	40%	60%	80%	80%	20%	20%	Group Average 49%
CONFIDENCE in DoC	3	3	3	4	4	3	3	66%

Table 13. Degree of Conformance with STC: Context of the Organization

2. THE ROLE OF TOP MANAGEMENT	UTILITY							
	1	2	3	4	5	6	7	
6. Has top management demonstrated its commitment to ensuring that the environmental objectives are established and are compatible with the strategic direction and the context of the organization?	No	No	Yes	No	Yes	No	Yes	
7. Has top management demonstrated its commitment to ensuring the integration of the EMS requirements into the organization's business processes?	No	Yes	Yes	No	Yes	No	Yes	
8. Has top management taken accountability for the effectiveness of the EMS?	No	No	Yes	Yes	Yes	No	Yes	
9. Has top management demonstrated commitment to communicating the importance of effective environmental management?	No	Yes	Yes	No	Yes	No	No	
Overall Score by Utility	0%	50%	100%	25%	100%	0%	75%	Group Average 50%
CONFIDENCE in DoC	2	2	4	3	4	2	3	57%

Table 14. Degree of Conformance with STC: The Role of Top Management

3. LIFE CYCLE PERSPECTIVE & OUTSOURCED PROCESSES	UTILITY							
	1	2	3	4	5	6	7	
10. Has the organization considered a life cycle perspective when determining environmental aspects of activities, products and services?	Yes	No	Yes	No	No	No	No	
11. Has the organization considered a life cycle perspective where appropriate when procuring products and services? (Consider: <i>Are there specific environmental requirements associated with these processes?</i>)	Yes	No	No	Yes	No	No	No	
12. Has the organization considered a life cycle perspective where appropriate when designing products and services? (Consider: <i>Are there specific environmental requirements associated with these processes?</i>)	No	No	Yes	Yes	No	No	No	
13. Has the organization determined the type and extent of control required for its outsourced processes?	Yes	No	No	Yes	Yes	No	No	
14. Has the organization determined the type and extent of communication it will have with external providers and contractors regarding environmental requirements?	Yes	No	Yes	No	Yes	Yes	Yes	
Overall Score by Utility	80%	0%	60%	60%	40%	20%	20%	Group Average 40%
CONFIDENCE in DoC	4	2	3	3	2	2	2	51%

Table 15. Degree of Conformance with STC: Life Cycle Perspective & Outsourced Processes

4. RISK & OPPORTUNITIES	UTILITY							
	1	2	3	4	5	6	7	
15. Does the organization follow a process that determines risks?	Yes	Yes	Yes	Yes	No	Yes	Yes	
16. Does the organization follow a process that determines opportunities?	Yes	No	No	No	No	No	Yes	
17. Has the organization established an action plan to address the identified risks?	Yes	Yes	No	Yes	No	Yes	Yes	
18. Has the organization established an action plan to address the identified opportunities?	Yes	No	No	No	No	No	Yes	
19. Has the organization determined how to evaluate the effectiveness of the actions taken to address the identified risk?	No	No	No	Yes	No	Yes	No	
20. Has the organization determined how to evaluate the effectiveness of the actions taken to address the identified opportunities?	No	No	No	Yes	No	No	No	
Overall Score by Utility	67%	33%	16%	67%	0%	50%	67%	43%
CONFIDENCE in DoC	3	3	2	4	2	3	3	57%

Table 16. Degree of Conformance with STC: Risk & Opportunities

5. ENVIRONMENTAL PERFORMANCE MONITORING & EVALUATION	UTILITY							
	1	2	3	4	5	6	7	
21. Has the organization determined the areas of its operation that need to be monitored, measured, analyzed and evaluated in order to gauge and continually improve its environmental performance?	Yes	No	Yes	Yes	Yes	No	No	
22. Have indicators been established to evaluate the achievement of environmental objectives?	Yes	No	No	Yes	Yes	No	Yes	
23. Have indicators been established to evaluate the effectiveness of the EMS?	No	No	No	Yes	Yes	No	Yes	
24. Are methods used for evaluation of environmental performance reproducible?	No	No	No	Yes	Yes	No	Yes	
Overall Score by Utility	50%	0%	25%	100%	100%	0%	75%	50%
CONFIDENCE in DoC	2	2	2	5	4	1	3	54%

Table 17. Degree of Conformance with STC: Environmental Performance Monitoring & Evaluation

6. EVALUATION OF COMPLIANCE	UTILITY							
	1	2	3	4	5	6	7	
25. Has the organization specified how compliance is to be evaluated and recorded?	Yes	Yes	Yes	Yes	Yes	Yes	No	
26. Has the organization determined the frequency of its compliance evaluations?	Yes	Yes	Yes	Yes	Yes	Yes	No	
27. Has the organization implemented a process to maintain knowledge and understanding of its compliance status?	Yes	Yes	Yes	Yes	Yes	Yes	No	
Overall Score by Utility	100%	100%	100%	100%	100%	100%	0%	86%
CONFIDENCE in DoC	4	5	5	4	5	4	2	83%

Table 18. Degree of Conformance with STC: Evaluation of Compliance

7. STRATEGIC & INTEGRATED ENVIRONMENTAL MANAGEMENT	UTILITY							
	1	2	3	4	5	6	7	
28. Has the organization evaluated the environmental issues and conditions that have the potential to impact the broader organizational goals and objectives?	Yes	No	Yes	Yes	No	Yes	Yes	
29. Are the environmental objectives compatible with the strategic direction of the organization?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
30. Has the organization been proactive in integrating EMS requirements into other more suitable business processes?	Yes	No	Yes	No	Yes	No	No	
31. Do the outputs from management reviews explicitly include implications for the strategic direction?	No	No	Yes	No	No	No	No	
32. Do the outputs from management reviews explicitly include opportunities to improve integration of the EMS with other business processes?	No	No	No	No	Yes	No	Yes	
Overall Score by Utility	60%	20%	80%	40%	40%	40%	60%	49%
CONFIDENCE in DoC	3	2	4	2	3	2	3	54%

Table 19. Degree of Conformance with STC: Strategic & Integrated Environmental Management

8. COMMUNICATION	UTILITY							
	1	2	3	4	5	6	7	
33. Has the organization developed an internal communication strategy, i.e. has it determined what, when, with whom and how it will communicate?	Yes	Yes	Yes	Yes	Yes	Yes	No	
34. Has the organization developed an external communication strategy, i.e. has it determined what, when, with whom and how it will communicate?	No	Yes	Yes	Yes	Yes	No	No	
Overall Score by Utility	50%	100%	100%	100%	100%	50%	0%	Group Average 71%
CONFIDENCE in DoC	3	4	5	4	4	3	2	66%

Table 20. Degree of Conformance with STC: Communication

6.2.2 Overall Summary of Gap Analysis Results

Theme	Utility							Group Average
	1	2	3	4	5	6	7	
1. Context of the Organization	Red	Red	Yellow	Green	Green	Red	Red	Red
2. Role of Top Management	Red	Yellow	Green	Red	Green	Red	Green	Yellow
3. Life Cycle Perspective & Outsourced Processes	Green	Red	Yellow	Yellow	Red	Red	Red	Red
4. Risk & Opportunities	Yellow	Red	Red	Yellow	Red	Yellow	Yellow	Red
5. Environmental Performance Monitoring & Evaluation	Yellow	Red	Red	Green	Green	Red	Green	Yellow
6. Evaluation of Compliance	Green	Green	Green	Green	Green	Green	Red	Green
7. Strategic & Integrated Environmental Management	Yellow	Red	Green	Red	Red	Red	Green	Red
8. Communication	Yellow	Green	Green	Green	Green	Yellow	Red	Yellow
Overall Individual Conformance Average	Yellow	Red	Yellow	Yellow	Yellow	Red	Red	Yellow
Individual Confidence in DoC Average	Yellow	Green	Green	Green	Green	Yellow	Red	Yellow
Key								
 75% - 100% conformity (Low) 50% - 74% conformity (Moderate) < 50% conformity (Significant)								

Table 21. Overall degree of Conformance with STCs

6.3 Discussion on Gap Analysis Results

It is evident from Tables 13 to 20 that even though some of the STC requirements have been met, none of the utilities reported a 100% conformance in any of the STC categories. Therefore, all utilities will need to implement changes to their EMS in order to fully comply with the new Standard.

Table 21 provides a summary of Tables 13 to 20. Given the substantive nature of the STCs and their interrelationships, utilities obtaining a greater percentage of “red” and “yellow” scores will need to implement fundamental changes to their EMS; this applies to a greater extent to utilities 2, 6 and 7, and to a lesser extent to utilities 1, 3, 4 and 5. This was concluded as utilities 2, 6 and 7 obtained a “red” score for more than 50% of the STCs. When pressed further, the organizations that reported a greater degree of conformance attributed it to the ongoing environmental commitments made by their top management.

Table 21 also demonstrates that when the group average is considered, the following STCs will require the greatest amount of effort on the part of the utilities to demonstrate conformance:

Context of the Organization, Life Cycle Perspective & Outsourced Processes, Risk and Opportunities, and Strategic & Integrated Environmental Management. The Role of Top Management, Environmental Performance Monitoring & Evaluation, and Communication will require a moderate amount of work to demonstrate conformance, and the Evaluation of Compliance will require the least amount of work as it appears that all but one of the utilities are satisfied that their existing compliance approaches are close to conforming to the new Standard.

This is not surprising given the fact that most organizations tend to give priority to ensuring that they are meeting their compliance obligations.

The STC that reported the lowest Degree of Conformance was Life Cycle Perspective & Outsourced processes. This is not a complete surprise as the new Standard is asking organizations to go above and beyond what has traditionally been asked of them. Organizations must now extend consideration of environmental matters to aspects that are external to their operations if they have some type of influence over them.

Table 21 demonstrates that the utilities' qualitative/instinctive measure of their Confidence in the DoC mirrored the quantitative measure of the Degree of Conformance when the overall ratings criteria are considered. However, it is recommended that utilities pay attention to the STCs that recorded a lower Confidence in the DoC such as Life Cycle Perspective & Outsourced Processes as this illustrates that the utilities anticipate a greater amount of effort on their part in order to implement the requirements for this STC. This indicates that there are characteristics about the existing EMS that may make it more challenging to conform to this particular STC. This is important for the utilities to consider when prioritizing their transition task.

CHAPTER 7 - CONFORMANCE STRATEGY

There are gaps in the existing research that have made it difficult for those responsible for implementing the Standard to bridge the gap between theory and real world application.

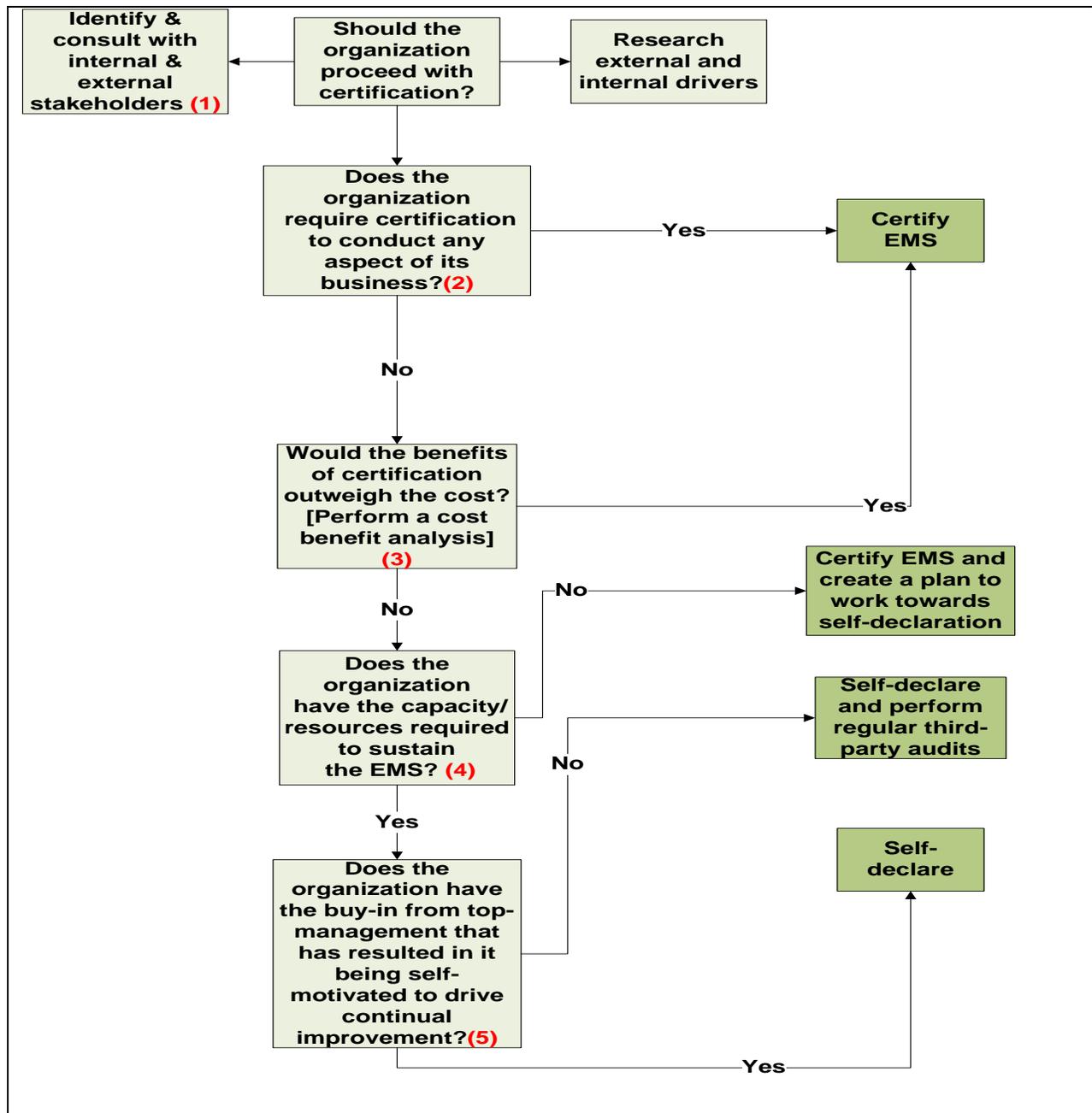
The conformance strategy includes:

1. ISO 14001 Third-Party Certification Decision Flow Diagram
2. Conformance guides
3. Transition time-line

7.1 ISO 14001 Registration Decision

Prior to transitioning to the new Standard, the utilities will need to make a decision about whether to continue with their Registration or obtain a Registration if they do not currently have one. Figure seven provides a tool developed by the author that can be used by most organizations, including the utilities that need to decide whether to continue with or obtain Registration.

The decision process is based on the author's experience that the relationship between Registration and resulting benefits is one of diminishing returns and therefore organizations that have voluntarily obtained Registration should not view it as a permanent fixture or the "cost of doing business". Instead, they should ultimately work towards an EMS that is self-sustaining and self-motivating, and therefore does not require Registration in order to drive improvement.



- 1) Internal stakeholders may include persons with the authority to make this decision (top-management), responsible for environmental programs, responsible for overseeing environmental/operating licences, responsible for export market negotiations, and responsible for public and indigenous affairs/communications. External stakeholders may include regulators and product customers
- 2) Certification may be required by regulators through legislation or licence/ permit conditions, financial institutions, contract terms (partnership agreements), industry memberships, supplier/manufacturer relationships, and parent companies.

- 3) Potential costs include the financial cost of the registrar, the cost and time of additional and existing staff, and the diminished public image.
Potential benefits include an extra layer of credibility, increased market share, strengthened corporate image, and regular surveillance audits that drive improvements and accountability.
- 4) Consider whether the organization has a firm understanding of how to implement an effective EMS (e.g. staff have experience with EMS implementation) and whether internal auditors are qualified (previous experience, lead- auditor training).
- 5) Consider whether top management is directly involved in driving the continual improvement of the system, has demonstrated their commitment to the EMS by their actions, and has demonstrated commitment to the EMS by ensuring that adequate resources are available to drive the continual improvement of the EMS.

Figure 8. ISO 14001 Third-Party Certification Decision Flow Diagram

7.2 Conformance Guides

1. CONTEXT OF THE ORGANIZATION	
Utility	Required Actions
1, 2, 6 & 7	<p>1. Consult with internal stakeholders (environmental SMEs, climate and hydrology specialist, load forecasters, financial planning groups, strategic planning groups, internal audit, EMS team members) to determine the external and internal "issues" that are relevant to establishing the context of the organization.</p> <p>Tip: Only consider "issues" that are relevant to the utilities purpose (i.e. power generation, transmission and distribution) and that can affect the utilities' ability to achieve the intended outcome of the EMS (consider the environmental policy, environmental objectives and compliance obligations)</p> <p>Tip: Do not forget to consider "issues" that can be leveraged to provide a beneficial effect.</p> <p>Documentation is recommended but is not required.</p>
6	<p>2. Consult with external stakeholders (neighbouring communities), review environmental impact statements, review results from monitoring reports, consult with corporate risk planning groups, and consult with customer care groups to determine the 'environmental conditions' being affected by or capable of affecting the organization.</p> <p>Documentation is recommended but is not required.</p>
1, 2, 6 & 7	<p>3. Consult with internal stakeholders (environmental licensing groups, EMS team, customer care groups, and export sales groups) to identify relevant interested parties.</p> <p>Tip: Establish criteria to define relevancy.</p> <p>Documentation is recommended but is not required.</p>
2, 3, 6 & 7	<p>4. Consult with internal stakeholders (environmental licensing groups, EMS team, customer care groups, and export sales groups) to determine the relevant needs and expectations of these interested parties.</p> <p>Tip: Establish criteria to define relevancy.</p> <p>Documentation is recommended but is not required.</p>

<p>1, 3, 4, 5 & 7</p>	<p>5. Consult with internal stakeholders (senior management, environmental licensing groups, EMS team, customer care groups, and export sales groups) to determine which needs and expectations to adopt as compliance obligations.</p> <p>Tip: Senior management should be involved or consulted during this process.</p> <p>Documentation is recommended but is not required.</p>
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Examples of Conformance Strategies Utilized by Utilities and other Organizations

- Established EH&S committees including at the executive level.
- Incorporated environmental management system objectives into program of excellence.
- Included an environmental performance section in the annual financial report.
- Regularly researched the impacts of the surrounding biophysical environment on operations.
- Considered strategies as part of corporate risk analysis.
- Extensively consulted with external stakeholders as part of project development.
- Developed internal policies and procedures in response to concerns of interested parties (e.g. biosecurity).
- Revised the Management Review template to account for needs and expectations of interested parties.

Table 22. Conformance Guide: Context of the Organization

2. THE ROLE OF TOP MANAGEMENT

Utility	Required Actions
1, 2, 4 & 6	<p>6. Establish a process that demonstrates top management is committed to ensuring that the environmental objectives are established and are compatible with the strategic direction and the context of the organization.</p> <p>Tip: This process can be incorporated into Management Review procedures.</p> <p>Documentation is not required.</p>
1, 4 & 6	<p>7. Establish a process that demonstrated that top management is committed to ensuring the integration of the EMS requirements into the organization's business processes.</p> <p>Tip: This can be incorporated into the Corporate Strategic Planning and Business Planning procedures.</p> <p>Tip: Other core business processes include HR, H&S, Purchasing/Procurement, Corporate Accounting, Corporate Communications and IT.</p> <p>Documentation is not required.</p>
1, 2 & 3	<p>8. Establish a process that demonstrates that top management has taken accountability for the effectiveness of the EMS.</p> <p>Tip: Identify performance indicators that can be used to measure the success of the EMS. They can be qualitative or quantitative.</p> <p>Tip: Performance indicators for the EMS do not have to be related to environmental performance. They can measure intangible successes such as increased employee awareness of environmental issues.</p> <p>Documentation is not required.</p>
1, 4, & 6	<p>9. Establish a process that demonstrates that top management is committed to communicating the importance of effective environmental management.</p> <p>Tip: Assigning responsibility to senior manager in charge of Corporate Communications provides an opportunity to demonstrate top management commitment and integrates the EMS and Corporate Communications processes.</p> <p>Documentation is not required.</p>

Examples of Conformance Strategies Utilized by Utilities and other Organizations

- Environmental performance measures (dashboards) were reviewed by senior management. Some performance measures were championed by executive members.
- External and internal audit findings are seriously considered by senior management.
- Policy and EMS governance documentation were signed and endorsed by the CEO.
- Senior level support and commitment is enshrined in corporate policies
- Executive committee established on Environmental Health & Safety (EH&S)
- Strategic goals related to environmental performance reviewed by senior management

Table 23. Conformance Guide: The Role of Top Management

3. LIFE CYCLE PERSPECTIVE & OUTSOURCED PROCESSES	
Utility	Required Actions
2, 4, 5, 6 & 7	<p>10. Incorporate a life cycle perspective when determining environmental aspects of activities, products and services.</p> <p>Tip: Life cycle stages include acquisition of raw materials, design, production, transportation/delivery, use, end-of-life treatment and final disposal (ISO 14004:2016, p.24)</p> <p>Documentation is required.</p>
2, 3, 5, 6 & 7	<p>11. Consult with Purchasing/ Procurement groups to establish a process that considers a life cycle perspective where appropriate when procuring products and services.</p> <p>Tip: Initiate or expand on product evaluation processes.</p> <p>Tip: Develop a "green" procurement policy.</p> <p>Tip: Include Purchasing/ Procurement groups to provide an opportunity to integrate the EMS with Purchasing/ Procurement processes.</p> <p>Documentation is recommended but is not required.</p>
1, 2, 5 6 & 7	<p>12. Consult with internal stakeholder (Planning, Design and Construction groups) to establish a process that considers a life cycle perspective where appropriate when designing products and services.</p> <p>Tip: Consider how design and planning can be used to reduce the potential for transferring adverse environmental impacts to other stages (ISO 14004:2016, p.</p>

	40).
2, 3, 6 & 7	<p>13. Determine the type and extent of control (full control, partial control, can be influenced) the utility has over the outsourced processes identified during identification of the life cycle stages of its activities, products and services.</p> <p>Documentation is recommended but is not required.</p>
2 & 4	<p>14. Use the results from Step 13 to determine the type and extent of communication the utility will have with external providers and contractors regarding environmental requirements.</p> <p>Tip: The Standard provides clarification on a common question: "How extensive does the evaluation of outsourced processes need to be?" Answer: "Only consider outsourced processes that are integral to the utilities functioning; where the function or process is needed for the environmental management system to achieve its intended outcome; and where the liability for the function or process conforming to requirements is retained by the organization"(ISO 14001:2015).</p> <p>Documentation is recommended but is not required.</p>

Examples of Conformance Strategies Utilized by Utilities and other Organizations

- Implemented a change management process.
- Implemented a new material requisition form with environmental sign off.
- Implemented ISNET.
- Developed and communicated a Contractor Environmental Responsibility document.
- Developed and implemented Environmental Management Plans for new and existing developments.
- Communicated ‘terms of conditions’ with environmental considerations for purchasing goods and services
- Integrated environmental clauses in contracts and communicated environmental requirements to contractors.
- Completed a life cycle analysis for products.

Table 24. Conformance Guide: Life Cycle Perspective & Outsourced Processes

4. RISK & OPPORTUNITIES

Utility	Required Actions
5	<p>15. Develop a process that determines risks.</p> <p>Tip: Integrate with the Strategic Planning or Corporate Risk Planning processes.</p> <p>Tip: Identifying the "Context of the Organization" will provide input that can be used to identify "Risk and Opportunities".</p> <p>Tip: Identifying "Risk and Opportunities" will in turn provide input for "Planning" actions. See Step 17.</p> <p>Documentation is required.</p>
2, 3, 4, 5 & 6	<p>16. Develop a process that determines opportunities.</p> <p>Documentation is required.</p>
3 & 5	<p>17. Establish action plans to address the identified risks.</p> <p>Tip: The action plan should identify the steps that need to be taken to effectively manage the identified risk (e.g. discovery of invasive species such as zebra mussels and club roots, or the designation of an aquatic species as threatened or endangered).</p> <p>The plan may need to extend into other areas of the EMS such as Emergency Response, Environmental Objectives and Internal Audit.</p> <p>Documentation is recommended but is not required.</p>
2, 3, 4, 5 & 6	<p>18. Establish an action plan to address the identified opportunities.</p> <p>Tip: Determine how opportunities can be leveraged to provide a beneficial effect. (i.e. new technology, natural resource discovery)</p> <p>Documentation is recommended but is not required.</p>
1, 2, 3, 5 & 7	<p>19. When developing the action plans in Step 17, include a performance indicator that can be used to determine whether the actions taken to address the risks were effective.</p> <p>Documentation is required.</p>

1, 2, 3, 5, 6 & 7	20. When developing the action plans in Step 18, include a performance indicator that can be used to determine whether the actions taken to leverage the opportunities were effective.
	Documentation is required.

Examples of Conformance Strategies Utilized by Utilities and other Organizations

- Risk consideration is brought in to aspect identification process and compliance obligation assessment.
- Developed emergency response plans (ERPs) for high risk activities. ERPs are updated on a regular basis.
- Developed Internal Audit plan based on higher risk areas.

Table 25. Conformance Guide: Risk & Opportunities

5. ENVIRONMENTAL PERFORMANCE MONITORING & EVALUATION

Utility	Required Action(s)
2 & 6	<p>21. Consult with internal stakeholders (EMS team, Top Management, Corporate Planning groups, Corporate Risk groups, Environmental SMEs) to determine the areas of its operation that need to be monitored, measured, analyzed and evaluated (MMA&E) in order to gauge and continually improve the utilities environmental performance.</p> <p>Tip: There are a number of inputs that can be used to identify areas of the operation that needs to be MMA&E. They include SEA, Risk and Opportunities, Internal Audits, Compliance Obligations, Request from Interested Parties.</p> <p>Tip: Top management should be involved in this process; however, the utility is able to decide the extent of involvement.</p> <p>Tip: The results of MMA&E can be used to identify nonconformity, adherence to limits specified by compliance obligations, performance trends and opportunities for continual improvement (ISO 14004:2016, p. 43)</p> <p>Documentation is required.</p>
2, 3, & 6	<p>22. Develop indicators that can be used to evaluate the achievement of environmental objectives.</p> <p>Documentation is required.</p>

<p>1, 2,3 & 6</p>	<p>23. Develop indicators that can be used to evaluate the effectiveness of the EMS.</p> <p>Tip: The organization can consider the use of environmental condition indicators (ECIs), management performance indicators (MPIs) and operational performance indicators (OPIs) appropriate to its significant environmental aspects (ISO 14004:2016, p. 31).</p> <p>Documentation is required.</p>
<p>1, 2, 3 & 6</p>	<p>24. After determining what needs to be MMA & E and developing performance indicators, the utility should determine how it will collect the data needed to monitor performance and ensure that the method selected is reproducible.</p>

Examples of Conformance Strategies Utilized by Utilities

- Tracked and reported on environmental performance measures (e.g. # of contaminated/remediated sites, # of avian incidents, percentage of trained employees)
- Developed and reviewed environmental targets on an annual basis (e.g. remediation of all sites by specific date, 90% of employees trained in EMS awareness, zero non-compliances with PCB regulations)
- Developed a strategy on sustainability which includes defined targets.
- Annual Sustainability Report made available to the public.
- Presented audit score card on a quarterly basis.
- Established performance measurement teams. Teams included subject matter experts. The team’s mandate is to develop appropriate performance measures for input to the business planning process.
- Established a corporate goal of becoming an environmental leader.

Table 26. Conformance Guide: Environmental Performance Monitoring & Evaluation

6. EVALUATION OF COMPLIANCE	
Utility	Required Actions
7	25. Specified how compliance is to be evaluated and recorded.
7	26. Determine the frequency of compliance evaluations.
7	27. Implement a process to maintain knowledge and understanding of the utilities' compliance status?
Examples of Conformance Strategies Utilized by Utilities	
<ul style="list-style-type: none"> • Used of compliance software (e.g. Nimonik). • Distributed annual legal material compliance questionnaire. • Performed compliance related field/site inspections. • Developed electronic compliance self-assessments. • Performed compliance audits of specific regulations (e.g. vegetation management, PCBs, wastewater & hazardous materials). • Developed a corporate compliance program. • Developed an EMS matrix that links all compliance obligations related to environmental aspects. • Maintained a documented list of compliance obligations. • Distributed a report on legal compliance to the Board. • Distributed compliance bulletins to appropriate employees when needed. 	

Table 27. Conformance Guide: Evaluation of Compliance

7. STRATEGIC & INTEGRATED ENVIRONMENTAL MANAGEMENT	
Utility	Required Actions
2 & 5	28. Evaluate the environmental issues and conditions that have the potential to impact the broader organizational goals and objectives.
	29. Are the environmental objectives compatible with the strategic direction of the organization? No action required. All utilities reported conformance
2, 4 & 6	30. Consult with internal stakeholders (human resources, IT, Financial, Procurement), Legal) to evaluate the feasibility of integrating EMS requirements into other more suitable business processes.
1, 2, 4, 5, 6 & 7	31. Incorporate a requirement in the Management Review process to include implications for the strategic direction as part of the summary discussion.
1, 2, 3, 4 & 6	32. Incorporate a requirement in the Management Review process to include opportunities to improve integration of the EMS with other business processes as part of the summary discussion.
Examples of Conformance Strategies Utilized by Utilities	
<ul style="list-style-type: none"> • Goals and objectives are identified in Business Plans and in the Corporate Strategic Plan • The legal department is responsible for identifying new and changed compliance obligations (legal registry). • Used 3E system to manage SDS. • Environmental Health & Safety Management System (EHSM) used to report all incidents (environmental, safety, fire, vehicle accident). • Created an Environmental Health & Safety Integration department. • Procurement department incorporated environmental considerations for product evaluations; this included assigning an environmental score to new products. • Procurement department used environmental performance criteria to evaluate the performance of contractors. 	

Table 28. Conformance Guide: Strategic & Integrated Environmental Management

8. COMMUNICATION	
Utility	Required Action(s)
7	33. Developed an internal communication strategy, i.e. determine what, when, with whom, and how to communicate?
1, 6 & 7	34. Developed an external communication strategy, i.e. determined what, when, with whom and how to communicate?
Examples of Conformance Strategies Utilized by Utilities	
<ul style="list-style-type: none"> • Distributed environmental bulletins to staff. • Communications department developed a broader communication strategy that covers requirements for environmental communications. • Established a committee to communicate with municipalities, agricultural and customer representatives. • External reporting to Canadian Electricity Association and to the National Pollutant Release Inventory is performed. • Developed a formal, documented response procedure to address external inquiries. • Created a Public Affairs department that deals with all external communication. • Developed a complaint registry which is reviewed on a regular basis. 	

Table 29. Conformance Guide: Communication

7.3 Transition time-line

As discussed, utilities should be able to demonstrate conformance with the new Standard by September, 2018 in order to maintain their Registration. This transition time-line provides strategic guidance for the logical completion of significant milestones. The time-line again looks at the STCs from a holistic perspective and considers the interrelationships between clauses. The time-line is organized to reflect that there are certain milestones that must be addressed prior to starting others as the result should be used to inform an interrelated process.

Utility	Action #	2016				2017				2018		
		J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	J-M	A-J	J-S
1, 2, 6 & 7	1											
6	2											
1, 2, 6 & 7	3											
2, 3, 6 & 7	4											
1, 3, 4, 5 & 7	5											
5	15											
2, 3, 4, 5 & 6	16											
3 & 5	17											
2, 3, 4, 5 & 6	18											
1, 2, 3, 5 & 7	19											
1, 2, 3, 5, 6 & 7	20											
2, 4,	10											

Utility	Action #	2016				2017				2018		
		J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	J-M	A-J	J-S
5, 6 & 7				■	■							
2, 3, 5, 6 & 7	11			■	■							
1, 2, 5 6 & 7	12			■	■							
2, 3, 6 & 7	13			■	■							
2 & 4	14			■	■							
1, 2, 4 & 6	6			■	■	■	■	■	■	■	■	■
1, 4 & 6	7			■	■	■	■	■	■	■	■	■
1, 2 & 3	8			■	■	■	■	■	■	■	■	■
1, 4, & 6	9			■	■	■	■	■	■	■	■	■
2 & 5	28					■	■	■	■	■	■	
	29					■	■	■	■	■	■	
2, 4 & 6	30					■	■	■	■	■	■	
1, 2, 4, 5, 6 & 7	31					■	■	■	■	■	■	
1, 2, 3, 4 & 6	32					■	■	■	■	■	■	
2 & 6	21									■	■	■
2, 3, & 6	22									■	■	■
1, 2,3 & 6	23									■	■	■
1, 2, 3 & 6	24									■	■	■
7	25									■	■	■
7	26									■	■	■
7	27									■	■	■
7	33										■	■
1, 6 & 7	34										■	■

Figure 9. ISO 14001:2015 Transition Completion Time-line

CHAPTER 8 - CONCLUSION & DISCUSSION

8.1 Conclusion

This research comprised of three primary objectives; this section provides summary and concluding remarks on each objective.

Objective 1:

What are the motivations for voluntary adoption of the Standard?

There has been a shift in the environmental consciousness of some organizations; this is evident by the increase in investments in voluntary environmental initiatives such as the adoption of an EMS standard. A number of relevant motivations for this trend were highlighted in the literature review. An important consideration for the utilities to keep in mind as they transition to the new Standard is that the perceived and real value of the EMS can be enhanced if organizations periodically reflect on their initial internal motivations (the “big picture”) for adopting the Standard. These “big picture” motivations reflect the core values of the organization and provide a measuring stick against which the EMS can be evaluated for effectiveness. Paying greater attention to the attainment of “big picture” items rather than the minutiae of the Standard’s requirements should help in improving the perception of the EMS. It is recommended that in addition to establishing objectives and targets related to the monitoring and measuring of environmental performance, utilities should establish overall EMS performance objectives that take their initial motivations for adopting the Standard into account.

Does adoption of the Standard result in overall business and or environmental performance improvements?

The literature demonstrated that there is no guarantee that adopting the Standard will result in any environmental or business performance benefits. However, the literature also demonstrated that there are variables that can increase the likelihood of obtaining a positive relationship between Standard adoption, and environmental and business performance. It is therefore recommended that utilities reflect on the culture of their organization to ensure that they have avoided the common pitfalls that have led to an ineffective EMS to ensure that their transition strategy incorporates practices that have been proven to increase the likelihood of achieving improvements in business and environmental performance.

What are some of the recommended factors for the successful implementation of the Standard?

The utilities should be mindful that while the conformance strategy identifies initiatives that can be used to demonstrate conformance, it does not take into account those elements of an organizations environmental management culture that may impede the successful implementation of these strategies. Utilities are encouraged to gain further insight on proven factors for the successful implementation of an EMS. This research has identified a few of the proven factors that utilities should incorporate when implementing the conformance strategy; they include: (1) Ensure the top management and employees are involved in the initial design of the EMS (2) Assign the overall management of environmental matters to a member of top management, which creates a position that mid-level managers can work towards (3) Build coalitions between managers to address environmental concerns in an effort to give weight to

environmental matters (4) Establish cross functional committees and working groups to address environmental matters (5) Decentralize the EMS by integrating it with other core business processes (6) Establish an official Change Management process to effectively translate new and or changing requirements from external pressures such as auditors, regulators and consumers (7) Translate external pressures in a manner that adds value to the organization by focusing on business and environmental improvements which should avoid the trap of creating a ritualistic and documentary EMS (8) Approach corrective action planning with a sense of creativity and innovation and (9) Be proactive when it comes to stakeholder engagement and ensure that the engagement process reflects that of a closed loop system, and is done in a manner that establishes a sense of “trust”.

These recommended factors all contribute to the overall environmental management culture of the organization. It is therefore important that organizations take stock of the attitudes that exist within the organization regarding its response to environmental issues. Organizations that are already practicing some or all of the recommended factors for the success of an EMS and that have a proactive and positive attitude towards environmental management will inevitable have an encounter less challenges during their transition to the new Standard.

Is there sufficient justification for utilities to externally register their EMS?

Sub-question: Have registered EMSs resulted in any additional benefits to companies

The existing literature is inconclusive about whether organizations with Registrations perform better than organizations without Registrations. The decision to obtain Registration should be made on a case by case basis and should be constantly reviewed.

The premise behind the *Registration Decision Flow Diagram* is based on the author's experience and perception that the relationship between Registration and resulting benefits is one of diminishing returns; therefore, it is in the best interest of Registered organizations that are not required to maintain a Registration, to work towards a self-declared EMS. One of the biggest factors that should be used to assess an organizations' readiness to discontinue its Registration is whether or not the organization is self-motivated enough to drive continual improvement of the EMS. A good indicator of an organizations' potential to become self-motivated is the level of commitment and involvement of top management in the EMS.

Additionally, this premise holds up because of the lack of incentives associated with Registration for utilities in Canada. The concept of an ISO 14001 Registration is notably different from other certification brands such as LEED or Energy Star which have obvious incentives for organizations that met those Standards. If governments want to promote Registration as a tool for sustainability, they will have to implement policies that provide incentives to organizations who obtain Registration.

Furthermore, Registrars are guided by a strict standard of conduct and are only allowed to identify non-conformances and are not allowed to provide consultative advice concerning how to address these non-conformances. Organization may also want to assess whether the money would be better spent on consultants who are not limited by a code of conduct and can therefore identify gaps in conformance as well as provide advice on how to address these gaps.

What are the differences between ISO 14001:2004 and ISO 14001:2015?

This research examined the new Standard using a holistic approach in order to highlight the interrelationships that exist between clauses. It was important to apply this approach because from the authors perspective organizations tend to be fixated on the literal interpretation of each explicit requirement of the Standard instead of reviewing the Standard using a holistic approach and focusing on the “intent” of the Standard. This can sometimes result in the implementation of an EMS that is overly administrative and resource intensive. It is the researchers belief that these problems could be avoided if organizations made the implementation process more of an exercise designed to understand and improve the value they experienced as opposed to making it an exercise in “checking off the boxes”.

Organizations also tend to ignore the flexible nature of the Standard. The Standard allows organizations to design an EMS that is suitable and appropriate for their needs; this is evident throughout the new Standard by the use of the term “as appropriate,” which precedes many requirements. This results in an EMS that is not aligned with the strategic direction of the organizations and is compartmentalized.

Reviewing the changes using a holistic or systems thinking approach should help avoid some of these pitfalls; using this approach led to the identification of eight STCs. The identified STCs relate to new or enhanced requirements and will require a change in process and/or attitude in order to implement. STCs that are new and require a change process as well as attitude will require the most effort on the part of the utilities to implement successfully. Incorporating the context of the organization as part of the planning process for the EMS and ensuring that the

EMS functions at a strategic level as opposed to an operational level are two of the more significant changes that utilities will have to make.

Objective 2 - Gap Analysis

A gap analysis was used successfully to identify gaps in the current state of each utility's EMS when compared to the desired performance of conformance with the eight STCs. While conformance gaps varied between utilities, all utilities were found to have gaps in conformance related to the STCs. Therefore, all utilities will need to implement changes to their EMS in order to fully comply with the new Standard. As the current state of the utilities' EMS was used to assess conformance, the amount of effort required to conform to the eight STCs was dependent on the maturity and comprehensiveness of the current management system. The EMS of utilities 2, 6 and 7 will require the greatest degree of change in order to conform to the new Standard. When the group average is considered the following STCs will require the greatest amount of effort on the part of the utilities to demonstrate conformance: the Context of the Organization, Life Cycle Perspective & Outsourced Processes, Risk and Opportunities, and Strategic & Integrated Environmental Management. This is in line with the perspective of each utility's environmental representative when they were asked to use their own knowledge of their utilities' readiness to identify which STC would require the greatest amount of effort on their part to demonstrate conformance.

An added benefit of performing this gap analysis at this time is that the results can be used to recommend topics for upcoming industry webinars, conferences and meetings. Recommended

topics could include, strategies for addressing STCs requiring the greatest degree of change on the part of the utilities, and the most common gaps in STCs.

Objective 3 - Conformance Strategy

The third objective of this research was to develop a conformance strategy suitable and flexible enough for consideration by multiple utilities. The conformance strategy was designed in a format that bridged the gap between ISO 14001 theory and the real-world business practices of utilities.

The transition time-line can be used by the utilities to provide a sense of the resources that will be required and the potential time constraints they will have to work with to meet the transition deadline. Utilities are encouraged to consider the recommended best practices for the successful implementation of an EMS when further developing and implementing their transition plan.

Though the conformance strategy was developed for electrical utilities, it can also be easily utilized and adapted by organizations outside of the electricity sector that are interested in transitioning to the new Standard.

8.2 Discussion

8.2.1 Research Limitations and Steps to Address Them

While this research serves as a significant resource that can be referenced by utilities during the transition process to the new Standard, there are some additional steps that should be taken by the utilities in order to compensate for some of the limitations of this research.

Firstly, as this research is limited to examining the significant thematic changes, utilities will need to complete a more prescriptive/fulsome review of the new Standard to capture any changes that were not considered significant and therefore were not captured by the gap analysis. This may pertain to changes that are administrative in nature or changes that reflect a small deviation from the old Standard.

Secondly, while this conformance strategy does provide specific details regarding the transition process, these details are deliberately captured at a level that can be applied by multiple utilities; it is therefore recommended that utilities use additional resources to further customize this conformance strategy to suit their needs and the strategic direction of their utility.

Thirdly, another STC emerged after further assessment of the gap analysis results (i.e. Continual Improvement). As this STC emerged later in the research it was not considered during the gap analysis; therefore, it is recommended that utilities identify the requirements and intent of the changes regarding Continual Improvement in addition to the other eight STCs.

8.2.2 Ideas for Future Research

As discussed in the background section of this research, ISO released a report that identified 19 future environmental challenges. Future research on how organizations can use their EMSs to address these challenges would be valuable and allow organizations to be proactive and stay on the cutting edge of environmental issues.

Additionally, this research demonstrates that in the absence of an external pressure to obtain Registration, there is no proven incentive or benefit for utilities or other organizations in a

similar environment to obtain Registration. There is an opportunity for policy makers to conduct research on the effectiveness of voluntary action initiatives such as EMSs in reducing negative environmental impacts when compared with the more traditional command and control policy instruments. There is also an opportunity for research on how new policies can provide incentives for organizations to adopt voluntary action initiatives such as an EMS. The benefit of these voluntary action initiatives is that they can create a culture of environmental consciousness and responsibility within organizations, something the traditional command and control policies are not able to do.

8.2.3 Closing Remarks

The new Standard represents a significant revision of the old Standard. The new Standard includes fundamental changes that will require organizations to not only change their processes but also their overall environmental management culture. The requirement to incorporate the EMS with the strategic goals of the organization will require organizations to move away from the isolated, stand-alone systems that are managed by a specific set of employees (the EMS team) and in some cases by a single individual (the EMS Representative). This change in mindset will require the use of a different set of skills from environmental professionals as they will now have to be concerned with ensuring that environmental matters are considered during top-level strategic planning. This will require that the discussion on environmental matters be elevated from an operational or tactical level and discussed/presented in a manner that is relevant to top-managements' business strategy. This new approach will require improvements to the business acumen of environmental professionals who may have to provide a business case for the

“planning actions” needed to meet the intended outcomes of the EMS as the EMS will have to compete with other business priorities at that level.

Additionally, the process of identifying the context of the organization should not be taken lightly by organizations. Thoughtful consideration of the context of the organization will assist organizations in implementing an EMS that meets their needs rather than trying to implement a “cookie cutter” version of the EMS or an EMS designed to appease an auditor.

Finally, the transition to the new Standard provides the perfect opportunity for organizations to reevaluate their EMSs. This is an opportunity for organization to: move away from the status quo; discard or revamp processes that have not been ineffective, and leverage the new requirement for greater involvement of top management to get support to implement new and innovative initiatives.

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Appendix A: The ISO 14000 Family

NUMBER	TITLE
ISO 14001: 2004	Environmental management systems - Requirements with guidance for use
ISO 14004: 2004	Environmental management systems - General guidelines on principles, systems and support techniques
ISO/WD 14006	Environmental management systems - Guidelines on eco-design
ISO 14005: 2010	Environmental management systems - Guidelines for the phased implementation of an environmental management system, including the use of environmental performance evaluation
ISO 14015:2001	Environmental Assessment of Sites and Organizations
ISO 14020: 2000 Environmental Labels and Declaratives	Environmental Labels and Declaratives - General Principles ISO
ISO 14021: 1999 Environmental Labels and Declarations	Environmental Labels and Declarations - Self-declared Environmental Claims
ISO 14024: 1999	Environmental Labels and Declarations - Type I Environmental Labeling - Guiding Principles and Procedures
ISO 14025: 2006	Environmental Labels and Declaratives - Type III Environmental Declaratives - Principles and Procedures
ISO 14031: 1999	Environmental Management - Environmental Performance Evaluation - Guidelines
ISO 14032: 1999	Environmental management - Examples of Environmental Performance Evaluations
ISO 14040: 2006	Environmental Management - Life Cycle Assessment - Principles and Procedures
ISO 14044: 2006	Environmental Management – Life Cycle Assessment – Requirements and Guidelines
ISO 14047:2003	Environmental Management - Life Cycle Assessment - Examples of Application of ISO 14042

NUMBER	TITLE
ISO 14048: 2002	Environmental Management - Life Cycle Assessment - Data Documentation Format
ISO 14049: 2000	Environmental Management - Life Cycle Assessment - Examples of Application of ISO 14041 to Goal and Scope Definitions and Inventory Analysis
ISO 14050: 2009	Environmental Management - Vocabulary
ISO 14062: 2002	Environmental Management - Integrating Environmental Aspects into Product Design and Development
ISO 14063: 2006	Environmental Management - Environmental Communications - Guidelines and Examples
ISO 14064-1: 2006	Greenhouse Gases - Part 1: Specification with Guidance at the Organizational Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals
ISO 14064-2: 2006	Greenhouse Gases - Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements ISO
ISO 14064-3: 2006	Greenhouse Gases - Part 3: Specification with Guidance for Validation and Verification of Greenhouse Gas Assertions
ISO 14065: 2007	Greenhouse Gases -- Requirements for Greenhouse Gas Validation and Verification Bodies for Use in Accreditation or other Forms of Recognition

Table 30. ISO 14000 Family of Standards (ISOStore, 2016)

Appendix B: Gap Analysis Handbook

ISO 14001:2015 GAP ANALYSIS HANDBOOK ELECTRICAL UTILITY ENVIRONMENTAL AUDIT SPECIALTY MEETING

Study Title

Assessment of ISO 14001:2015, Environmental Management System Standard:
A Conformance Strategy for Select Canadian Electrical Utilities

Research Goal

The goal of this research is to provide a comprehensive examination of the intent of the new Standard in order to develop a conformance strategy suitable for adoption by select Canadian electrical utilities. Specifically, the conformance strategy will provide environmental decision-makers employed by these companies with a real-world application guide that can be used to assist with the transition process.

Name:

Email:

Company Name:

1. CONTEXT OF THE ORGANIZATION

4. Context of the Organization

4.1 Understanding the organization and its context

4.2 Understanding needs & expectations of interested parties

CONFIDENCE WITH DEGREE OF CONFORMANCE

Circle the number that best reflects your confidence with the ability of your utility to meet the requirements of this STC

*1	**2	***3	****4	*****5
<ul style="list-style-type: none"> Major non-conformance(s) (NC) are evident No process exist 	<ul style="list-style-type: none"> Chronic minor NCs Systemic NC(s) Process requires significant updates in order to demonstrate conformance 	<ul style="list-style-type: none"> Potential NCs Process requires moderate to minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> Conformance is probable Process requires minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> Conformance is evident No updates to processes required
<p>1. Has the organization undertaken a review to determine fully the external and internal issues that are relevant to establishing the context of the organization?</p> <p style="text-align: center;">Yes No</p>				

2. Has the organization identified the 'environmental conditions' being affected by or capable of affecting the organization?
Yes No
3. Has the organization undertaken a review to identify relevant interested parties?
Yes No
4. Has the organization determined the relevant needs and expectations of these interested parties?
Yes No
5. Has the organization determined which needs and expectations they will adopt as compliance obligations?
Yes No

Examples of Conformance

Considering the questions where a "yes" response was provided, please identify examples of strategies/processes/tools/products that your utility uses that demonstrates conformance

2. THE ROLE OF TOP MANAGEMENT

5 Leadership

5.1 Leadership and commitment

CONFIDENCE WITH DEGREE OF CONFORMANCE

Circle the number that best reflects your confidence with the ability of your utility to meet the requirements of this STC

*1	**2	**3	****4	*****5
<ul style="list-style-type: none"> • Major NCs are evident • No process exist 	<ul style="list-style-type: none"> • Chronic minor NC • Systemic NC • Process requires significant updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Potential NC • Process requires moderate to minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is probable • Process requires minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is evident • No updates to processes required

6. Has top management demonstrated its commitment to ensuring that the environmental objectives are established and are compatible with the strategic direction and the context of the organization?
Yes No
7. Has top management demonstrated its commitment to ensuring the integration of the EMS requirements into the organization's business processes?
Yes No

8. Has top management taken accountability for the effectiveness of the EMS?
Yes No
9. Has top management demonstrated commitment to communicating the importance of effective environmental management?
Yes No

Examples of Conformance

Considering the questions where a "yes" response was provided, please identify examples of strategies/processes/tools/products that your utility uses that demonstrates conformance

3. LIFE CYCLE PERSPECTIVE & OUTSOURCED PROCESSES

- | | |
|--|---|
| 6 Planning | 8 Operation |
| 6.1 Actions to address risk and opportunities | 8.1 Operational planning and control |
| 6.1.2 Environmental Aspects | |

CONFIDENCE WITH DEGREE OF CONFORMANCE

Circle the number that best reflects your confidence with the ability of your utility to meet the requirements of this STC

*1	**2	**3	****4	*****5
<ul style="list-style-type: none"> Major NCs are evident No process exist 	<ul style="list-style-type: none"> Chronic minor NC Systemic NC Process requires significant updates in order to demonstrate conformance 	<ul style="list-style-type: none"> Potential NC Process requires moderate to minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> Conformance is probable Process requires minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> Conformance is evident No updates to processes required

10. Has the organization considered a life cycle perspective when determining environmental aspects of activities, products and services?
Yes No
11. Has the organization considered a life cycle perspective where appropriate when procuring products and services? (Consider: *Are there specific environmental requirements associated with these processes?*)
Yes No
12. Has the organization considered a life cycle perspective where appropriate when designing products and services? (Consider: *Are there specific environmental requirements associated with these processes?*)
Yes No
13. Has the organization determined the type and extent of control required for its outsourced processes?
Yes No
14. Has the organization determined the type and extent of communication it will have with external providers and contractors regarding environmental requirements?
Yes No

Examples of Conformance

Considering the questions where a "yes" response was provided, please identify examples of strategies/processes/tools/products that your utility uses that demonstrates conformance

4. RISK AND OPPORTUNITIES

6 Planning

6.1 Actions to address risk and opportunities

6.1.1 General

CONFIDENCE WITH DEGREE OF CONFORMANCE

Circle the number that best reflects your confidence with the ability of your utility to meet the requirements of this STC

*1	**2	**3	****4	*****5
<ul style="list-style-type: none"> • Major NCs are evident • No process exist 	<ul style="list-style-type: none"> • Chronic minor NC • Systemic NC • Process requires significant updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Potential NC • Process requires moderate to minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is probable • Process requires minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is evident • No updates to processes required

15. Does the organization follow a process that determines risks?

Yes No

16. Does the organization follow a process that determines opportunities?

Yes No

17. Has the organization established an action plan to address the identified risk?

Yes No

18. Has the organization established an action plan to address the identified opportunities?

Yes No

19. Has the organization determined how to evaluate the effectiveness of the actions taken to address the identified risk?

Yes No

20. Has the organization determined how to evaluate the effectiveness of the actions taken to address the identified opportunities?

Yes No

Examples of Conformance

Considering the questions where a "yes" response was provided, please identify examples of strategies/processes/tools/products that your utility uses that demonstrates conformance

5. ENVIRONMENTAL PERFORMANCE MONITORING & EVALUATION

6 Planning	6 Planning	9 Performance Evaluation
6.2 Environmental objectives and planning to achieve them	6.2 Environmental objectives and planning to achieve them	9.1 Monitoring, measurement, analysis and evaluation
6.2.1 Environmental objectives	6.2.2 Planning actions to achieve environmental objectives	

CONFIDENCE WITH DEGREE OF CONFORMANCE

Circle the number that best reflects your confidence with the ability of your utility to meet the requirements of this STC

*1	**2	**3	****4	*****5
<ul style="list-style-type: none"> • Major NCs are evident • No process exist 	<ul style="list-style-type: none"> • Chronic minor NC • Systemic NC • Process requires significant updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Potential NC • Process requires moderate to minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is probable • Process requires minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is evident • No updates to processes required

21. Has the organization determined the areas of its operation that need to be monitored, measured, analyzed and evaluated in order to gauge and continually improve its environmental performance?

Yes No

22. Have indicators been established to evaluate the achievement of environmental objectives?

Yes No

23. Have indicators been established to evaluate the effectiveness of the EMS?

Yes No

24. Are methods used for evaluation of environmental performance reproducible?

Yes No

Examples of Conformance

Considering the questions where a "yes" response was provided, please identify examples of strategies/processes/tools/products that your utility uses that demonstrates conformance

6. EVALUATION OF COMPLIANCE

9 Performance Evaluation

9.1 Monitoring, measurement, analysis and evaluation

9.1.2 Evaluation of compliance

CONFIDENCE WITH DEGREE OF CONFORMANCE

*1	**2	**3	****4	*****5
<ul style="list-style-type: none"> • Major NCs are evident • No process exist 	<ul style="list-style-type: none"> • Chronic minor NC • Systemic NC • Process requires significant updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Potential NC • Process requires moderate to minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is probable • Process requires minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is evident • No updates to processes required

25. Has the organization specified how compliance is to be evaluated and recorded?

Yes No

26. Has the organization determined the frequency of its compliance evaluations?

Yes No

27. Has the organization implemented a process to maintain knowledge and understanding of its compliance status

Yes No

Examples of Conformance

Considering the questions where a “yes” response was provided, please identify examples of strategies/processes/tools/products that your utility uses that demonstrates conformance

7. STRATEGIC AND INTEGRATED ENVIRONMENTAL MANAGEMENT

5.1 Leadership and commitment

6.2.2 Planning actions to achieve environmental objectives

6.1.4 Planning action

9.3 Management review

CONFIDENCE WITH DEGREE OF CONFORMANCE

Circle the number that best reflects your confidence with the ability of your utility to meet the requirements of this STC

*1	**2	**3	****4	*****5
<ul style="list-style-type: none"> • Major NCs are evident • No process exist 	<ul style="list-style-type: none"> • Chronic minor NC • Systemic NC • Process requires significant updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Potential NC • Process requires moderate to minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is probable • Process requires minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is evident • No updates to processes required

28. Has the organization evaluated the environmental issues and conditions that have the potential to impact the broader organizational goals and objectives?

Yes No

29. Are the environmental objectives compatible with the strategic direction of the organization?

Yes No

30. Has the organization been proactive in integrating EMS requirements into other more suitable business processes?

Yes No

31. Do the outputs from management reviews explicitly include implications for the strategic direction

Yes No

32. Do the outputs from management reviews explicitly include opportunities to improve integration of the EMS with other business processes

Yes No

Examples of Conformance

Considering the questions where a "yes" response was provided, please identify examples of strategies/processes/tools/products that your utility uses that demonstrates conformance

8. COMMUNICATION

7.4 Communication

9 Performance evaluation

9.1 Monitoring, measurement, analysis and evaluation

9.1.1 General

CONFIDENCE WITH DEGREE OF CONFORMANCE

Circle the number that best reflects your confidence with the ability of your utility to meet the requirements of this STC

*1	**2	**3	****4	*****5
<ul style="list-style-type: none"> • Major NCs are evident • No process exist 	<ul style="list-style-type: none"> • Chronic minor NC • Systemic NC • Process requires significant updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Potential NC • Process requires moderate to minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is probable • Process requires minor updates in order to demonstrate conformance 	<ul style="list-style-type: none"> • Conformance is evident • No updates to processes required

33. Has the organization developed an internal communication strategy, i.e. has it determined what, when, with whom and how it will communicate?

Yes No

34. Has the organization developed an external communication strategy, i.e. has it determined what, when, with whom and how it will communicate?

Yes No

Examples of Conformance

Considering the questions where a "yes" response was provided, please identify examples of strategies/processes/tools/products that your utility uses that demonstrates conformance

Appendix C: Ethics Approval Certificate



UNIVERSITY
OF MANITOBA

Research Ethics
and Compliance

Human Ethics
208-194 Dafoe Road
Winnipeg, MB
Canada R3T 2N2
Phone +204-474-7122
Email: humanethics@umanitoba.ca

PROTOCOL APPROVAL

TO: Kimya Walcott (Advisor: Rick Baydack)
Principal Investigator

FROM: Kevin Russell, Chair
Joint-Faculty Research Ethics Board (JFREB)

Re: Protocol J2017:035 (HS20706)
"Assessment of ISO 14001:2015, Environmental Management System
Standard: A Conformance Strategy for Select Canadian Electrical Utilities"

Effective: June 8, 2017

Expiry: June 8, 2018

Joint-Faculty Research Ethics Board (JFREB) has reviewed and approved the above research. JFREB is constituted and operates in accordance with the current *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*.

This approval is subject to the following conditions:

1. Approval is granted only for the research and purposes described in the application.
2. Any modification to the research must be submitted to JFREB for approval before implementation.
3. Any deviations to the research or adverse events must be submitted to JFREB as soon as possible.
4. This approval is valid for one year only and a Renewal Request must be submitted and approved by the above expiry date.
5. A Study Closure form must be submitted to JFREB when the research is complete or terminated.
6. The University of Manitoba may request to review research documentation from this project to demonstrate compliance with this approved protocol and the University of Manitoba *Ethics of Research Involving Humans*.

Funded Protocols:

- Please mail/e-mail a copy of this Approval, identifying the related UM Project Number, to the Research Grants Officer in ORS.

Research Ethics and Compliance is a part of the Office of the Vice-President (Research and International)
umanitoba.ca/research

Appendix D: Participant Information and Consent Form



220 Sinnot Building
70A Dysart Road
University of Manitoba,
Winnipeg, MB R3T 2N2
Phone (204) 474-9451
Fax (204) 474-7699
Email
environment_geography@umanitoba

Participant Consent Form

Study Title: Assessment of ISO 14001:2015, Environmental Management System Standard: A Conformance Strategy for Select Canadian Electrical Utilities

Principal Investigator:

Kimya Walcott, University of Manitoba, Department of Environment and Geography.
umwalcok@myumanitoba.ca

Thesis Advisor:

Dr. Richard Baydack, University of Manitoba Professor and Chair, Environmental Science and Studies.
Rick.Baydack@umanitoba.ca

This is a consent form, a copy will be provided to you for your records and reference; this is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or Information not included here, you should feel free to ask. Please take the time to read this carefully.

Project Description:

This thesis research is being conducted in fulfillment of the requirements of a degree of Masters in Environment at the University of Manitoba. Therefore, information documented during the gap analysis will be part of a public report produced for the University of Manitoba.

The goal of this thesis research is to provide a comprehensive examination of the intent of the new ISO 14001:2015 Environmental Management System (EMS) Standard (the new Standard) in order to develop a conformance strategy suitable for adoption by select Canadian electrical utilities. Specifically, the conformance strategy will provide environmental decision-makers employed by these companies with a real-world application guide that can be used to assist with the transition process.

This thesis research is comprised of three main objectives. Objective one includes an examination of the following research questions: 1. What are the key factors hindering the successful implementation of an ISO 14001 compliant EMS?; 2. What are some of the recommended factors for the successful implementation of an ISO 14001 compliant EMS?; 3. Is there sufficient justification for Canadian electrical utilities to externally register their EMS?; and 4. What are the significant differences between ISO 14001:2004 and ISO 14001:2015? These questions will be answered by performing a literature review. Objective 2 includes performing a gap analysis in order to identify gaps in conformance to significant changes in the new Standard (the target state). Objective 3 uses the results from objectives one and two to develop a conformance strategy that is suitable for use by select Canadian electrical utilities.

Gap Analysis Questions

The gap analysis consists of 33 yes or no questions. Participants are also asked to provide examples of business processes, products or services that can be used to demonstrate conformance with the new requirements outlined in the gap analysis questions. Participants are asked to assign a rating for "degree of conformance". This is a measure that best reflects their confidence with their organization's degree of conformance to the new requirements. This is an instinctive measure of the amount of effort required by their utility to achieve conformance. This measure was included to allow companies to look beyond the questions being asked and to perform an overall assessment based on their perspective in relation to their degree of conformance; this can also be referred to as a 'gut check.'

A gap analysis handbook will be provided to you to document all responses.

Participants will be able to review the gap analysis questions and the responses they have provided at any time during the course of this thesis research in order to clarify any misunderstandings. This information will only be available for review prior to the finalization of this thesis research.

Participants have the right to withdraw from this thesis research at anytime during the course of this research; however, participants must inform the researcher of their desire to withdraw the information they have provided prior to the researcher submitting this thesis research to

the Faculty of Graduate Studies or before it becomes impossible to tell which data originated from which source. Upon receiving a request from a participant to withdraw from this thesis research all information provided by that participant will be immediately destroyed. Participants can request to withdraw from this thesis research by emailing the researcher at umwalcok@myumanitoba.ca . All requests to withdraw should be submitted before October, 2017.

Data Handling

The primary researcher is the only one who will have access to the raw data collected from the gap analysis. The gap analysis data will be collected during the annual Canadian Utilities Audit Specialty group meeting. The gap analysis is designed to collect data related to gaps in conformance to key changes identified in the new Standard. The data collected relates only to the changes that are considered significant. Gap analysis responses will be stored in hard copy only. Gap analysis responses will also be treated with anonymity. Company names will not be included in the final thesis document. The collective term "select Canadian electrical utilities" will be used throughout this thesis research to refer to participants. Gap analysis responses will be analyzed and synthesized in a manner that will ensure that responses will not be traced to the respondent or their corresponding company. When presenting and discussing the gap analysis, results will either be discussed as a general summary or companies will be addressed using pseudonym-numbers (company 1, 2 3...etc.) and not by their actual names.

Risks and Benefits of Participation

There are no physical, psychological, and/or emotional risks to participants or to a third party. All potential risk will be alleviated by strictly adhering to confidentiality agreements made in this consent document. For instance, companies may be concerned about gaps in EMS conformance being identified during the gap analysis but this risk is alleviated as it will not be possible to trace the information provided back to any company in the final report. The researcher will also carefully review all information provided to ensure that any information classified as a unique identifier is not included in this thesis research.

Formal permission from the participant's employer is not required; however, there may be a risk to participants if potentially confidential or proprietary information is provided without first obtaining the permission of their employer. While the nature of the gap analysis questions do not lend themselves to confidential or proprietary responses, participants can delay providing consent in order to first obtain the permission of their employer to alleviate any risk to them.

Participants should also be mindful of the nature of the information provided and not provide any information which they know to be confidential or proprietary. Furthermore, participants are asked to answer questions based on their own observations/experiences as individuals and not on behalf of their employer.

Personal names of participants will **not** be included in this thesis research. All responses will be carefully examined and any information that could link a person or company to their responses will not be included in this thesis research. Participants who do not wish to provide information based on their own observations/experiences as an individual have the option of declining consent or not participating in the gap analysis without any negative consequences to them.

Benefits to participants include being provided with information that will expedite their transition planning, therefore increasing the likelihood of meeting the September 2018 transition deadline. Additional benefits include cost savings as a result of less reliance on employees and consulting services to perform a gap analysis and design a conformance strategy. Participants will also have the benefit of being exposed to best practices of other similar organizations which will help in the continual improvement of their EMS.

Consent

As participants will notice, I will be fulfilling two roles during this thesis research, one as an employee of Manitoba Hydro and secondly as a researcher for the University of Manitoba. I would like to reiterate that consenting to participate in the gap analysis and to have the information provided included in this thesis research for the University of Manitoba is completely voluntary. Also, as stated earlier the primary researcher is the only one who will have access to the raw data collected from the gap analysis. The raw data will not be made available or discussed with anyone other than the individual who provided the information. Therefore, the raw data will not be discussed or provided to my employer (Manitoba Hydro). This is a self funded thesis research project; therefore, there is no obligation to provide the raw data to anyone.

Should you choose to decline you can do so without any negative consequences whatsoever. The primary researcher will also be the only one aware of who provided consent and who did not.

The raw data collected from the gap analysis will be destroyed at the completion and submission of this research or no later than March, 2020.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. Should consent be declined, any information provided during the gap analysis will only be reported back to the participant who provided the information for review

purposes. I would like to reiterate that if this consent form is not signed by the company representative at the Canadian Electrical Utility Audit Specialty meeting, the information you have provided should you choose to participate in the gap analysis will not be part of a public report produced for the University of Manitoba.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

This research has been approved by the "Joint-Faculty Research Ethics Board". If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 204 474-7122 or by email at *humanethics@umanitoba.ca*. A copy of this consent form has been given to you to keep for your records and reference.

Participant's Signature _____ Date _____

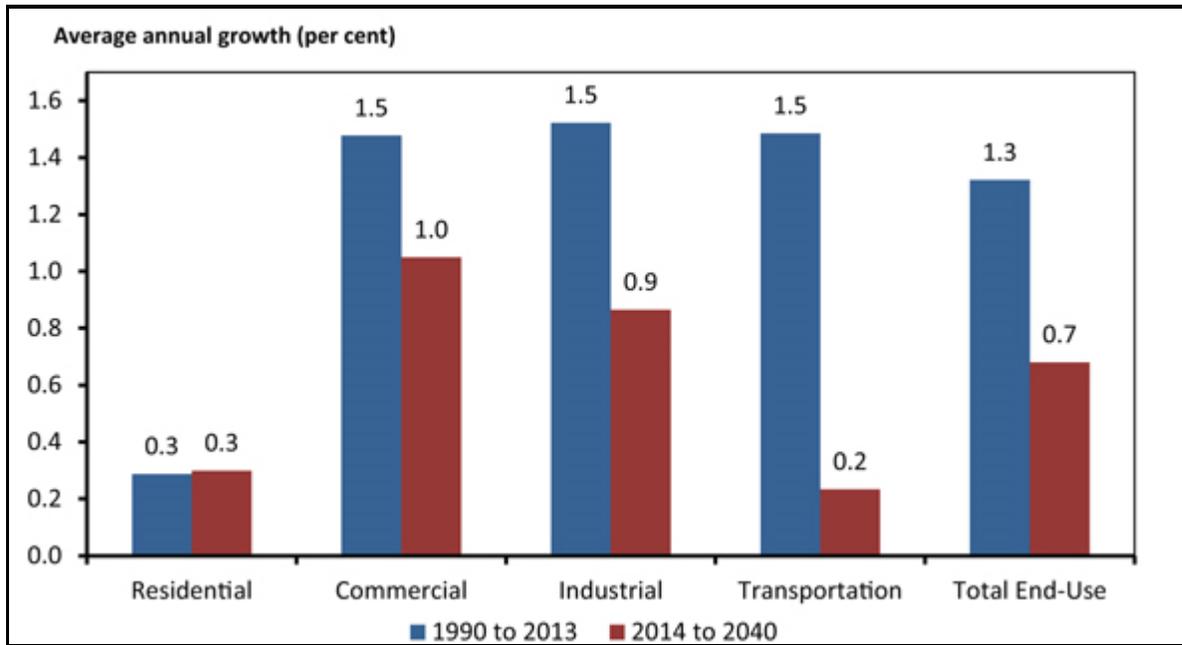
Researcher and/or Delegate's Signature _____ Date _____

Email or surface mail address to which a summary of findings and written reports (at your option)

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National Energy Board

Copyright permission was granted on June 16, 2017 via an email exchange for Figure 3:



(National Energy Board, 2016)

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Sent: Friday, June 16, 2017 4:18 PM

To: Walcott, Kimya

Subject: RE: Copyright question

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2017-06-27

Kimya Walcott, Master's Candidate

Subject: Reproduction of portions of ISO 14001:2015 (the "Publication")

Dear Ms. Walcott,

In response to your recent request and based on the information that you have provided to us, the Standards Council of Canada is pleased to grant Kimya Walcott (the "Requestor") permission to reproduce the following:

- The specific content from the Publication ("Content") listed below;
Reproduction of the Content in Assessment of ISO 14001:2015, Environmental Management System Standard: A Conformance Strategy for Select Canadian Electrical Utilities
- 2017-09-30

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Figure 1
Table B.1