University of Alberta

DESIGNING SUSTAINABLE DEVELOPMENT INDICATORS AT AN ELECTRIC UTILITY

by

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ABSTRACT

There is a pressing requirement to determine how electricity needs can be met in a more sustainable manner. Although many electric utilities have begun developing strategies for addressing the challenge of sustainable development, there are ongoing needs to find methods of measuring progress with respect to the economic, environmental, and social impacts of electric utilities. Fundamental to this task is the creation and integration of sustainable development indicators.

The purpose of this research was to develop an original system of sustainable development indicators specifically tailored to the transmission system of an electric utility. To achieve this aim, a six-step Sustainable Development Indicator Design Process was developed: (1) conduct a needs assessment; (2) conduct process planning; (3) develop a draft set of indicators; (4) test and adjust the indicators; (5) integrate the indicators; and (6) review and improve. Every step in the process involved consultation with internal experts at the case utility and external experts in the field of sustainable development indicators.

To maximize the utility of the indicators, the process had an overarching emphasis on integration with existing business infrastructure. A total of 98 indicators were incorporated into the system of indicators, with 70 being developed as a part of this process and 28 representing indicators previously developed by the company. Recognizing the difficulty of working with nearly 100 unstructured measures, four techniques were used to increase the utility of the indicators: (1) the indicators were clustered around eight key priority areas, (2) the indicators were organized according to a hierarchical approach linked to the business planning process, (3) the process of

integrating the indicators with existing corporate initiatives was staggered over time, and (4) a tiered aggregate was developed.

The potential benefits of the project are vast. The indicators provide a means for electric utilities to measure the progress of their transmission systems with regard to sustainable development. The development of an original indicator integration model provides a method to integrate performance indicators with existing business infrastructure. Furthermore, the indicator design process provides a basis for improved design of corporate sustainability indicators.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AHP	Analytic Hierarchy Process
BSI	British Standards Institute
CCFM	Canadian Council of Forest Ministers
CEA	Canadian Electricity Association
CFBE	Canadian Framework for Business Excellence
CSA	Community Sustainability Auditing
CSP	Corporate Strategic Plan
CSR	Corporate Social Responsibility
DSM	Demand Side Management
ECR	Environmental Commitment and Responsibility Program
EFQM	European Foundation for Quality Management
EMAS	Eco-Management and Audit Scheme
EMF	Electromagnetic Field
EMS	Environmental Management Systems
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
IISD	International Institute for Sustainable Development
IMS	Integrated Management Systems
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
MCDM	Multi-criteria Decision-making
MSS	Management System Standards
NGO	Non-Governmental Organization

NIST	National Institute of Standards and Technology
NQI	National Quality Institute
OECD	Organization for Economic Cooperation and Development
OHSAS	Occupational Health and Safety Assessment Series
PAR	Participative Action Research
PDCA	Plan-Do-Check-Act
PERI	Public Environmental Reporting Initiative
PSR	Pressure State Response
R&D	Research and Development
ROW	Right of Way
SAI	Social Accountability International
SD	Sustainable Development
SDI	Sustainable Development Indicator
SDR	Sustainable Development Records
TBL	Triple Bottom Line
T&D	Transmission and Distribution
TDSP	Transmission and Distribution Strategic Plan
TQM	Total Quality Management
UN	United Nations
VTE	Vulnerable, Threatened, or Endangered Species
WBCSD	World Business Council for Sustainable Development
WCED	World Commission on Environment and Development

1 INTRODUCTION

1.1 Sustainable Development in Industry

Over the last decade, there has been a substantial shift in what society expects from business. It is no longer sufficient to merely provide a quality product at a reasonable price. More than ever, organizations are now challenged to consider the entire life cycle implications of their activities. They are under growing pressure from both outside and within the company to be more open, more accountable for a wide range of actions, and to report publicly on their performance in social and environmental areas (WBCSD, 2000). While the creation of shareholder value remains a central consideration, there is a growing recognition that it cannot be seen in isolation (Dudok van Heel *et al.*, 2001 and Foley, 2005).

In response to this pressure, quality issues have evolved from a focus on product performance and costs to comprehensively addressing business excellence (Isaksson and Garvare, 2003). In turn, the concept of business excellence has broadened from a focus on direct customers and economic results to addressing the issues of all impacted stakeholders and concentrating on the "triple bottom line" of economic, environmental, and social performance (Edgeman, 2000 and Garvare and Isaksson, 2001). Increasingly, sustainability issues are becoming a part of what defines business success (WBCSD, 2002a).

Defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987), sustainable development has significant implications for many companies. In particular, it requires decision-making tools that address the impacts associated with an

organization's key environmental, economic, and social issues. However, although that notion is widely accepted and understood, the practice remains more elusive (Becker, 2004; Carvelho, 2001; Epstein and Roy, 2003; Hoopwood et al., 2005; Pfhal, 2005; and Robinson, 2000).

Dudok van Heel *et al.* (2001) report that the lack of robust, generally accepted measures of sustainability performance is the biggest research gap plaguing the operationalization of sustainable development. However, the design of a set of sustainable development indicators alone will not necessarily ensure that triple bottom line issues are considered in organizational decision-making. Another key challenge is to ensure that the indicators are integrated into mainstream business processes and systems (WBCSD, 2002b).

1.2 Sustainable Development in the Electric Utility Industry

Although industries of all types are struggling with the concept of sustainable development, effort is particularly needed in the electric utility industry. There are a number of driving forces for sustainable development in that sector. Among the most significant are the need to meet or exceed regulatory requirements, conditions of operating licenses, participation in voluntary initiatives, and stakeholder demands for increased transparency, accountability, and responsibility (WBCSD, 2002c). Continued technological innovation, increasing trends towards deregulation, and other changing market conditions mean that these and other environmental, economic, and social issues must be addressed at a time when the industry is undergoing unprecedented change (WBCSD, 2002c).

However, although the electric utility industry is one of the leading industries in sustainability reporting (see, for example, Andrews and Slater, 2002 and Stratos, 2003), many companies have struggled to apply the principles of sustainable development in their decision-making processes (WBCSD, 2002c). Even in electric utilities that have made a strong commitment to sustainable development, there are ongoing requirements to develop and implement sustainable development indicators. Electric utilities, and industry in general, specifically need:

1. A clear, flexible, and transparent process to create sustainable development indicators.
2. Example indicators that address environmental, economic, and social issues.
3. A model to integrate indicators with existing initiatives.

This research addresses each of those needs. This study therefore provides a unique example of how to develop and integrate sustainable development indicators for one of Canada's largest industrial sectors. In addition to the benefits gained by the electric utility sector, the research provides a needed starting point for other sectors.

1.3 Purpose and Overall Objectives

The purpose of this research was to develop an original system of sustainable development indicators specifically tailored to the transmission system of an electric utility. The research also called for the development of an original indicator integration model that focused on integrating the indicators with existing business

infrastructure. To this end, an in-depth case study with a major Canadian electric utility was conducted. The primary objectives of the case study were to:

1. Evaluate a process for creating sustainable development indicators in a corporate context.
2. Develop sustainable development indicators for the transmission system of a Canadian electric utility.
3. Develop an indicator integration model to incorporate the system of sustainable development indicators into existing business infrastructure.

A more detailed breakdown of the research objectives is available in Section 2.13.

1.4 Scope

The focus of the indicators was limited to the case utility's major high voltage transmission lines. The major high voltage transmission system operates at 115, 138, 230, and 500 kilovolts (kV) on alternating current (AC) and at 500 kV on direct current (DC) lines. Transmission lines operating below 115 kV were not considered as a part of this study since they are considered a part of the utility's distribution system. The rationale underlying this selection is that a transmission system is a required piece of most energy systems, whether the power is generated from hydro, fossil fuel, nuclear, or wind-based sources. Although it is recognized that at-source power generation options would eliminate the need for a transmission system, it is anticipated that these systems will continue to provide the majority of electricity for the foreseeable future (WBCSD, 2002c).

Since the case utility operates over 20,000 kilometres of transmission lines that influence many aspects of the environment, economy, and society, the group of internal and external stakeholders in any project is potentially quite large. However, it was not possible to meet with each and every potential stakeholder as a part of this project. Therefore, it was necessary to undertake a limited consultation. Participants were selected on the basis of their experience working with the case utility and/or their experience in working with sustainable development indicators. Further details on the consultation methods and participants are available in Sections 3 – 7.

Finally, it should be noted that this dissertation builds on the work conducted by Searcy (2002). To ensure the continuity of the dissertation, small sections of that document have been included where necessary. Furthermore, some sections of the dissertation have been previously published in Searcy *et al.* (2004, 2005a, 2005b, 2006a, 2006b, and 2006c) and Rocha *et al.* (2005).

1.5 Organization of the Dissertation

The dissertation is organized into eight sections. Following this section, Section 2 presents the results of an extensive review of published literature on sustainable development indicators and other material relevant to the research. Section 3 outlines the methodology used to achieve the research objectives. The results of the case study are presented and discussed in Sections 4 – 7, followed by the conclusions and recommendations for further research in Section 8. A summary of references is provided at the end of the dissertation and several appendices are also included to provide supporting materials for the previous sections.

2 LITERATURE REVIEW

2.1 Introduction

This section reviews the current state-of-the-art of sustainable development indicators. Since effective implementation requires more than simply reporting on a set of indicators, literature pertaining to integrated management systems is also emphasized. Furthermore, since pursuing a commitment to sustainable development does not mean abandoning old methods, but rather building them into a broader framework (van den Burgh, 1996), key literature from several other disciplines is also surveyed. Relevant literature pertaining to environmental management, performance measurement, multi-criteria decision-making, corporate social responsibility, total quality management, and aggregation are therefore reviewed. As illustrated in Figure 2.1, all of these disciplines are linked by a review of literature on stakeholder theory. This is an essential point, since sustainable development cannot be considered without stakeholder input.

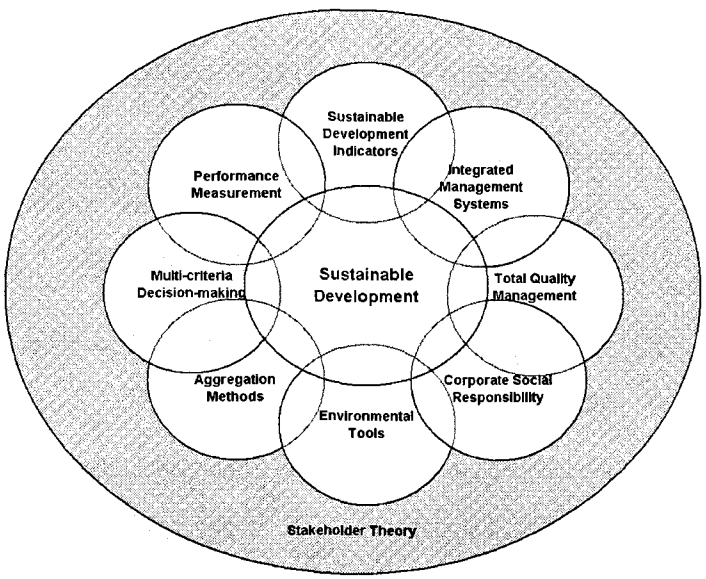


FIGURE 2.1
KEY AREAS SURVEYED IN THE PUBLISHED LITERATURE

Finally, as there is little peer-reviewed literature on indicators that pertains directly to electric utilities, the review surveys material relevant to all corporations.

2.2 Sustainable Development

As Bell and Morse (2003) explain, the notion of sustainable development comprises two concepts: development (to improve) and sustainability (to maintain). While these may appear to be contradictory, it is important to emphasize that "sustainable" does not imply preservation of a static state of affairs (Walter and Wilkerson, 1998). Sustainability is a dynamic, evolutionary process that requires an emphasis on continuous improvement.

Sustainable development is generally interpreted to require improvement in the areas of economic, environmental, and social performance. These three dimensions represent the "triple bottom line" (Elkington, 1997) of organizational performance and are often referred to as the three pillars of sustainable development. Rather than treating issues associated with the three pillars as mutually exclusive, sustainable development recognizes the need for integrated solutions to problems. As the WBCSD (2002c) highlights, many electric utilities have recognized, and struggled to address, this challenge.

Although the amorphous nature of the concept has lead to considerable debate on what sustainable development means in practice (Beloff *et al.*, 2004), there is growing agreement on its key requirements. Gibson (2004) summarizes some general requirements as social and ecological integrity, sufficiency and opportunity, equity, efficiency and throughput reduction, democracy and civility, precaution and adaptation, and immediate and long-term integration. As Gibson acknowledges,

other formulations are possible and the items could be presented in different ways. Epstein and Roy (2003), Chinien *et al.* (2004), and Hardi and Zdan (1997) all offer general examples of alternative formulations while the WBCSD (2002c) summarizes the key sustainable development principles and objectives for electric utilities.

While the concept of sustainable development initially emerged as a global issue, it has increasingly been applied at the corporate level (Atkinson, 2000; Bansal, 2005; and Ehrenfeld, 2005). As Edgeman and Hensler (2001) note, sustainable development issues are now essential to all types of organizations. Building on the most widely accepted definition of sustainable development (WCED, 1987), corporate sustainable development is the capability to anticipate and meet the needs of both present and future generations of stakeholders (Hund *et al.*, 2004). In addition to strengthening relationships with stakeholders, some benefits of pursuing such a commitment may include improved efficiency, reduced risk, best practice influence on regulation, and increased emphasis on innovation (see, for example, Dudok van Heel *et al.*, 2001; WBCSD, 2001; and Willard, 2002). Furthermore, with the legitimacy (Andriof *et al.*, 2002 and Suchman, 1995) of organizational actions becoming more central to the contemporary business enterprise (Foley, 2005), a consideration of sustainable development issues may also help improve the reputation of the company (Dudok van Heel *et al.*, 2001).

In an effort to apply the principles of sustainable development, organizations have developed a multitude of policies, plans, and programs (Beloff *et al.*, 2004). For instance, many electric utilities have developed sustainable development policies, committed to stakeholder consultation, implemented environmental management

systems, promoted renewable energy development, initiated education programs, and have begun reporting on some aspects of their sustainable development performance (WBCSD, 2002c). However rhetoric, not substance, is unfortunately the fate of many sustainability initiatives (Wijkman, 1999). This underscores the fact that the hardest part about sustainable development is actually applying it (Hart, 1998) to achieve organizational aims.

As Schwarz *et al.* (2002) note, putting the concept of sustainable development into operation "requires practical, cost-effective ways to assess performance and measure progress." Fundamental to this task is the creation and integration of sustainable development indicators.

2.3 Sustainable Development Indicators

There are many definitions of indicators in the literature (see, for example, Bell and Morse, 2003; Bossel, 1999; and Meadows, 1998). One concise summary is that "an indicator is simply a measure of things we value" (Walter and Wilkerson, 1998). Using both quantitative and qualitative information, indicators reflect the status of larger systems. While indicators cannot provide information on everything about the system in question, they should provide enough to make good decisions possible (Bossel, 1999). In particular, they ought to build the foundation for improved information and data collection, and enable an analysis of the state of and progress towards sustainable development goals (Spangenberg *et al.*, 2002). Note that the terms indicators and measures are used synonymously in this dissertation.

There are few sustainable development indicator programs specifically designed for electric utilities, but there are many examples of other corporate

indicator programs available. However, while existing performance standards serve as useful reference points, an essential point is that an organization should go through the development of the indicators from the first principles (Bell and Morse, 2003; Keeble *et al.*, 2003; Wackernagel *et al.*, 2002; and Walter and Wilkerson, 1998). This will help the organization develop a sense of ownership over the results, fully realize the benefits of organizational learning, and ensure the results truly reflect the values and business situation of the company. As Walter and Wilkerson (1998) note, the manner in which the indicators are produced is therefore just as important as the indicators themselves.

Prior to reviewing existing sets of indicators, this section therefore reviews the process of developing indicators. While there is no universally applicable guide to indicator development, there are tools available to assist in the design process.

2.3.1 Indicator Design Processes

While there are guidelines available to assist in their creation (Hardi and Zdan, 1997), one reason the development of indicators remains subject to considerable debate is that the diversity of approaches taken makes it difficult to reproduce results (Dudok van Heel *et al.*, 2001). Although it is recognized that each organization will have to tailor a process to make it applicable to its own unique situation, there is a need for a flexible, broadly applicable methodology that emphasizes transparency and stakeholder involvement in the development of the indicators. However, the development of a sustainable development indicator design process for corporations is largely unexplored in the published literature. This is a

critical gap because the process of addressing sustainable development is itself one of the central and defining characteristics of the concept.

While they are not directly applicable to the development of indicators for corporations, there are a number of models available to help provide a starting point. Among the methodologies developed for community indicator programs are those by Maclaren (1996), Valentin and Spangenberg (2000), Wackernagel *et al.* (2002), and Walter and Wilkerson (1998). Examples from strategic planning (see, for example, Bryson, 1995), research protocols (Robson, 1993), and project management (Project Management Institute, 2000) provide additional insight.

2.3.2 Conceptual Frameworks

To help organize and prompt the selection of the indicators, all sustainable development indicator projects use a conceptual framework. As Walter and Wilkerson (1998) note, it is a set of interrelated concepts, principles, and ideas that help organize and direct thinking about a particular issue. An effective framework should therefore help determine priorities in the choice of indicators and help communicate those choices to interested stakeholders (Hardi and Zdan, 1997).

Although there are many variations on these frameworks, some models to consider include the environment-economy-society approach (see, for example, Hart, 1998), the pressure-state-response (PSR) approach (OCED, 1994), the biophysical-economic-societal-technological (BEST) approach (Hensler and Edgeman, 2002), the capital stocks approach (Meadows, 1998), the ecology-equity-economy approach (McDonough and Braungart, 2002), the community sustainability auditing (CSA) approach (Walter and Wilkerson, 1998), and the sustainable development records

(SDR) approach (Nilsson *et al.*, 1998). However, despite the proliferation of models, there is a need for further research on how to tailor a conceptual framework to the specific needs of an organization. For instance, while many electric utilities have structured their sustainable development initiatives using the environment-economy-society approach (WBCSD, 2002c), there is a need to study how that framework can help facilitate the integration of sustainable development with existing operations.

2.3.3 Example Indicators

Although focusing on standardized sets of indicators will not lead to the development of innovative measures specifically tailored to the unique needs of the organization (Kaplan and Norton, 1996), there are a number of existing programs that may help inform the development of indicators. Parris and Kates (2003) provide a discussion of twelve corporate and community indicator programs, while the International Institute for Sustainable Development (IISD) provides an online compendium of over 500 indicator initiatives (IISD, 2005a).

Community indicator programs have been initiated at the international (see, for example, UN, 2003), national (Environment Canada, 2003), regional (Manitoba Conservation, 2005), and local (Sustainable Calgary, 2002) government levels. As Labuschagne *et al.* (2004) note, although aspects addressed by community frameworks are not all relevant to the business community, they do provide insight into what sustainability entails. Bell and Morse (2003) provide a summary of the differences between community and corporate indicators.

While indicators specific to the electric utility industry are in the earliest stages of development (GRI, 2006a), there are a limited number of indicator sets for

the energy sector. For example, Afgan *et al.* (2000) defines a generic set of fourteen indicators for energy system assessment, Spalding-Fecher (2003) suggests eight indicators for South Africa's energy sector based on Helio International's (2006) Sustainable Energy Watch Indicators, Rosenthal (2004) presents eighteen indicators for the electricity system in Danlin, China, and Vera *et al.* (2005) present a set of thirty indicators for sustainable energy development. However, these programs focus on energy development at the regional and national, rather than corporate, levels. Furthermore, the indicators in these systems focus almost exclusively on the generation aspects of the energy sector, with transmission and distribution issues receiving very little attention.

With few examples in the electric utility or energy sector to consider, it is useful to reflect on the literature pertaining to corporate sustainability in general. The literature on corporate sustainable development indicators is growing rapidly. Some relevant examples include those from the chemical industry (IChemE, 2004), mining and minerals (Azapagic, 2004 and Yachnin and Associates *et al.*, 2006), production (Azapagic and Perdan, 2000 and Veleva and Ellenbecker, 2001), and forestry (CCFM, 2000). However, the most popular corporate sustainability reporting framework is by far the Global Reporting Initiative (GRI, 2002).

The GRI guidelines have been voluntarily applied in hundreds of companies representing a number of different industries, including the energy sector (GRI, 2006b). For example, BC Hydro (2006), Hydro Quebec (2006), and Wisconsin Energy (2006) are among the forty-seven energy utilities that publish supplements to their annual reports on indicators drawn from the GRI. However, while the GRI has

enhanced awareness regarding the use of sustainable development indicators at the corporate level, it has been subjected to significant criticism (see, for example, Stratos, 2002). The most common criticisms include that there are too many indicators in the unstructured core set, the representation of the three pillars of sustainable development is not balanced, and that premature standardization of indicators may stunt innovation.

However, the GRI is not alone in facing such criticism. As Labuschagne *et al.* (2004) observe, many of the other existing indicator systems do not effectively measure business sustainability, even in their own areas. For example, most indicator programs in industry are heavily focused on environmental indicators, with social issues in particular receiving little attention. Some of the other common problems include a lack of transparency (Veleva and Ellenbecker, 2001), a tendency to measure too much (Neely, 1998), an overwhelming focus on standard measures (Kaplan and Norton, 1996), limited predictive capability of selected indicators (Neely, 1998), and limiting focus to existing processes (Kaplan and Norton, 1996). An issue that merits special attention is the lack of guidance regarding the integration of the indicators (Morse *et al.*, 2001).

2.4 Performance Measurement

The ability to measure performance is a prerequisite for business improvement (Lohman *et al.*, 2004). However, there is widespread agreement that existing performance measurement systems are rarely enough to improve business performance (Neely, 1998). Well-documented criticisms of traditional measurement systems include that they tend to encourage short-term thinking, merely report past

history, encourage local optimization, and fail to account for issues other than financial performance (Neely, 1999). Another significant concern is that the measures are rarely integrated with the organization's business strategy (Neely, 1998). These issues are at the heart of many sustainability indicator initiatives.

One less-documented, but no less important, weakness is that most performance measurement systems do not explicitly consider the impact of existing internal projects (Lohman *et al.*, 2004; Tangen, 2004; and Wouters and Sportel, 2005). Implicit in many approaches for designing indicators is a "green field approach" that largely ignores the company's existing initiatives (Lohman *et al.*, 2004). This is a critical weakness that many sustainable development indicator projects have also struggled to overcome. For instance, the GRI (2002) was developed as a stand-alone external reporting tool that provides little concrete advice on how to integrate its suggested indicators with existing internal initiatives. There is a need for research on how existing internal measures influence the development of expanded performance measurement systems.

In response, authors are increasingly emphasizing the need to move beyond a set of individual performance measures to more comprehensive performance measurement systems. The Balanced Scorecard (Kaplan and Norton, 1996) is perhaps the best known of these efforts and there are published studies that attempt to expand its four original perspectives to incorporate other elements, including those of the triple bottom line (Dias-Sardinha and Reijnders, 2005 and Figge *et al.*, 2002). Another performance measurement system that emphasizes a holistic approach is the Performance Prism (Neely *et al.*, 2001; Neely *et al.*, 2002; and Neely and Adams,

2005). Tangen (2004) provides a summary of the strengths and weaknesses of both the Balanced Scorecard and the Performance Prism. Afroza *et al.* (2003), Bourne *et al.* (2000, 2002), De Toni and Tonchia (2001), and Medori and Steeple (2000) provide additional illustrations of the need for enhanced measurement systems.

Therefore, while not explicitly focused on sustainable development indicators, research on performance measurement can help inform the development of such measures at an electric utility. Many of the issues that challenge sustainable development projects have also been identified in this area. For example, the literature on performance measurement identifies the need for further research on the development of non-financial indicators, on approaches to indicator development, on how to build on existing business systems, and on how indicators must evolve.

2.5 Multi-criteria Decision-making

Since sustainable development is a function of various environmental, economic, and social goals, any indicator development process must inevitably involve multi-objective tradeoffs (Loucks, 2000). The published literature is rich in discussions of multi-objective problems, especially in the area of operations research, but concepts from this discipline have also been applied in sustainable development indicator programs. Multi-criteria decision-making (MCDM) tools, particularly the identification of selection criteria, have been widely used in the development of indicators (see, for example, Maness and Farrell, 2004; Mendoza and Prabhu, 2000; and Popp *et al.*, 2001). The widespread use of indicator selection criteria demonstrates how MCDM concepts may be used to select appropriate indicators.

While less widely applied, the development of trade-off criteria can demonstrate the relevance of such techniques to the application of the selected indicators.

2.5.1 Indicator Selection Criteria

To clarify what makes a good indicator of sustainable development, virtually all projects identify a set of indicator selection criteria prior to attempting the creation of specific indicators. Doing so helps guide the indicator development process and provides a means to assess each of the proposed indicators. While the identification of the specific criteria is always at the discretion of those involved, this is a mature area of research and a starting point is provided by the many existing examples (see, for example, Bell and Morse, 2003; Meadows, 1998; and Veleva and Ellenbecker, 2001). The main caution to note is that while criteria are useful in guiding the selection of indictors, they are not a guarantee the indicators selected will be the most useful to any given audience (Pinter *et al.*, 1999).

2.5.2 Trade-off Criteria

Trade-off criteria help decision-makers manage conflicting objectives between the selected indicators. As in the identification of indicator selection criteria, the indicator trade-off criteria are at the discretion of those involved. As Keeney and McDaniels (1999) illustrate, this is best accomplished in consultation with key stakeholders. A summary of approaches to trade-off decisions and some general rules for making decisions about trade-offs for sustainability are provided by Gibson (2004). However, research in this area is in the earliest stages of development and there is a need for work on how trade-off criteria may be applied in practice.

2.6 Aggregation

One of the most debated issues in the development of indicators is whether or not they should be subjected to some form of aggregation. Those advocating the practice believe a certain aggregation is needed to have a substantial effect on decision makers and to increase the visibility of sustainable development issues (see, for example, Jesinghaus, 2004 and Spangenberg *et al.*, 2002). However, others argue that aggregated measures often combine so much into one measure it is impossible to use them to identify problem areas.

Therefore, although higher aggregation levels may make the information more comprehensive and surveyable, it may simultaneously make it less transparent (Bell and Morse, 2003). This highlights that the purpose of an index, i.e. the set of aggregated indicators, is to indicate change, but not necessarily to disclose all aspects behind a change (Segnestam, 2002). As the OECD (1998) notes, the idea is to guide decision-makers in the right direction as opposed to getting the indicators strictly comprehensive and correct.

In any case, sustainable development indices are complex to create. The primary challenges involve determining the indicators to be included in the index, determining the relative weight of each of the included indicators, and determining how the indicators are combined (Mendoza and Prabhu, 2004). This last issue is particularly debated since the various economic, environmental, and social indicators will use different units of measurement (Bell and Morse, 2003). All of these challenges remain areas of active research and there is a need for further studies on how they may be addressed in electric utilities and in the broader corporate context.

2.6.1 Example Weighting Methods

While there is no universally accepted weighting method, there are a number of published methods to consider. Saaty's (1990) Analytic Hierarchy Process (AHP) applies a scientific approach to the weighting process, with a controversial consistency test being its most unique feature. However, it is time intensive to apply and becomes increasingly awkward as the number of factors to be evaluated increases. The Delphi Approach is another approach that has been used in a number of indicator projects. As described by Canter (1996), it is based on a series of questionnaires of relevant stakeholders or experts. The Delphi Approach offers anonymous ranking of the indicators and is applicable to large sets of measures, however it lacks the consistency test of AHP. A third option is the assignment of a predetermined number of points to the indicators and issues. For example, one possible method could be to distribute 100 points amongst the indicators (see, for example, Mendoza and Prabhu, 2000). This has the advantage of being the easiest, and perhaps most clear, of the three proposed methods. However, the weights of the individual indicators, and thus the overall index, could be skewed by a limited number of extreme scores.

It is important to note that the weights may be equal for all indicators and issues, particularly in the case where indicators are newly developed. This was the approach chosen in the Dashboard of Sustainability (IISD, 2005b). Time and experience may be required to determine the relative importance of each indicator in the index. The determination of appropriate weights remains an active area of debate.

2.6.2 Example Aggregation Programs

There are numerous aggregation methods in the published literature. For instance, the United Nations Division for Sustainable Development (UN, 2004) has analyzed nine initiatives for the aggregation of sustainable development indicators. The initiatives analyzed include the Ecological Footprint (Wackernagel and Rees, 1996), the Genuine Progress Indicator (Venetoulis and Cobb, 2004), the Dashboard of Sustainability (IISD, 2005b), and the Human Development Report Indices (UNDP, 2004). However, only the Dashboard of Sustainability is focused on addressing all three pillars of sustainable development. Furthermore, all of those initiatives focus on aggregating information at the national, rather than the company, level.

As Krajnc and Glavic (2005a and 2005b) note, there is still no useful method for integrated sustainable development assessment on the company level. This is an important research question that is only beginning to be addressed. Narodoslawsky and Krotscheck (2004) propose a Sustainable Process Index that is loosely based on the Ecological Footprint. However, the calculation of the amount of land that is necessary to support a human activity remains an imprecise data normalization method. In the Sustainable Development Composite Index, Krajnc and Glavic (2005a and 2005b) propose an alternative normalization procedure that is very similar to that used in the calculation of the Human Development Index (UNDP, 2004). Under Krajnc and Glavic's method indicators are calculated according to the following equations:

$$\text{Indicators of Positive SD} = \frac{\text{this year's value} - \text{minimum value over last 5 years}}{\text{maximum value over last 5 years} - \text{minimum value over last 5 years}}.$$

$$\text{Indicators of Negative SD} = 1 - \frac{\text{this year's value} - \text{minimum value over last 5 years}}{\text{maximum value over last 5 years} - \text{minimum value over last 5 years}}$$

As Krajnc and Glavic explain, indicators are considered positive if their increasing value has a positive impact towards a sustainable development goal (i.e. "more is better"). Indicators are considered negative if their increasing value has a negative impact towards a sustainable development goal (i.e. "less is better").

The Krajnc and Glavic method offers the advantage of incorporating different kinds of units by normalizing them to a value between 0 and 1, 0 being the worst score and 1 being the best. However, one weakness of this approach is that not all indicators must always increase or decrease. Some indicators may seek to remain within an appropriate range, while others may be based on a binary (yes/no) assessment. Addressing these types of indicators will require further research.

2.7 Environmental Tools

In many industries, sustainable development has its roots in addressing environmental issues. For example, there are a myriad of publications that deal specifically with the development of environmental indicators (see, for example, Chess *et al.*, 2005; ISO, 1999; OECD, 1998; Olsthoorn *et al.*, 2001; Niemeijer, 2002; Schuh and Thompson, 2002; and Veleva *et al.*, 2003). A special class of environmental indicators, eco-efficiency indicators, includes economic, as well as environmental, issues (DeSimone and Popoff, 2000). Within the Canadian electric utility industry, there are a limited number of standard environmental performance indicators that are widely used (CEA, 2004). Furthermore, many individual utilities, such as SaskPower (2006) and EPCOR (2006) publish environmental performance reports that include some indicators.

In addition to the many examples of environmental indicators, there are several publications pertaining to environmental reporting (Cormier and Gordon, 2001; Marshall and Brown, 2003; and PERI, 2005). However, the existing environmental indicator and reporting initiatives struggle with many of the same issues as those facing the creation of sustainable development indicators. Approaches to indicator development and the integration of the indicators with other initiatives are two areas in particular that are in need of further research. Therefore, although these initiatives are narrowly focused on only one of the three pillars of sustainable development, they can help provide insight into the development of a broader sustainable development framework.

Widely applied concepts such as strategic environmental assessment (see, for example, Noble, 2002 and Finnveden *et al.*, 2003), environmental impact assessment (Canter, 1996), design for environment (Fiskel, 1996), environmental management systems (ISO, 2004a and EMAS, 1993), industrial ecology (Graedel and Allenby, 1995), and life cycle assessment (Curran, 1996 and Graedel, 1998) are also gaining attention as supporting tools for sustainable development. Many of these tools have been explicitly linked to sustainable development and indicators in the literature. For example, Cooper (2003) has discussed the importance of using a life-cycle perspective in the development of indicators while Pflieger *et al.* (2005) has detailed how life cycle assessment can contribute to more effective sustainability reporting. Veleva *et al.* (2001) and McDonach and Yaneske (2002) have discussed the relationship between environmental management systems and corporate sustainability. Finally, Dewulf and van Langenhove (2005) have introduced the

notion of using the principles of industrial ecology to help inform the development of environmental indicators. Each of these programs is in its infancy and the exploration of other linkages between these disciplines is an area of active research. However, these efforts further demonstrate that sustainable development is interdisciplinary in nature and that addressing it requires that existing boundaries be crossed.

2.8 Corporate Social Responsibility

The need for improved environmental management is also one of the core objectives of most corporate social responsibility (CSR) programs. In addition to that issue, CSR includes concepts such as human rights, community involvement, safety, organizational governance, unfair business practice, and social development (Leonard and McAdam, 2003). The central proposition of CSR is that organizations must accept greater accountability for their actions (WBCSD, 2000).

CSR is an essential part of sustainable development. However, exactly where it fits is vigorously debated because both CSR and sustainable development have so many different interpretations (WBCSD, 2000). Challenges common to both CSR and sustainable development include establishing a workable organizational definition, appropriate goals, and meaningful measures. Enhancing linkages with existing management systems is another challenge common to both concepts that requires further research. Although it is focused primarily on only one of the three pillars, the notion of CSR bears a striking resemblance with the core principles of sustainable development. Research on the integration of sustainable development with existing operations will therefore provide a basis for improving CSR programs in electric utilities and other corporations.

2.9 Total Quality Management

There are many parallels between the implementation of a total quality management (TQM) program (Besterfield *et al.*, 1995; Dale, 2004; and Sila and Ebrahimpour, 2002) and applying the principles of sustainable development at the corporate level (Sisaye *et al.* 2004 and 2005). As Hitchcock and Willard (2002) note, the implementation process is strikingly similar. Both will require the development of a business case, performance measures, and ongoing assessment (Hitchcock and Willard, 2002). However, the linkages between TQM and sustainable development go well beyond procedural issues.

At their core, both TQM and sustainable development must emphasize the concepts of stakeholder duality and total organizational involvement. The concept of stakeholder duality implies that the role of all stakeholders in any project is dual: they provide input into the system and they also receive output from that system (Neely and Adams, 2005). One of the central tenants of quality is therefore that it starts and ends with stakeholders. This must also be the case for any sustainable development project. The TQM concept of total organizational involvement also requires that quality be built into every level of the organization (Dale, 2004). This underscores the fact that quality cannot be the job of one person or department, but rather it is the job of everyone associated with the organization (Foley, 2005). The challenge of building sustainable development into the day-to-day operation of an organization must be viewed in a similar manner (WBCSD, 2005).

There is also much to be learned from the success and failures of past TQM projects. Sohal and Terziovski (2000) identify several critical success factors for

TQM projects including a positive attitude towards quality, leadership education, integration of stakeholder concerns, and the development of appropriate performance indicators. As Hermel (1997) notes, some mistakes included neglecting the process itself by centering only on the pursued content, downplaying the role of stakeholders, lacking creativity, refusing to adapt methods to the unique organizational context, and to believe TQM in and of itself was a quality generator. These experiences offer important lessons to any sustainable development indicator project.

Building on Crosby's (1979) notion of "quality is free," both TQM and sustainable development are about getting people to do the things they should be doing anyway. However, as literature pertaining to both concepts makes clear, this is always a challenge and remains an area of active research. Given the many parallels between the concepts discussed above, further insight into the application of sustainable development at an electric utility may be drawn from business excellence models (see, for example, EFQM, 2001; NIST, 2005; and NQI, 2004), quality management standards (ISO 2000 and 2004b), and other literature related to TQM.

2.10 Integrated Management Systems

One of the primary criticisms of most existing indicator programs is that they provide little advice as to how the indicators may be integrated into existing structures (Morse *et al.*, 2001). This is a critical weakness because if sustainable development is seen as just another "add-on," it will not be viewed as an essential business imperative (Johnson and Walck, 2004). In recognition of this point, many authors have noted that sustainability programs must be directly linked with the continual improvement of business performance (Coelho and Moy, 2003) and must

be fully integrated with mainstream business strategies (Dudok van Heel *et al.*, 2001). However, the lack of a framework to integrate sustainable development into mainstream business processes is one of the biggest gaps preventing its application at the organizational level. There is very little in the peer-reviewed literature on how to address this important research question.

2.10.1 Sustainable Development Reporting

Most of the published literature focuses on how to create a sustainable development report rather than how to integrate the indicators into existing management systems. The Global Reporting Initiative (2002) is the most prominent of these guidelines, but useful guidelines on preparing a sustainable development report are also offered by the WBCSD (2002b) and Stratos (2003), among others. Each of these programs emphasizes the need to report on the triple bottom line of environmental, economic, and social performance. Evers *et al.* (2004) discuss the history of sustainability reporting while Kolk (2003) provides an overview of trends in sustainable development reporting amongst major companies.

However, while reporting is an important component of integration, there is more to integration than reporting on sustainability performance. Effective implementation of sustainable development indicators requires that they be built directly into the organization's core business infrastructure. Rather than creating an entirely new and independent information system, the indicators must be incorporated into the electric utility's existing performance measurement systems, management review processes, and other relevant internal initiatives.

2.10.2 The Integrated Management Systems Approach

To address the challenges noted above, a review of published literature pertaining to integrated management systems (IMS) is helpful (Beckmerhagen *et al.* 2003a and 2003b; Douglas and Glen; 2000; Holdsworth, 2003; Jonker and Karapetrovic, 2004; Karapetrovic, 2002 and 2003; Karapetrovic and Willborn, 1998; Seghezzi and Schweickardt, 2001; Von Ahsen and Funck, 2001; Wilkinson and Dale, 1999 and 2001, and Wright, 2000). While the IMS literature is generally focused on the cross-functional integration of independent management systems standards, such as ISO 9001, ISO 14001, OHSAS 18001, SA 8000, and AA 1000, it does provide insight into how an organization may incorporate sustainable development indicators into its existing business infrastructure. The key is to recognize that any organization must be conceptualized as a single system rather than a set of independent management and operational functions. Many IMS initiatives therefore focus on identifying and building on the key management systems elements that are common to all of the organization's initiatives. For instance, Karapetrovic (2003) focuses on the elements of goals, processes, and resources while Wilkinson and Dale (2001) focus on an expanded set of elements including policy, leadership, resources, processes, culture, goals, and stakeholders.

A similar element-based approach may be used to structure the incorporation of sustainable development indicators, or other performance measures, into existing organizational initiatives. However, the published IMS models are insufficient since they focus on integrating standardized management systems, lack the critical element of management review, do not place enough emphasis on the role of assessment, and

do not consider the concept of sustainable development. Although the value of an IMS-based approach to corporate sustainable development has been acknowledged in the literature (Oskarsson and von Malmborg, 2005), a model for the integration of indicators with existing business infrastructure has yet to be published.

2.10.3 Assessment Systems

As Foley (2005) notes, continual improvement requires that the organization regularly assess its processes and activities to identify improvements that add value to the system under consideration. Therefore, one of the most important points of any integration initiative is that it requires ongoing evaluation or assessment (Karapetrovic, 2003). However, although virtually all sustainable development indicator programs acknowledge that the indicators must evolve over time, most do not provide any detail as to how this might be accomplished.

To sustain the continuous improvement of any system, there are three levels of assessment available to organizations: (1) audits, (2) self-assessment, (3) and benchmarking. All three levels of assessment are complementary and all are discussed extensively in the literature (see, for example, Besterfield *et al.,* 1995; Dale, 2004; Karapetrovic and Willborn, 2001; and Ni and Karapetrovic, 2003). Audits offer the advantage of being both independent and objective (Foley, 2005). However, they require a standard on which to base the audit. Self-assessments offer the advantage of focusing on opportunities for improvement and emphasizing the need for follow-up action, both of which are weaknesses of auditing (Karapetrovic and Willborn, 2001). However, they lack the independence and objectivity of an audit. Finally, while both auditing and self-assessments are focused internally,

benchmarking focuses on comparing the performance of the company with others in the same industry (Dale, 2004).

As Kennerley and Neely (2002 and 2003) note, regular assessment of indicators is needed to review the ongoing usefulness of the indicators, identify changing organizational requirements, monitor data availability, and to determine the success of the integration effort. Foley (2005) adds that assessment is essential to move issues from the periphery to the centre of management attention and to demonstrate to key stakeholders that action has been taken. A model is therefore required to assess and improve the integration of sustainable development indicators with existing business infrastructure over time.

2.11 Stakeholder Theory

Stakeholders and their interests are the essential building blocks of business behavior (Foley, 2005). This is why all of the areas illustrated in Figure 2.1 are linked by stakeholder theory. Stakeholder consultation is therefore one of the most critical aspects of any sustainable development project since it is not possible to consider sustainability without regard for people (Bell and Morse, 2003).

Bryson (1995) defines a stakeholder as "any person, group or organization that can place a claim on an organization's attention, resources or outputs or is affected by that output." Foley (2005) adopts a more limited definition of a stakeholder, defining them as entities that could threaten the "viability of the enterprise and/or inflict unacceptably high costs if their needs and expectations are not met." Under either definition, it is clear that the needs of both employees of the organization and external parties must be considered. Moreover, the need to satisfy

the expectations of multiple stakeholders has significant implications for business. Two specific consequences identified by Foley (2005) are the need for (1) a greater emphasis on lead indicators and (2) increased prominence of non-financial information. Sustainable development indicators help address both of these issues.

Recognizing that an organization's stakeholders may change over time, Foley (2005) identifies customers, management, staff, suppliers, shareholders, and government as the major stakeholders of any organization. Electricity-sector watchdog agencies, non-governmental organizations, and academics/scientists are additional groups identified by the WBCSD (2002c) for electric utilities. Although Foley (2005) is careful to note that they are illustrative rather than comprehensive, he lists financial probity, risk, quality, health, safety, profit, the environment, ethics, and innovation as some key stakeholder interests (Foley, 2005). In any case, stakeholder interests can vary both within and between groups, change over time, and are often in conflict with each other (Foley, 2005; Andriof *et al.*, 2002; and Crowther, 2002). However, an organization must explicitly identify the key priorities of its stakeholders unless it intends to meet all of the perceived needs and expectations of all identified stakeholders or respond randomly; neither of which is feasible (Foley, 2005).

One of the first steps in any sustainable development indicator initiative is therefore to establish corporate priorities for action. Although the importance of identifying key priorities has been acknowledged by many authors (see, for example, Keeble *et al.* 2003; Maclaren, 1996; and Walter and Wilkerson, 1998), it remains one of the most overlooked challenges in the literature. This is an important gap because:

1. The selected priorities will form the basis for the rest of the indicator development process. If inappropriate priorities are selected, the development of meaningful indicators will not be possible.
2. The priority selection process provides an early opportunity to begin the integration of the indicators with existing business infrastructure. Establishing linkages to existing systems is necessary if the indicators are to become a part of the decision-making process.

With the above in mind, it is clear that the way to attain a truly meaningful, useful, and representative set of sustainable development indicators is to involve a broad section of key participants in the selection process (Sustainable Calgary, 2002). Only through meaningful consultation will a company be able to identify and act on the key priorities of its stakeholders.

The literature on stakeholder consultation is abundant. For example, there are numerous public consultation guides available including Sterne (1997), McMillan and Murgatroyd (1994), Greenbaum (2000), and Susskind *et al.* (1999). These publications provide insight into the process of setting consultation objectives, identifying key stakeholders, determining when and how to involve those stakeholders, preparing for consultations, conducting consultations, and, critically, following-up on consultations. All of these issues must be considered in the development of sustainable development indicators. In fact, many books focused on sustainable development provide their own brief summaries of stakeholder consultation methods including Bell and Morse (2003), Bossel (1999), and Meadows (1998). Literature pertaining to qualitative research, anthropology, and participative

action research (PAR) methods is also rich in both the theory and practice of stakeholder consultation. For further information, the interested reader is referred to Weinberg (2002), Russell (2002), and Reason and Bradbury (2001).

For a more detailed review of stakeholder consultation methods, the interested reader is referred to Searcy (2002).

2.12 Motivations for Research

There is increasing pressure on organizations of all types to conduct their activities in a manner that balances economic, environmental, and social factors. This pressure has come from all forms of stakeholders including investors, customers, governments, and the general public, looking for increased transparency, accountability, and responsibility. With these pressures in mind, many organizations have made a commitment to apply the principles of sustainable development to their operations. However, meeting this commitment is a complex and challenging undertaking that requires new methods of thinking about corporate performance.

Building on a notion introduced by van den Burgh (1996), effectively addressing sustainable development does not only involve the combining of multidisciplinary information, concepts, and theories, but also the synthesis of methods and models. Related topics such as performance measurement, corporate social responsibility, total quality management, integrated management systems, and assessment were therefore explored in the literature survey. Given the many common challenges between these related areas and sustainable development, it is clear that applying the lessons learned and the tools discussed throughout the survey will aid in the development of sustainable development indicators.

Recognizing that there is no direct way to measure sustainable development, and that measurement is not in itself a panacea for improved organizational performance, indicators provide a systematic means to measure and compel progress towards sustainable goals. In doing so, they can help address the most fundamental gap facing the application of sustainable development to industry. However, while progress has been made, research on corporate sustainable development indicators is still in its embryonic stages and work remains in developing indicators that meet the needs of industry.

There are currently no sets of sustainable development indicators for electric utilities in the peer-reviewed published literature. However, the gaps in the existing knowledge base go well beyond the indicators themselves. These gaps apply not only to electric utilities, but to indicators developed in other industries as well. Specifically, research on the development and integration of sustainable development indicators is required to:

- Identify a flexible, transparent process that may be tailored to the unique needs of different organizations.
- Demonstrate how a company can identify and act on the key sustainable development priorities of its stakeholders.
- Illustrate how a conceptual framework, particularly the widely used environment-economy-society model, may be applied to address the distinct needs of an organization.
- Identify how indicators may be structured to increase their usefulness.

- Investigate how existing measurement systems influence the development of newly created indicators.
- Establish how an aggregation method can address the varying goals of each individual indicator.
- Clearly show how sustainable development issues may be integrated with existing internal initiatives.
- Identify how indicators can be improved over time.
- Provide a reference point for future indicator development.
- Demonstrate that sustainable development is not an entirely new concept and that existing tools may be used or adapted to help address the priorities associated with it.

The overall goal of the research is therefore to help make action within the electric utility industry more effective while simultaneously contributing to the academic knowledge base. Furthermore, addressing these issues will provide a baseline for new insights into other areas. As explained in the literature survey, the development and implementation of environmental indicators, other performance measurement systems, and corporate social responsibility programs face many of these same challenges. The lessons learned throughout this research will therefore provide a needed starting point in other areas as well.

2.13 Research Objectives

The overall objectives of the research were identified in Section 1.3. A more detailed representation of the objectives can be described as follows:

1. To evaluate a process for creating sustainable development indicators in a corporate context. This will include:
   a. The application of the complete process to the case utility's transmission system.
   b. An assessment of the lessons learned following the application of the process.

2. To develop a system of sustainable development indicators for the transmission system of a Canadian electric utility. This will include:
   a. The identification of the key stakeholders whose needs must be addressed by the indicators.
   b. The selection of a conceptual framework to structure the identification of priorities and indicators.
   c. The identification of the key priorities to be addressed by the indicators.
   d. The application of a structured approach to represent linkages between the key priorities.
   e. The identification of existing internal measures and newly created indicators to be included in the system of indicators.

f. The development of indicator selection criteria to guide the selection of the indicators.

g. The identification of goals for each indicator.

h. The identification of a form of measurement for each indicator.

i. The application of a structured approach to represent linkages between the indicators.

j. An assessment of current data availability for each indicator.

k. The specification of an aggregation method that takes into consideration the varying goals for each indicator.

3. To develop an indicator integration model to incorporate the system of sustainable development indicators into existing business infrastructure. The model will include:

   a. The identification of a generic set of integration elements that was common to all of the case utility's existing internal initiatives.

   b. An analysis of how the integration elements may be used to structure the integration of the indicators at the case utility.

   c. The development of indicator trade-off criteria to help guide the application of the indicators at the case utility.

   d. The development of an assessment model to drive the continuous improvement of the indicators and the integration effort.

Completing these objectives will help address the primary research question of "how do you measure progress towards sustainable development in electric utilities?"

3 RESEARCH METHODOLOGY

3.1 Introduction

This section discusses the research methodology. It includes:

- A discussion of the general approach to the research.
- A profile of the case utility.
- Details on the development of the indicator design process.
- An overview of the Sustainable Development Indicator (SDI) Design Process.
- A summary of the research instruments and protocol.

3.2 General Approach to the Research

This research was based on the study of a major Canadian electric utility. The study occurred between December 2000 and December 2005. The results of the first phase of the research, conducted between December 2000 and September 2002, were reported in Searcy (2002). This dissertation reports on the results of the study obtained between September 2003 and December 2005.

A single-case study approach was selected as the research method. Case studies have a long history in research and are a "frequent mode of thesis and dissertation research in all disciplines and fields" (Yin, 2003). However, as in any research methodology, it is important to understand that the case study method does have limitations in addition to its strengths. Feagin *et al.* (1991), Voss *et al.* (2002), and Yin (2003) provide discussions of the strengths and limitations of the case study approach.

Among the most prominent limitations of the single-case study method is the issue of generalization (Yin, 2003). Since only one company provides the basis for all results, there is some uncertainty as to whether the results will apply elsewhere. Second, there is the issue of stakeholder representation. The individuals consulted will always heavily influence the results achieved. Third, an exaggerated emphasis may be placed on easily available data (Voss *et al.*, 2002). Fourth, without the controlled conditions provided in a laboratory, it may be difficult to draw conclusions about cause and effect relationships. Finally, case studies are time consuming.

However, case studies are ideal where a holistic, in-depth investigation is required (Feagin *et al.*, 1991) or the focus is on a contemporary event (Yin, 2003). Provided the limitations are understood and the scope of the study is clear, there are many benefits to conducting a case study. Since case studies are based on actual experience working with real companies and real people, they are highly practical in nature and tend to have high validity with practitioners (Voss *et al.*, 2002). Part of this practicality is that case studies permit a focused exploration of solutions for complex issues (Feagin *et al.*, 1991). In addition to testing and refining existing theory, case studies are therefore "particularly suitable for developing new theories and ideas" and for "studying emergent practices" (Voss *et al.*, 2002). As Voss *et al.* (2002) note, many breakthrough concepts and theories have been developed through case research. In fact, Meredith (1998) lists one of the "outstanding strengths" of the case study to be its application to early, exploratory investigations where the phenomenon is still not well understood. These factors all indicate that a case study approach is suitable to the design of sustainable development indicators.

3.3 Case Utility Profile

The case utility is one of the largest electric utilities in Canada. Based in a regulated energy market, it is a fully integrated utility that provides generation, transmission, and distribution services to its customers. The provincial Crown Corporation has over 5,000 employees and provides electricity to nearly 750,000 customers. It also exports electricity to over 50 electric utilities in North America.

The case utility is organized into five business units: Transmission and Distribution (T&D), Power Supply, Customer Service and Marketing, Finance and Administration, and Corporate Relations. As noted in Section 1.4, this study focused on developing and integrating indicators for the major-high voltage transmission system (115 kV and above), a part of the T&D Business Unit. The T&D unit is organized into three divisions. Within each division, there are numerous departments.

Having instituted an active sustainable development program over the last decade, the case utility was well positioned to develop the indicators. The principles of sustainable development, including environmental stewardship, efficiency, equity, stakeholder participation, and continuous improvement were all well established in policy statements at all levels of the corporation. However, while programs such as an ISO 14001 environmental management system (EMS) provided useful starting points, the company continued to struggle with the integration of sustainable development principles into its decision-making processes. Tangible applications of the principles of sustainable development were therefore needed to help the company demonstrate thought, effort, and leadership in areas of concern to its key internal and external stakeholders. Further details on the utility are provided in Appendix B.

3.4 Development of the Indicator Design Process

Before indicators can be developed, it is necessary to establish an indicator design process. Since the development of indicators can be complex, the process was developed using a systematic approach that took a holistic perspective. The focus was on the development of a process for the design of a "system of indicators." A system of indicators was defined as the set of all interrelated indicators that together characterize the nature of the indicators through their key elements, how they are related, how they change over time, and how they are linked to other initiatives.

The process applied in this research was developed by Searcy (2002) as a part of the requirements for a Master of Science degree from the University of Manitoba. As a complement to an extensive study of peer-reviewed literature, the process was developed in collaboration with internal experts at a case utility and experts in the field of sustainable development indicators. Individual interviews, facilitated group consultations, critical reviews, and a face validity test (trial run) were a part of the development process. Ultimately, consensus emerged on a six-step Sustainable Development Indicator (SDI) Design Process. For a complete description of the development of the process, the interested reader is referred to Searcy (2002).

3.5 The Sustainable Development Indicator (SDI) Design Process

Figure 3.1 depicts the Sustainable Development Indicator (SDI) Design Process for electric utilities. The model provides a proactive, flexible, and transparent approach to systematically developing and integrating indicators that is strongly linked to the principles of continuous improvement and is systemized through a unique process flow chart.

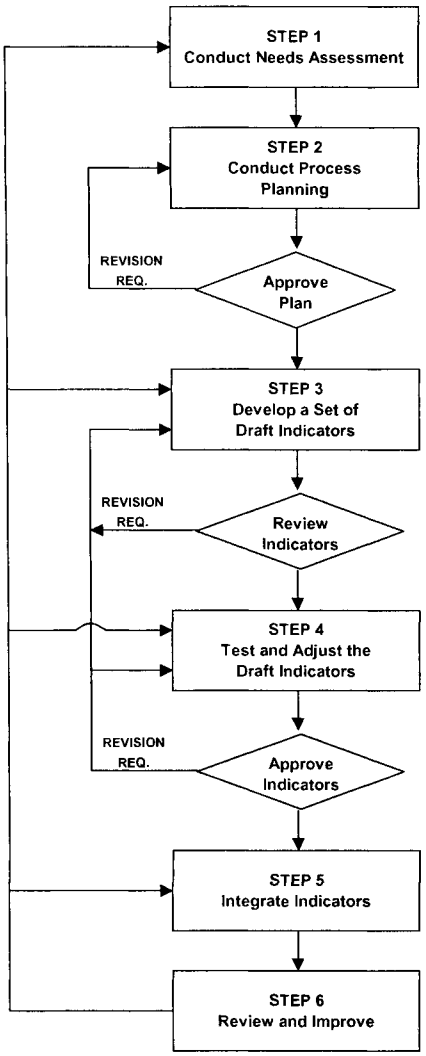


FIGURE 3.1
THE SUSTAINABLE DEVELOPMENT INDICATOR DESIGN PROCESS
Source: Adapted from Searcy, 2002

Each step in the SDI Design Process consisted of several key activities. The starting point in each step was the formulation of key research objectives. This in turn helped determine the type of information required to complete the step. Data was gathered through a combination of expert consultation and document review. An overview of each step is provided in the following sub-sections. Detailed discussions of the methodology and results of each step are provided in Sections 4 – 7.

3.5.1 Conduct Needs Assessment

The purpose of this step was to determine the underlying needs that must be addressed by the indicators. Key items that were addressed included clarifying the existing situation at the case utility, identifying what the utility needed to do better, and discussing how best to meet the needs of those who would utilize the research. Detailed discussions of the methodology and results of the needs assessment are provided in Section 4.

3.5.2 Conduct Process Planning

The purpose of this step was to conduct process planning. Building on a notion introduced by Coughlan and Coghlan (2002), it was recognized that the process of developing indicators is emergent. In other words, the process emerges "as the designated issue is confronted" since the "enactment of the cycles of planning, taking action and evaluating can be anticipated but cannot be planned in detail in advance" (Coughlan and Coghlan, 2002). This step therefore did not focus on identifying every specific task needed to complete the process. Rather, it involved determining how the development of the indicators should be approached, identifying the key internal experts that should be involved, and discussing the extent of external expert involvement in the process. Detailed discussions of the methodology and results of the process planning are provided in Section 4.

3.5.3 Develop a Draft Set of Indicators

The purpose of this step was to develop a draft set of indicators. The step began by selecting the conceptual framework that would be used to help structure the

identification of the key priorities that must be addressed by the indicators. The key priorities were then identified in an iterative consultation process. Throughout the identification of the priorities, special attention was paid to determining how the linkages between them could best be represented. Once the priorities were established, the draft indicators were developed. This involved identifying both the existing measures that should be included in the system as well as the new indicators that should be created. Detailed discussions of the methodology and results of the development of the draft indicators are provided in Section 4.

3.5.4 Test and Adjust Indicators

To ensure that the draft indicators addressed the case utility's key sustainable development priorities, this step began with a critical review of the indicators. This provided the basis for finalizing a working system of indicators. Once the indicators were finalized, goals were identified for each indicator and an assessment of current data availability was conducted. These steps provided the basis for the development of an aggregation method that considered the varying goals for each indicator. Detailed discussions of the methodology and results of the testing and adjusting of the indicators are provided in Section 5.

3.5.5 Integrate Indicators

The purpose of this step was to develop an indicator integration model that demonstrated how the indicators relate to existing internal initiatives at the case utility. It should be noted that the name of this step was modified from the step "Implement Indicators" identified in Searcy (2002). This was done in consultation

with key internal and external experts and was done because it better reflected the actual content of the step.

The step began by identifying the elements that are common to all of the case utility's existing internal initiatives. The elements formed the basis for the development of the indicator integration model. Using the model, it was demonstrated how the integration of the indicators could be structured at the case utility. A key component of the overall integration model was the development of an assessment model to guide the continuous improvement of the indicators. Detailed discussions of the methodology and results of the integration of the indicators are provided in Section 6.

3.5.6 Review and Improve

The purpose of this step was to summarize the lessons learned from the process. The entire process was considered as a part of the evaluation. Detailed discussions of the methodology and results of this step are provided in Section 7.

3.6 Research Instruments and Protocols

Yin (2003) describes the design of case study research in detail. As in all forms of research, the case study method requires that consideration be given to both the construct validity and the reliability of the results (Voss *et al.*, 2002). Construct validity involves "establishing correct operational measures for the concepts being studied" while reliability involves "demonstrating that the operations of a study – such as data collection procedures – can be repeated, with the same results" (Yin, 2003). There are a number of tactics to address these issues. Two methods

highlighted by Yin (2003) are using multiple sources of evidence, particularly on issues that lend themselves to subjectivity and bias, and the development of a formal case study protocol.

3.6.1 Sources of Evidence

Yin (2003) suggests using multiple sources of evidence to ensure construct validity and reliability. This point is supported by Voss *et al.* (2002) who note that asking the same questions to a number of people will enhance both the construct validity and the reliability of the data. Sources of evidence could include individual interviews, group meetings, surveys, and documentation (Yin, 2003).

Each step in the SDI Design Process therefore involved a review of key documentation and consultation with internal experts at the case utility and external experts in the area of sustainable development indicators. As illustrated in Table 3.1, the experts were consulted in a variety of individual and professionally facilitated group meetings and a wide range of internal documentation was reviewed. A summary of the external documentation reviewed was previously provided in Section 2. Further information on the consultations, including agendas, dates, and key questions, are available in Appendix B.

TABLE 3.1
DATA GATHERED IN THE CASE STUDY

Step	Stakeholder Consultations	Internal Documents Reviewed
1	One individual meeting with the principal informant* One small group meeting with key internal experts	Annual Report Corporate Policies Corporate Strategic Plan

TABLE 3.1
DATA GATHERED IN THE CASE STUDY

Step	Stakeholder Consultations	Internal Documents Reviewed
2	One individual meeting with the principal informant Two small group meetings with key internal and external experts	Transmission and Distribution Strategic Plan Transmission Division Strategic Plans Transmission Department Strategic Plans Environmental Impact Statements Sustainable Development Report Environmental Management Systems Manuals Process Flow Charts Corporate Intranet Employee Surveys
3	Ten small group meetings with twenty-one key internal and external experts Six large group meetings with key internal and external experts	
4	Three small group meetings with key internal experts Fourteen individual meetings with twelve key internal and external experts One large group meeting with key internal experts One email consultation with five key internal experts	
5	One small group consultation with key internal experts Two individual consultations with key external experts One email consultation with three internal experts	
6	One email consultation with six key internal and external experts	

Note: **The principal informant was the case utility's Corporate Planning Manager*
"Small group": three participants or less (excluding members of the research team and the facilitator)
"Large group": four participants or more (excluding members of the research team and the facilitator)

A total of sixteen internal experts and ten external experts participated in the consultations. The experts who participated in the SDI Design Process are listed by function in Table 3.2. As illustrated in Table 3.2, the number and type of experts involved varied throughout the SDI Design Process. Internal experts at the case utility included representatives from corporate planning, environmental assessment, corporate communications, construction, maintenance, forestry, education, safety, and

the aboriginal liaison. External experts included several experienced consultants in environmental impact assessment, aboriginal relations, forestry, and sustainable development indicators. In all cases, the experts were selected based on recommendations from key internal experts at the case utility.

TABLE 3.2
EXPERTS INVOVLED IN THE SDI DESIGN PROCESS

	Step Involved					
Internal Experts	1	2	3	4	5	6
Aboriginal Liaison			•			
Chief Forester			•			
Corporate Planning Manager*	•	•	•	•	•	•
Environmental Education Specialist			•	•		
Environmental Management Systems Coordinator*	•	•	•	•	•	•
Environmental Specialist (1)			•	•		
Environmental Specialist (2)			•			
Forester			•	•	•	
Hazardous Materials Officer			•			
Line Maintenance Supervisor			•	•		
Senior Communications Advisor			•	•		
Senior Environmental Assessment Officer (1)	•	•	•	•	•	•
Senior Environmental Assessment Officer (2)			•			
Senior Environmental Specialist (1)			•			
Senior Environmental Specialist (2)			•	•		
Transmission Line Services Engineer			•	•	•	
Transmission Construction and Maintenance Projects Manager	•	•	•	•	•	•
External Experts	1	2	3	4	5	6
Aboriginal Relations Consultant			•	•		
Environmental Impact Assessment Consultant (1)			•	•		
Environmental Impact Assessment Consultant (2)				•		
Environmental Interest Group Representative				•		
Faculty of the Environment Ph.D. Candidate				•		
Model Forest Manager				•		
Professional Facilitator	•	•	•	•	•	•
Provincial Government Sustainable Development Policy Analyst		•	•	•	•	•
Sustainable Development Indicator Department Manager**			•			
Sustainable Development Indicator Project Manager		•	•	•	•	•

Legend: *• = involved in that particular step, blank cell = not involved in that particular step*
Notes: **The Corporate Planning Manager and EMS Coordinator positions are currently held by the same person.*
***Involved only in the M.Sc. portion of the research*

All internal experts had extensive experience at the case utility and in working with sustainable development. Many of the internal participants also had extensive

experience in stakeholder consultation including environmental impact assessments, open houses, public hearings, external reporting, and general inquiries. While no members of the executive committee at the case utility were available to participate in the research, several of the participating experts frequently consult with and report to members of the executive committee. Many of the external experts also had experience working with the case utility on a variety of environmental management and other projects. The external experts also included several individuals with extensive experience designing and implementing sustainable development indicators. All of these factors illustrate that the experts consulted were a comprehensive enough group for the purposes of this research.

Further details on the consultations are available throughout Sections 4 – 7.

3.6.2 Research Protocol

A case study protocol consists of a set of general rules to be followed in the gathering of the data (Voss *et al.*, 2002). As Yin (2003) notes, it is "a major way of increasing the reliability of case study research." Key parts of the protocol in this research included the development of an informed consent form, sharing key questions and information in advance of the meetings, recording of the data, providing all participants with the opportunity to review and comment on consultation reports, identifying a method for analyzing the data, and recognizing when the consultations were to be completed. Each of these protocol components is discussed in the following sub-sections. It should be noted that a single investigator, the author, conducted the entire case study investigation.

3.6.2.1 Informed Consent

All participants in the consultations were required to review an informed consent form as a part of their first meeting with the author. The informed consent form was reviewed and approved by the Research Ethics Committee in the Faculty of Engineering at the University of Alberta. As illustrated in Appendix B, the form provided an overview of the purpose of the research and the key procedures for the consultations.

3.6.2.2 Provision of Information

As Voss *et al.* (2002) note, it is often useful to test the research protocols in advance and to send an outline of the protocol to participants prior to any meeting. Key questions to be discussed in the consultations were therefore reviewed in advance with a professional facilitator and with the research supervisors. Following those discussions, agendas were distributed to the participants at least three days prior to each meeting. The agendas were accompanied by the key questions that would be asked as well as any supporting materials, including a project overview, that were necessary for the consultation. The agendas for each consultation and the key questions asked in the consultations are available in Appendix B.

3.6.2.3 Recording of the Data

As Voss *et al.* (2002) note, there are divided views on whether tape recorders should be used in interviews. The primary advantage is they provide an accurate transcript of what was actually said. However, transcribing the tapes is expensive, very time consuming, and can be seen as a substitute for listening. Critically, taping

any conversations may also inhibit those being interviewed (Voss *et al.*, 2002). For those reasons, no tape recorders were used in any of the consultations. The author recorded all key comments by hand. The case study database, i.e. the complete summary of comments obtained, is available in Appendices C – H.

3.6.2.4 Reporting and Confirmation

It was recognized that an accurate record of the consultations was needed. As Yin (2003) notes, the accuracy of the records can be enhanced by feedback and checking of the data. Following the completion of each series of consultations, the participants were therefore provided with a summary of the meeting results. It was continuously emphasized that follow-up comments were welcome. As Voss *et al.* (2002) and Yin (2003) note, in addition to improving the reliability of the results, having participants review the results also helps test the construct validity.

3.6.2.5 Data Analysis

A critical aspect of data analysis in this form of research is that "it is collaborative – both the researcher and members of the client system do it together" (Coughlan and Coghlan, 2002). Therefore, the analysis of the comments received in the consultations was conducted in two parts. In the first part, the author prepared a summary of the key points from the consultations. The summary, along with the complete set of comments received, were then sent to participants via email. The key points were then discussed and finalized in consultation, either in person or through email, with the participants.

3.6.2.6 Completing the Consultations

Consultations were conducted throughout all six steps of the SDI Design Process. However, Table 3.1 highlights that the majority of the consultations were conducted in the first four steps. This occurred for several reasons. First, many comments were received throughout the entire process that were relevant to the last two steps. Second, it was evident that the consultations had reached a point of diminishing returns. This was likely due to the fact that all participants had provided detailed comments previously and had few additional comments to offer. Third, and most importantly, the consultations were completed because enough data had been gathered to address the key research objectives. As Appendices C – H demonstrate, an exhaustive amount of effort was expended to collect the relevant evidence (Yin, 2003). As Voss *et al.* (2002) note, there is always the temptation to do one more consultation. However, "knowing when to stop is an important skill of a case researcher" (Voss *et al.*, 2002).

3.7 Summary

This chapter provided an overview of the research methodology. The rationale for using a case study approach and a profile of the case utility were provided. A description of the indicator design process was presented, as were details on the development of that process. Since every step in the process required multiple sources of evidence, a summary of the data sources and research protocols were also provided. The application of the SDI Design Process, including expanded descriptions of the methodology, is described in detail in Sections 4 – 7.

4 DEVELOP A DRAFT SET OF INDICATORS

4.1 Introduction

This section presents the results of the first three steps of the SDI Design Process:

- Conduct Needs Assessment.
- Conduct Process Planning.
- Develop a Draft Set of Indicators

The results of each step are discussed in detail in the following sub-sections.

4.2 Conduct Needs Assessment

The goals of this step included clarifying the current situation at the case utility, identifying what the company needed to do better, and discussing how best to meet the needs of those who will utilize the research. Since needs are implicitly linked to people, consultation with key experts from the case utility was an important component of this step. The manager of corporate planning, the EMS coordinator, a senior environmental assessment officer, and a projects manager were all involved in the needs assessment. A review of internal documentation supplemented the consultations.

In the consultations, the participants emphasized that the indicators must be useful to both internal and external stakeholders. At the case utility, the indicators would be useful to managers, engineers, and other employees as a tool in both making and defending decisions. Externally, it was noted that the indicators would be useful as a reporting mechanism for local stakeholders. The utility's local stakeholders

included customers, governments, suppliers, communities, landowners, non-governmental organizations, and aboriginals. The indicators will also be valuable to a wider external audience, particularly the Canadian Electricity Association (CEA).

To meet the needs of internal stakeholders, it was therefore essential that the indicators be useful in management decision-making. The participants noted that although significant amounts of data were readily available at the case utility, much of it was not being fully utilized. In particular, the existing data and indicators suffered from a lack of effective analysis and were in many cases not linked to decision-making processes, goals, or targets. These factors contributed to a lack of meaningful indicators for the transmission system.

Nonetheless, there were many existing initiatives on which to build the system of indicators. Internally, key measures were related to the business planning processes at the corporate, business unit, division, and department levels. Further, the ISO 14001 EMS and the CEA's Environmental Commitment and Responsibility Program drew on, and complemented, indicators from those programs. All of the programs were supported by policies that incorporated many principles of sustainable development. However, the participants noted that it was important to pursue those policies in an organized, systematic, and transparent fashion from the beginning of a project rather than using them to justify decisions only in the final stages.

With the above in mind, it was noted that the indicators developed in this process must tie into existing infrastructure wherever possible. Furthermore, it was recognized that integration with existing initiatives must begin at the very start of the indicator development process. The purpose of the indicators was not to duplicate

existing initiatives, but rather to augment them so that they were more reflective of sustainable development. Figure 4.1 provides a representation of this objective.

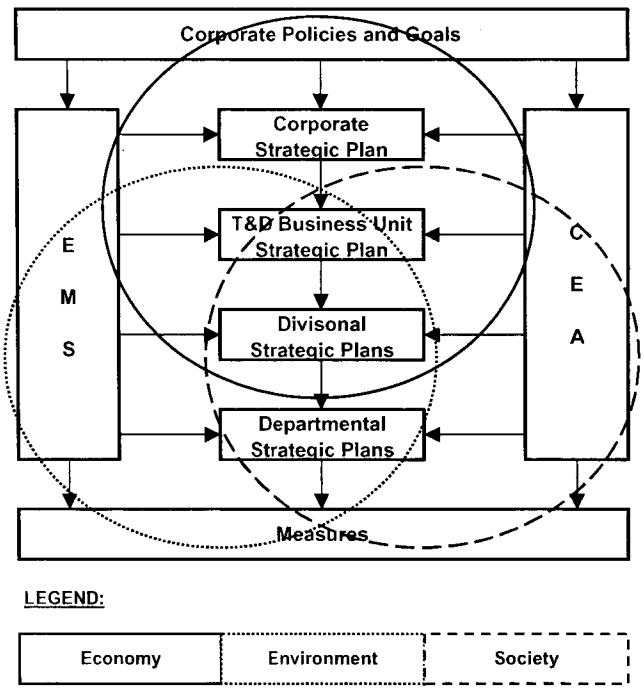


FIGURE 4.1
REPRESENTATION OF NEEDS ASSESSMENT

The needs assessment helped form the underlying rationale for the rest of the process. A complete summary of the comments obtained during this step is summarized in Appendix C.

4.3 Conduct Process Planning

To ensure the development of meaningful indicators, the next step in the case study was to conduct process planning. Rather than specifying every planned activity in advance, this step focused on addressing how the development of the indicators should be approached, which internal stakeholders should be involved, and the extent and timing of external stakeholder involvement. This involved consultation with the

internal experts consulted in the needs assessment as well as a professional facilitator and two external experts with previous experience developing indicators.

Five key conclusions were drawn from the process planning consultations:

1. Broad internal consultations were required.
2. Consultation with external stakeholders was also required, but would be most appropriately limited to experts with relevant experience.
3. All expert participants should be introduced to the project in an individual or small group orientation meeting.
4. It would be critical to show how the indicators fit in the management cycle.
5. The development of the indicators would be iterative.

The feedback in the process planning consultations provided the basis for initiating the development of the issues and indicators. In particular, the participants felt that the consultations should focus primarily on internal experts. The key internal stakeholders for the indicators at the case utility are identified in Table 4.1.

TABLE 4.1
KEY INTERNAL STAKEHOLDERS AT THE CASE UTILITY

Business Unit	Division	Department	Rationale
Transmission and Distribution	Transmission Planning and Design	Licensing and Environmental Assessment	Expertise regarding sustainable development principles, legislation, transmission line impacts, environmental protection and monitoring, non-governmental organizations, and public consultation
		Transmission System Planning	Involved in establishing transmission line planning criteria and studies

TABLE 4.1
KEY INTERNAL STAKEHOLDERS AT THE CASE UTILITY

Business Unit	Division	Department	Rationale
		Transmission and Civil Design	Relevant responsibilities include facility designs and designing options to mitigate environmental impacts
		Property	Expertise in land and water use policies and legislation
	Transmission Construction and Line Maintenance	Transmission Line Maintenance	Applicable duties include long term right of way management, setting of field practices, and monitoring
		Transmission Construction	In addition to developing construction practices, has had extensive public contact (aboriginal liaison)
Power Supply	Power Planning and Development	Environmental and Land Use Planning	Involved in legislation, environmental policy, resource planning, externalities, export policies, climate change, and contact with non-governmental organizations
Customer Service and Marketing	Customer Service Operations	N/A	Expertise in forestry, vegetation management, wood poles, preservative use, field practices, legislation, and public contact (municipal liaison)

Source: Adapted from Searcy (2002).

The participants explained that internal experts had extensive experience in external stakeholder consultation including environmental impact statements, open houses, public hearings, external reporting, and general inquiries. Many of the internal experts identified for participation had also been with the company for many years and had extensive experience in applying the principles of sustainable development. All of these points supported a primary focus on internal consultations.

The participants did acknowledge that external participation was needed, but that the most effective approach would be to limit external participation to consultants with extensive experience working with the case utility and to experts in developing sustainable development indicators. Although the possibility was discussed, broad public consultations were ruled out due to time considerations and the utility's desire to develop its internal systems prior to engaging the general public. However, the participants did identify the key external stakeholders for the case utility (Table 4.2) and acknowledged that, although they would not necessarily be directly consulted as a part of a Ph.D. research project, the needs of these groups should be considered throughout the indicator design process.

TABLE 4.2
KEY EXTERNAL STAKEHOLDERS AT THE CASE UTILITY

Stakeholder Category	Rationale
Federal and Provincial Regulators and Technical Advisors	Offer expertise in a number of relevant areas including indicators, regulations, and environmental data.
Environmental and Public Interest Groups	Relevant expertise includes perspective on key issues related to the environment and society as well as some experience working with sustainable development indicators.
Aboriginals (First Nations, Inuit, and Metis)	Interest may vary substantially though possibilities could include effects on traditional ways of life, employment opportunities, and other interests.
Landowners and Rate Payers	Offer perspective on key issues.
Other External Experts	Offer expertise regarding sustainable development indicators.
Industry Associations and Groups	Offer perspective on key issues as well as relevant technical expertise.

Source: Adapted from Searcy (2002).

In any case, the participants recommended that the first step in developing the indicators should be individual and small group meetings to introduce the research, provide an opportunity for initial questions, and to assess the understanding of the participants with respect to sustainable development. Another objective of these meetings would be to demonstrate that the indicators are needed to help close feedback loops in the internal management cycle and to discuss why sustainable development is important to the transmission system. These answers would help illustrate how the indicators fit in the overall management cycle.

A complete summary of the comments received in the action planning consultations is provided in Appendix D.

4.4 Develop a Draft Set of Indicators

While there is no universally accepted formula for creating indicators, the key components in the process to develop the draft indicators are illustrated in Figure 4.2. Each component is discussed in the following sub-sections. Supporting material for each sub-step is provided in Appendix E.

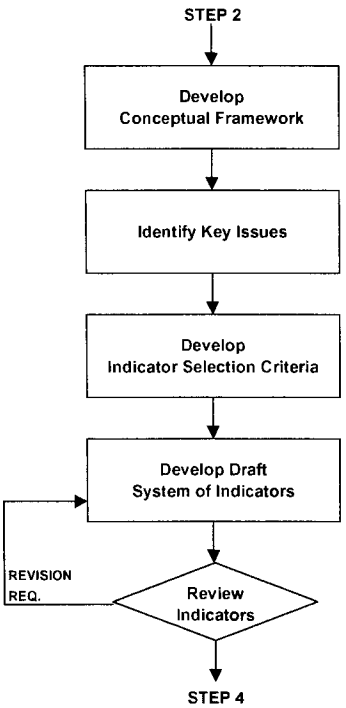


FIGURE 4.2
PROCESS FOR STEP 3: DEVELOP A DRAFT SET OF INDICATORS

4.4.1 Develop Conceptual Framework

The development of a conceptual framework was accomplished through consultation with two internal experts and two external experts. In a two-hour meeting, several models were evaluated on the basis of four criteria: communication, practicality, compatibility, and scope. Using those criteria as a starting point, discussions resulted in a consensus that the environment-economy-society framework was most appropriate for this case study. This decision was made for a number of reasons including that the framework is simple, widely accepted, directly linked to the three pillars of sustainable development, and that local experts had previously used it. However, one of the most important reasons was that all previous sustainability initiatives at the utility had been based on that framework.

Although the environment-economy-society framework does offer the benefits above, it does have some drawbacks. Most notably, it is divided along traditional scientific disciplines. As the participants noted, this runs the risk of creating "silos" or islands where each dimension is looked at separately. Therefore, this approach does a poor job of integrating the three pillars of sustainable development and could potentially lead to further fragmentation despite the need for approaches that highlight the interdependencies between and within the groupings.

4.4.2 Identify Key Issues

The identification of the priorities for action, or key issues, was an iterative process that required extensive consultation with internal and external experts. An overview of the key issue identification process is in Figure 4.3. This figure provides further detail on the second sub-step in Figure 4.2, "Identify Key Issues."

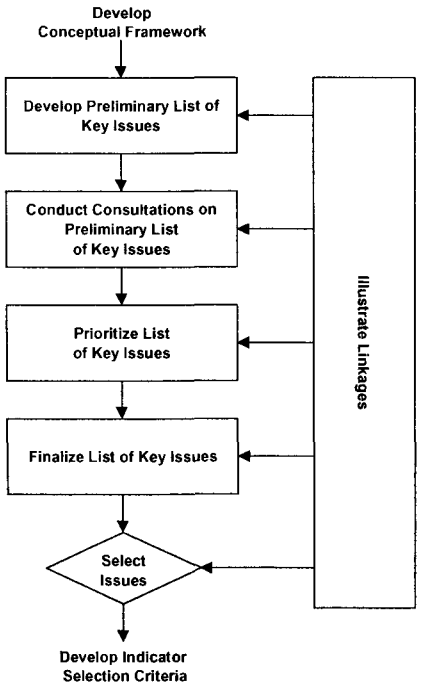


FIGURE 4.3
PROCESS TO IDENTIFY THE KEY ISSUES TO BE ADDRESSED BY THE INDICATORS

4.4.2.1 Develop Preliminary List of Key Issues

To initiate the identification of key issues, a facilitated brainstorming session was held with five key internal and external experts. No filtering of ideas was conducted at this stage. In addition to key issues, the initial list of over one hundred items generated by the participants included symptoms of key issues, impacts, operational concerns, and possible indicators.

Given the variety of items raised in the initial discussions, it was necessary to filter the contents so a more manageable set of key issues was available. The fact that items other than key issues emerged in this step was significant. This underscored that time and effort will be necessary to develop a common understanding of what the term "key issue" means in the context of the project. Led by the facilitator, the participants considered each of the items listed during the brainstorming exercise and over a three-hour period ultimately agreed on a consolidated list of key issues organized around the three categories provided by the conceptual framework, namely the environment, the economy, and society.

4.4.2.2 Conduct Consultations on Preliminary List of Key Issues

Using the previously agreed upon issues as a starting point, broad consultations with twenty internal and external experts were held. The sixteen internal experts included representatives from corporate planning, environmental assessment, corporate communications, construction, maintenance, forestry, education, safety, and the aboriginal liaison. The four external experts included experienced consultants in environmental impact assessment, aboriginal relations, and sustainable development indicators. Following the recommendations of earlier steps,

the consultations began with individual and small group meetings. An analysis of the comments received in those consultations revealed several critical themes:

1. Focus needed to be devoted to the critical issues most important to the sustainable development of the transmission system.
2. Several categories could be added, subtracted, or renamed.
3. Aboriginal issues, in particular, were significant enough to warrant special attention.

The last point highlights the fact that Aboriginals are a particularly important stakeholder group for Canadian electric utilities. Using those points as a guide, the preliminary list of key issues was adjusted in broad consultations with the internal and external experts. In a facilitated three-hour meeting, a roundtable discussion with the participating experts led to agreement on the updated, although similar, set of key issues. The set of key issues is listed in Table 4.3.

4.4.2.3 Prioritize List of Key Issues

Once the set of issues was reviewed and updated, prioritization criteria were created. It should be noted that the participants recognized those issues of relatively lower priority should not be forgotten. This step was in recognition of the fact that the utility required a manageable list of key issues to address at a time.

TABLE 4.3

LIST OF INITIAL KEY ISSUES AND SUMMARY OF PRIORITIZATION EXERCISE

		Prioritization Guidelines									
	Key Issues	Public Interest	Regulatory Compliance	Management Informational Needs	Amenable to Indicator	Future Liability Implications	Interdependency	Intergenerational	Relation to Existing Initiatives	External Policy Influences	TOTALS
Environment	Vegetation Management	3	3	2	3	1	3	2	3	1	**972**
	Public Involvement	3	3	2	1	2	3	2	3	1	**648**
	Changes to Habitat	3	3	2	3	3	3	3	2	1	**2916**
	Loss of Forest Cover	3	3	2	3	3	3	3	2	2	**5832**
	Increased Access	3	2	2	1	2	2	3	2	1	**288**
	Potential Contamination	3	3	3	3	3	3	3	3	2	**13122**
Economy	Profitability	3	2	3	3	3	2	3	3	1	**2916**
	Benefits to Stakeholders	3	3	3	2	3	3	3	3	1	**4374**
	System Reliability	3	3	3	3	3	3	3	3	2	**13122**
	Governance Issues	2	3	3	2	3	3	3	3	2	**5832**
Society	Employee and Public Safety	3	3	3	3	3	2	2	3	1	**2916**
	Equity	3	1	3	2	1	2	2	3	1	**216**
	Community Relations	3	3	3	2	3	3	3	3	2	**8748**
	Electric and Magnetic Field (EMF)	3	1	2	1	2	2	2	2	2	**192**
	Private and Crown Land Usage	3	3	3	3	2	3	3	3	2	**8748**
	Education and Training	2	2	2	3	2	3	3	3	2	**2592**
	Aesthetics	2	1	2	1	1	3	2	2	1	**48**
	Aboriginal Involvement	3	3	3	3	3	3	3	3	2	**13122**

The results of the prioritization process are illustrated in Table 4.3. Using the prioritization criteria (which were also developed in consultation with the experts) depicted in the table, each key issue was ranked by the participants using a majority (i.e. fifty percent or more) vote. The participants agreed on a three-point scale to determine whether that relation was of high, medium, or low importance. A three-point scale was selected because it was more conducive to a quick group vote than a five- or nine-point scale. To help separate the most important issues from the others,

those issues with a rating of "high" were assigned a score of 3, "medium" a score of 2, and "low" a score of 1. For each key issue, the scores were then multiplied using each of the nine criteria. For example, the total for Vegetation Management Practices was obtained by the following calculation:

Relative Priority of Vegetation Management Practices = 3*3*2*3*1*3*2*3*1 = 972

However, rather than lead to the definitive selection of the key issues to be addressed, the prioritization exercise served as a catalyst for further discussion. Throughout the prioritization process, there was active debate not only on the rankings listed in Table 4.3, but also on the key issues themselves. Many of the participants felt there were several opportunities for further consolidation of the list. This served as a useful reminder that even though the participants previously believed the identification of priorities was at an end, the selection process is iterative.

Although the rankings were ultimately not used to select the final list of key issues, the prioritization process did constitute a critical step. It forced participants to ask difficult questions about why they had developed the list they had and whether it really represented the essential priorities for corporate action. Critically, it also reinforced the notion that the issues cannot be viewed separately from the rest of the organization's activities and that a re-emphasis on integration was necessary.

4.4.2.4 Finalize List of Key Issues

To address the issues raised in the prioritization process a consultation with a small group of three internal experts was held. The group considered the definitions of the selected key issues, existing internal programs, and further consolidation of the

list of key issues. In addition to the prioritization criteria, the question "how significant is this issue to the sustainable development of the transmission system?" was used as a guiding influence. With those points in mind, the group suggested the indicators be organized around the three themes and issues depicted in Figure 4.4.

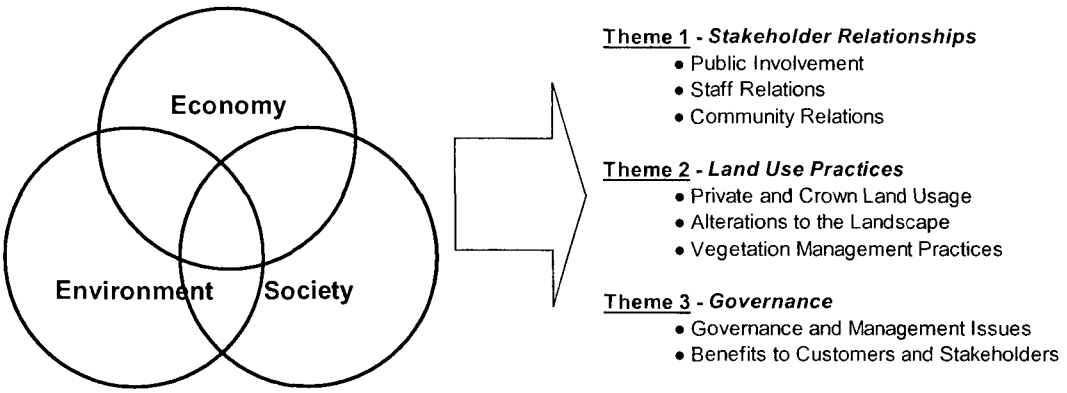


FIGURE 4.4
SELECTED KEY ISSUES FOR THE TRANSMISSION SYSTEM OF THE CASE UTILITY

The three themes in Figure 4.4 represent the major sustainable development issues for the transmission system. To address a concern over creating "silos," where issues might be looked at independently, none of the themes was explicitly listed as an environmental, economic, or social cluster of issues. Rather, each of them is intended to consider issues across the three dimensions. The revised list of issues was confirmed in a consultation with the experts previously consulted.

The most significant revision in the key issues illustrated in Table 4.3 was related to the category of "Potential Contamination." This issue was one of the highest ranked in the prioritization exercise. However, it was noted by several participating experts that issues associated with potential contamination were already addressed in well-established programs at the utility. It was argued that value would not be added by considering those issues as their own category as a part of this

process. In cases where it was necessary to consider contamination issues, they were therefore considered as a part of other categories, such as "Vegetation Management Practices." Other issues were also considered as a part of the consolidated list. Details for each selected key issue are in Table 4.4.

TABLE 4.4
DETAILS OF SELECTED KEY ISSUES

Key Issue	Details
Public Involvement	Building trust and relationships with relevant stakeholders is a prerequisite to sustainable development. Aboriginals, landowners, and non-governmental organizations are among the public groups interested and affected by developments in the transmission system.
Staff Relations	Transmission system employees are a critical stakeholder. Since building internal capabilities is one of the most essential components of sustainable development, one important component of this relationship is education and training. Education and training can help promote employee personal growth, raise job satisfaction, and improve safety.
Community Relations	Business is a part of a larger society. An effective community relations plan can potentially result in improved corporate image, brand value, and reputation. The company aims to contribute to the sustainability of local communities to enhance their quality of life. One particularly important community relations issue is EMF.
Private and Crown Land Usage	Factors such as expropriation, perceived effects on adjacent property, crossing of Crown lands, and other considerations can make the siting of a transmission line controversial.
Alterations to the Landscape	Clearing rights-of-way (ROW) for transmission lines may alter wildlife habitat, increase access, and result in a change of forest cover. Further, the presence of the line may have other impacts associated with an edge effect and habitat fragmentation.
Vegetation Management Practices	Vegetation management is necessary to prevent trees from interfering with the operation of a transmission line. Any interference could effect the transmission of electricity, present a fire hazard, or impede access by maintenance crews.
Governance and Management Issues	Effective management of financial resources, human resources, and existing infrastructure is critical to the success of any organization. System reliability, transfer capability, cost issues, and regulatory issues are particularly important management issues.
Benefits to Customers and Stakeholders	The provision of a reliable source of electricity offers many external benefits. Impacts on employment, local incomes, and business development are among them.

4.4.2.5 Illustrate Linkages

Throughout the development of the key issues in Figure 4.4, attention was also devoted to illustrating the interrelationships between them. This was in recognition of the fact that sustainable development cannot be viewed as a disconnected initiative. Several strategies were employed to this end.

After experimenting with a matrix and relationship diagram, it was found that an approach based on network diagrams was the most effective method of illustrating the interrelationships. A network diagram was created for each of the three overriding themes: stakeholder relationships (Figure 4.5), land use practices (Figure 4.6), and governance (Figure 4.7).

It should be noted that the network diagrams are more illustrative than comprehensive. Additional relationships are possible and the structure of the diagram itself may be presented in many different ways. For instance, it may be useful to consider what Figure 4.6 would look like if "Land Use Practices" were the first, rather than the last, entry. However, even in their current form, the participants agreed that they do accomplish the goal of clearly illustrating that the key issues are interrelated and how one issue can drive decisions that affect other issues.

For example, the network diagram can clearly and concisely illustrate how each issue, represented by a box, may be considered as both a driver for impacts in other key issues and as an impact itself. As an illustration of this point, consider the "Creation of New Rights-of-Way (ROW)" in the center of Figure 4.6. The creation of a new ROW will require alterations to the landscape, the implementation of a new vegetation management plan, and will affect the aesthetics in the area. Each of these

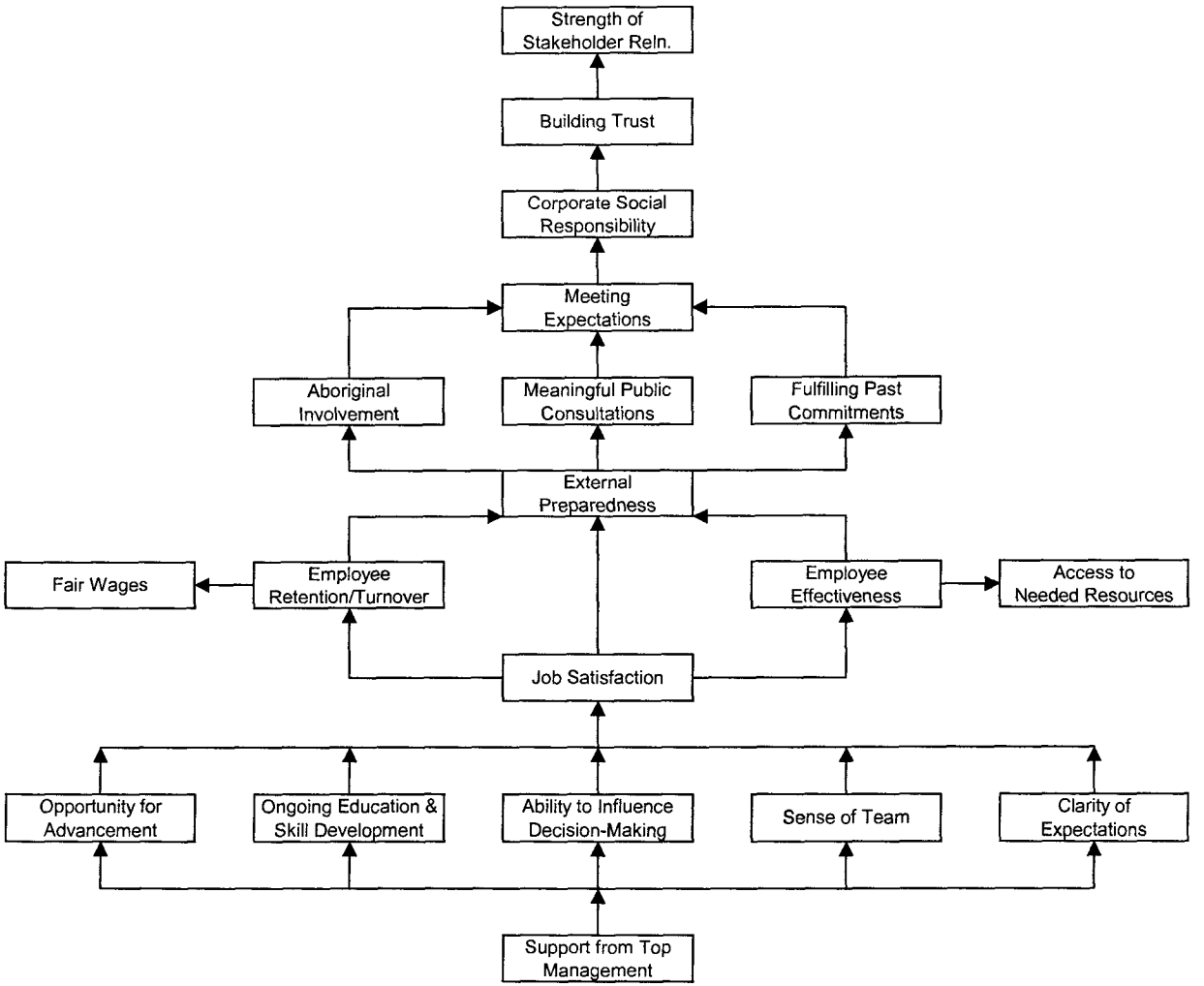


FIGURE 4.5
NETWORK DIAGRAM FOR KEY ISSUES ASSOCIATED WITH STAKEHOLDER RELATIONSHIPS THEME

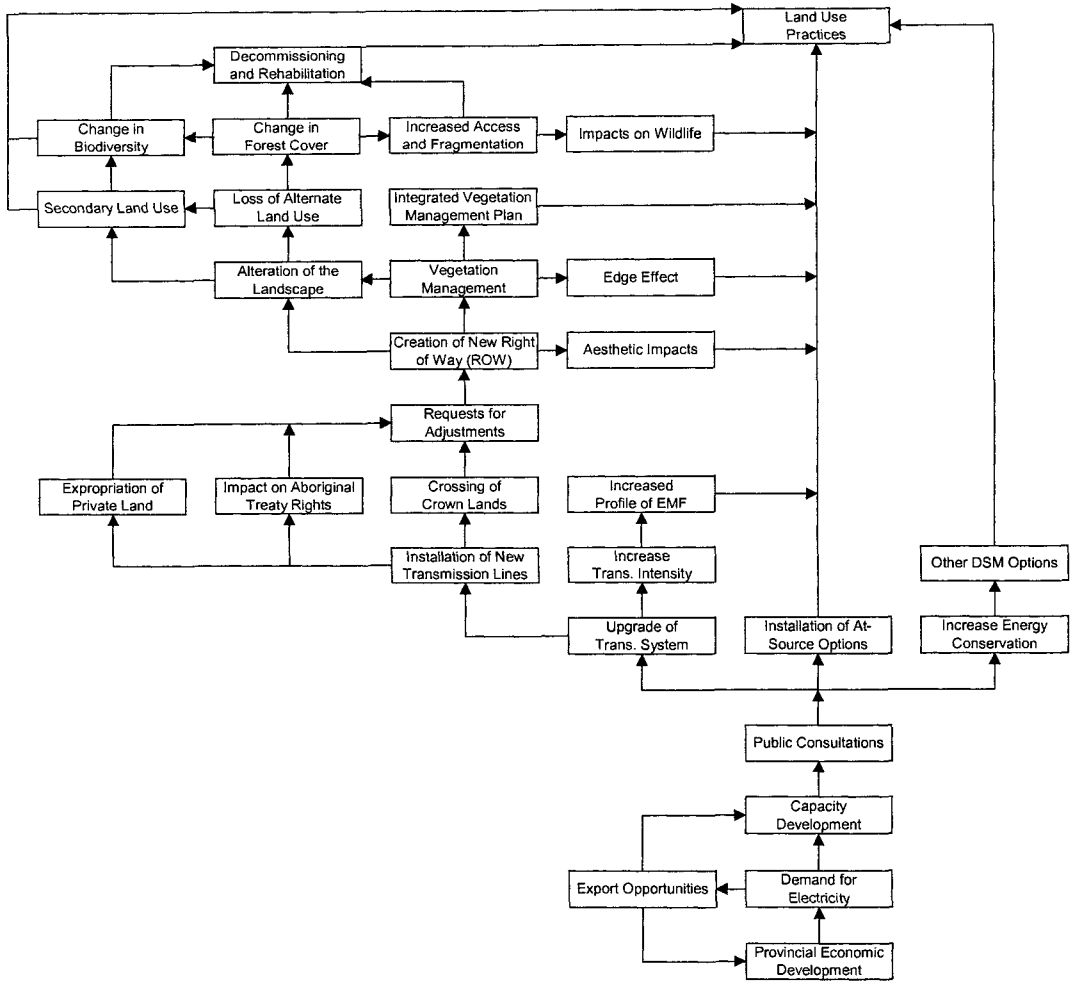


FIGURE 4.6
NETWORK DIAGRAM FOR KEY ISSUES ASSOCIATED WITH LAND USE PRACTICES THEME

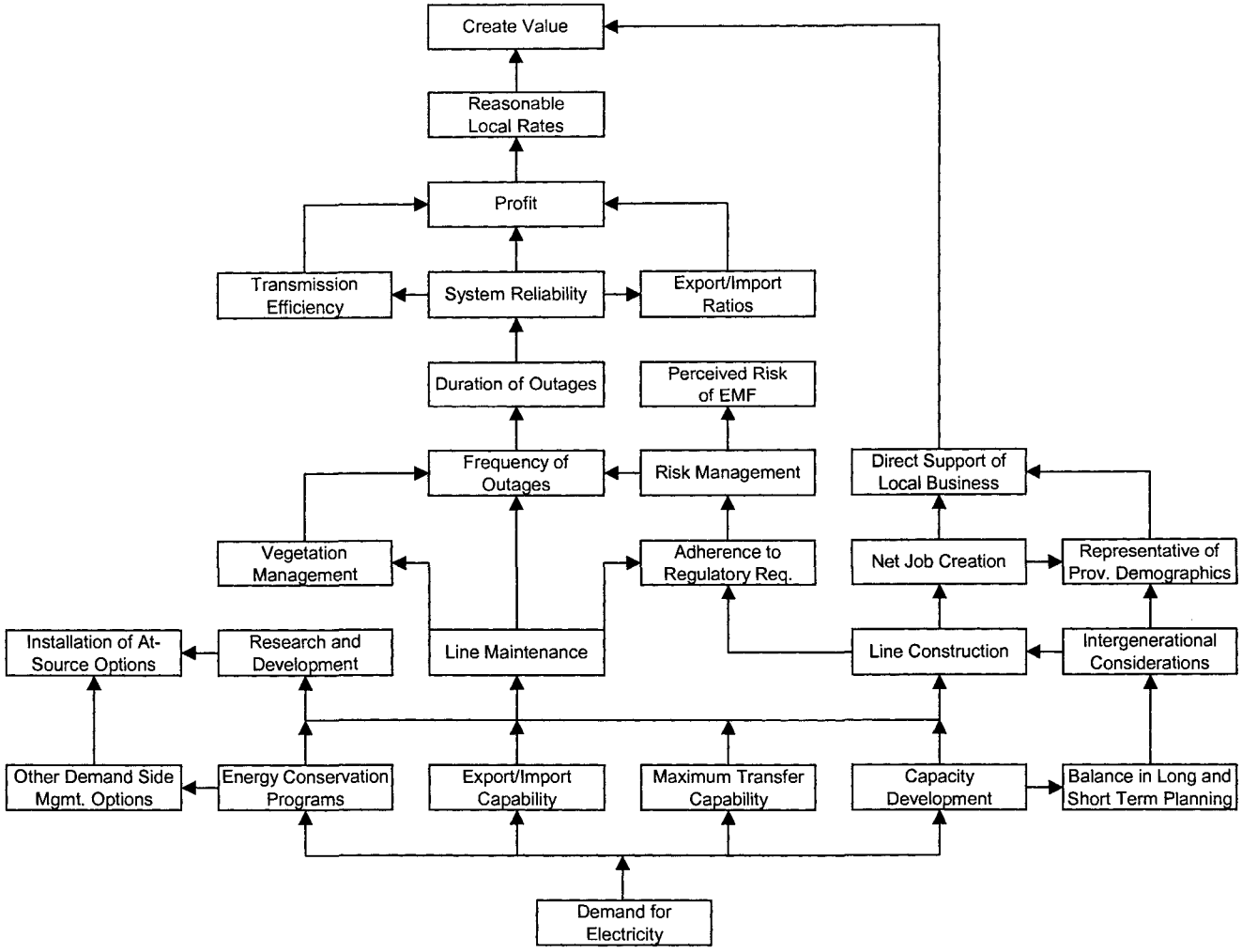


FIGURE 4.7
NETWORK DIAGRAM FOR KEY ISSUES ASSOCIATED WITH GOVERNANCE THEME

may be considered impacts arising as a result of the decision to create a new ROW. However, the creation of a new ROW is itself ultimately the result of a decision to install new transmission lines rather than meeting the increased demand for electricity exclusively through increasing the intensity of existing lines or investigating demand side management options. The origin of the arrow may therefore be considered to be a driver while the end point may be seen as an impact arising from that driver.

4.4.3 Develop Indicator Selection Criteria

Once the key issues were established, indicator selection criteria were developed. The criteria were intended to help guide the indicator development process. However, it was recognized that not every indicator would necessarily meet all criteria. Based on consultation with internal and external experts, it was determined the indicators should be (Searcy, 2002):

1. *Understandable*: The indicators should be clear, transparent, and unambiguous.
2. *Actionable*: Improvement should be within reasonable control of the case utility.
3. *Relevant*: The indicators must focus attention on issues relevant to the system under examination.
4. *Credible*: Only those indicators possessing reasonable grounds (scientific, community, or traditional knowledge) for belief should be included.
5. *Illustrative*: Any indicator should be sensitive to change and be capable of illustrating those changes.

6. *Provide linkages*: Since sustainable development is a concept attempting to integrate environmental, economic, and social concerns, the indicators should reveal the company's progress towards this goal.

Five guiding principles were suggested to accompany the criteria:

1. Data does not need to be currently available but the company should have the ability to measure the indicator.
2. The indicator should be used as a part of a decision-making process.
3. The indicator must be acceptable to senior management, to those who will use it, and to those who will collect the data.
4. Comparability to indicators used by other electric utilities should be a consideration.
5. Consider whether the indicators are meant to drive or to support policy.

4.4.4 Develop Draft System of Indicators

The key steps in this process were developing a pool of indicators for each key issue, preparation of a consolidated set of organized indicators for each key issue, development of a preliminary system of draft indicators, and finalizing the draft system of indicators. This required several iterations of consultation using a combination of small and large group meetings. As in the development of the key issues, twenty internal and external experts participated in the consultations.

To initiate the development of a draft system of indicators, individual and small group consultations were held with the internal and external experts. In addition to providing a project orientation, the consultations focused on discussing

how the indicator development meetings should be structured. A review of the comments received revealed:

1. The meetings should not be divided by environmental, economic, and social disciplines.
2. The indicators must build on existing initiatives wherever possible.
3. The indicators should focus on the positives too, not just the negatives.

It was also determined that two group meetings were required to develop a draft set of indicators. The first large group meeting on indicator development consisted of structured brainstorming on the selected key issues over a three-and-a-half-hour period. An extensive list of indicators and ideas was generated for each key issue. However, the participants noted that, given more time, additional issues and indicators may have been developed. The indicators developed in the brainstorming exercise were therefore regarded as illustrative rather than comprehensive.

Using the brainstormed indicators as a starting point, an organized set of indicators was developed. However, it was recognized that further consolidation of the organized indicators was necessary. In the second large group meeting, conducted over a three-hour period, internal and external experts were consulted to provide comments on the process for selecting the desired indicators, the final structure of the indicators, and the number of indicators desired. The participants were also invited to comment on a sample set of consolidated indicators. It should be noted, however, that focus was devoted to discussing what the indicators should be rather than confirming the sample set.

Throughout the indicator development consultations, several recurring themes emerged. The importance of linking the indicators to the utility's business planning process at the business unit, division, and department levels was continuously emphasized. The participants suggested that the different levels of business planning may be addressed by a hierarchy of indicators that builds on existing corporate goals. Although the number of indicators at lower levels of the business planning hierarchy should not be a particular concern, 3-10 indicators at the business unit level should be sufficient. It was noted that anything beyond that could reduce the effect of the indicators. Other recurring themes included that indicators should address multiple key issues wherever possible, indicators measuring the current state could serve as useful anchors, focus needed to remain on indicators explicitly relevant to the transmission system, and to always remember the importance of financial indicators.

Building on the feedback received, a draft system of indicators was developed for each of the eight key issues depicted in Figure 4.4. Based on a hierarchical approach linked to the business planning process, the draft system illustrated linkages between the indicators, showed how existing indicators could be utilized in the overall system, and incorporated both baseline and management indicators. A total of 122 indicators were incorporated into the draft system of indicators, with 93 being developed as a part of this process and 29 representing indicators previously developed by the company. Spanning all 8 key issues, 9 new indicators were created for the business unit level, 27 for the division level, and 57 for the department level. This was consistent with the guidelines established previously.

The complete draft system of indicators, including all of the comments received throughout the development process, is available in Appendix E.

4.5 Summary

This section provided the results for the first three steps in the SDI Design Process at the case utility. The key outcomes of the needs assessment and the process planning were presented. The development of the draft system of indicators was then discussed in detail. The selection of the conceptual framework, the identification of the key issues to be addressed, the creation of indicator selection criteria, and the process of developing the draft indicators were all discussed. These steps provided the basis for the next step in the indicator design process: testing and adjusting of the indicators.

5 TEST AND ADJUST THE INDICATORS

5.1 Introduction

This section presents the results of the testing and adjusting of the indicators at the case utility. The process used to complete the testing and adjusting is illustrated in Figure 5.1. Each of the steps identified in Figure 5.1 are discussed in detail in the following sub-sections.

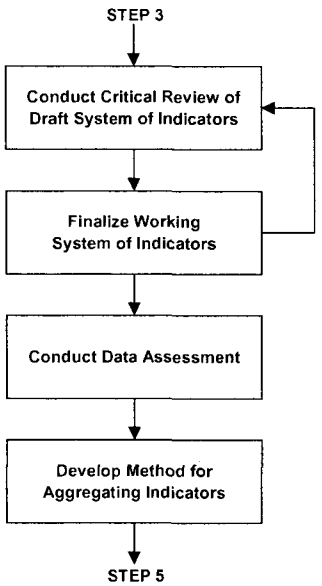


FIGURE 5.1
PROCESS FOR STEP 4: TEST AND ADJUST THE INDICATORS

5.2 Conduct Critical Review of Draft Indicators

To initiate the critical review of the draft system of indicators, individual and small group meetings were held with ten internal experts and eight external experts. Although comments on the indicators were not limited in any way, participants were asked to consider: (1) has anything been missed? (2) should any indicators be removed? (3) are the indicators presented at an appropriate hierarchical level? and (4) are the indicators presented in the most appropriate key issue?

The discussions with individual experts provided a wide variety of input. The key findings, in no particular order, included the following ten points:

1. The hierarchical method of presenting the indicators was clear and useful.
2. There was no need to limit the number of indicators at the lower levels of the hierarchy since the participants did not want to lose any of the key information in the system.
3. Definitions of each indicator must be carefully considered since several of them could be defined in different ways.
4. It was important to tie the indicators to goals and targets. Note that not all indicators must always increase or decrease, but rather may focus on staying within an appropriate range.
5. Regulatory issues should be moved to the "Governance and Management Issues" section.
6. A separate pyramid within "Public Involvement" should be created for Aboriginal issues.
7. Some indicators could be added. For example, the importance of export capability should be more heavily emphasized.
8. Several indicators could be renamed to better reflect an appropriate definition. Among the indicators cited for clarity on definition were those involving the measurement of outages.
9. Several indicators could be subtracted due to lack of relevance, inability to collect meaningful data, or to eliminate redundancy in the system.

10. Although the overall focus is on the transmission system, it is also important to consider linkages to other parts of the company and the Province as a whole.

The complete set of comments received during the individual consultations on the draft set of indicators is presented in Appendix F. Appendix F also summarizes the complete set of responses to those comments and the updates to the indicators.

The key findings from the individual and small group consultations provided the starting point for a professionally facilitated two-hour group meeting with five key internal experts. For each of the ten key points noted above, a complete summary of the response was provided. Again, this resulted in a wide variety of feedback. For example, several indicators were again suggested for deletion or addition and the need to link the indicators to goals was again heavily emphasized. It was noted that regulatory issues should not be presented as optional but that it was also important to not try and set arbitrary standards. However, one of the main comments was to consider phasing the indicators in over time. This would recognize the need to focus on a manageable set of indicators initially, but would also emphasize that the remaining indicators are not to be forgotten. These comments provided the basis for the final updates to the system of indicators. A complete summary of the comments received during the discussion of the updates to the indicators is available in Appendix F.

5.3 Finalize Working System of Indicators

The complete system of sustainable development indicators for the transmission system of the case utility is displayed in Figures 5.2 – 5.9. A total of 98 indicators were incorporated into the system, with 70 being developed as a part of this process and 28 representing indicators previously used by the company. The inclusion of the case utility's existing indicators was a critical point because no system of indicators can be designed without regard for what the company already has in place. The need for linkages to existing company programs was further emphasized by the system's alignment with the utility's business planning process and a continuous emphasis on addressing existing company policies.

The following sub-sections highlight several of the key features of the system of indicators. The first sub-section explains that goals were developed for each indicator. The second sub-section notes that the indicators were based on a number of different measurement methods. The third sub-section explains the hierarchical structuring of the indicators. This was in recognition of the fact that using such a large number of indicators in any decision-making process would be difficult unless they were carefully structured. Finally, the limitations of the systems of indicators are discussed in the fourth sub-section.

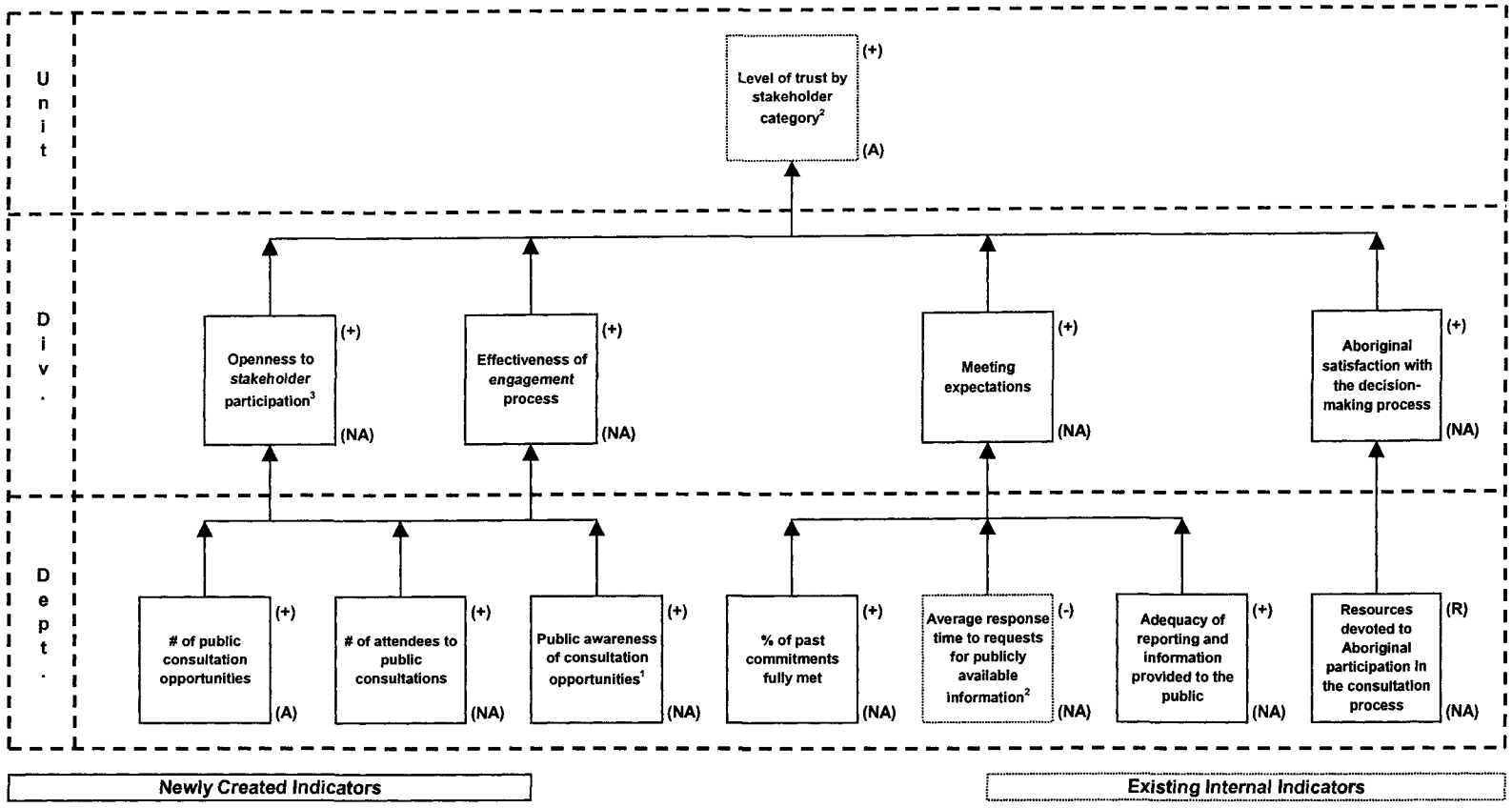


FIGURE 5.2

WORKING SYSTEM OF INDICATORS FOR PUBLIC INVOLVEMENT

Goal Legend: (+) = Increase over time, (-) = Decrease over time, (R) = Maintain an appropriate range over time, (Y) = Existence of plan, program, or policy is desirable
Data Legend: (A) = Currently available, (NA) = Not currently available
Sources: (1) NRC, 2000. (2) CEA, 2004. (3) Veleva and Ellenbecker, 2001.

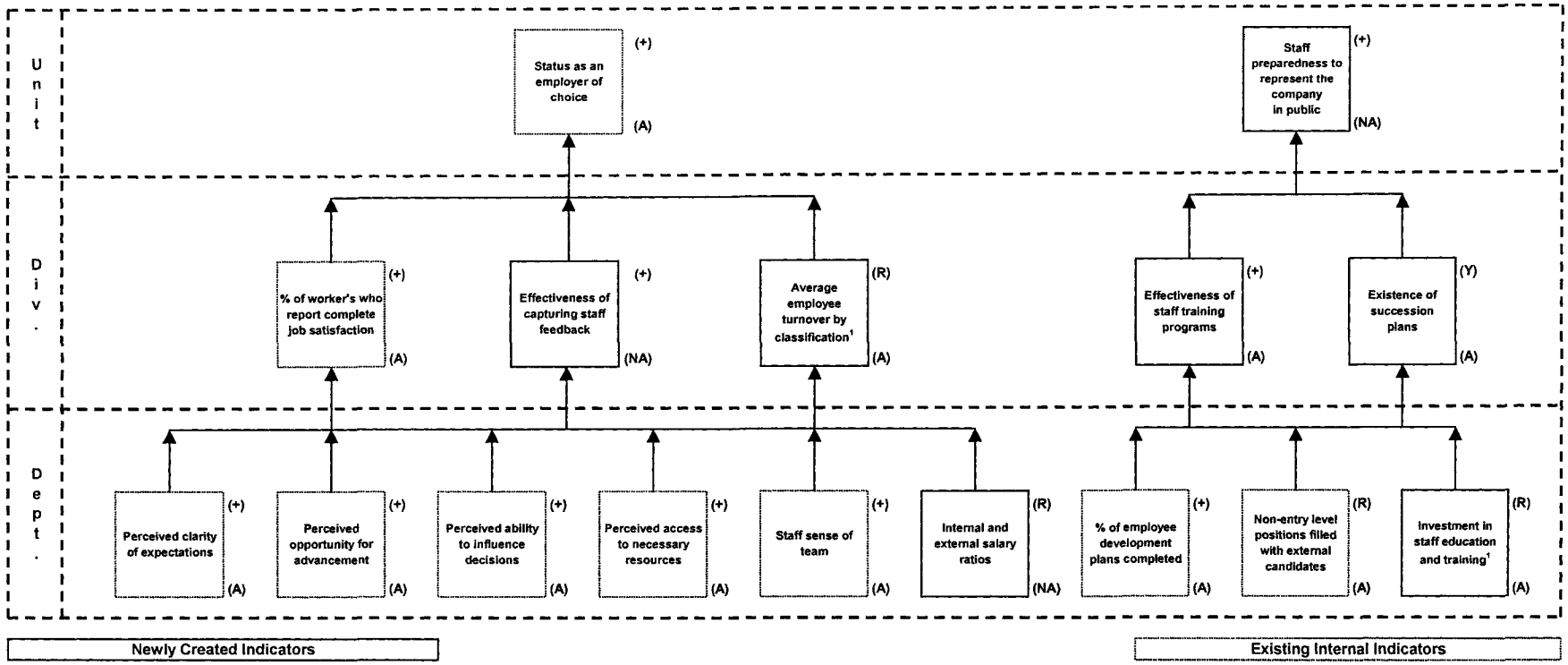


FIGURE 5.3

WORKING SYSTEM OF INDICATORS FOR STAFF RELATIONS

Goal Legend: (+) = Increase over time, (-) = Decrease over time, (R) = Maintain an appropriate range over time, (Y) = Existence of plan, program, or policy is desirable
Data Legend: (A) = Currently available, (NA) = Not currently available
Sources: (1) GRI, 2002.

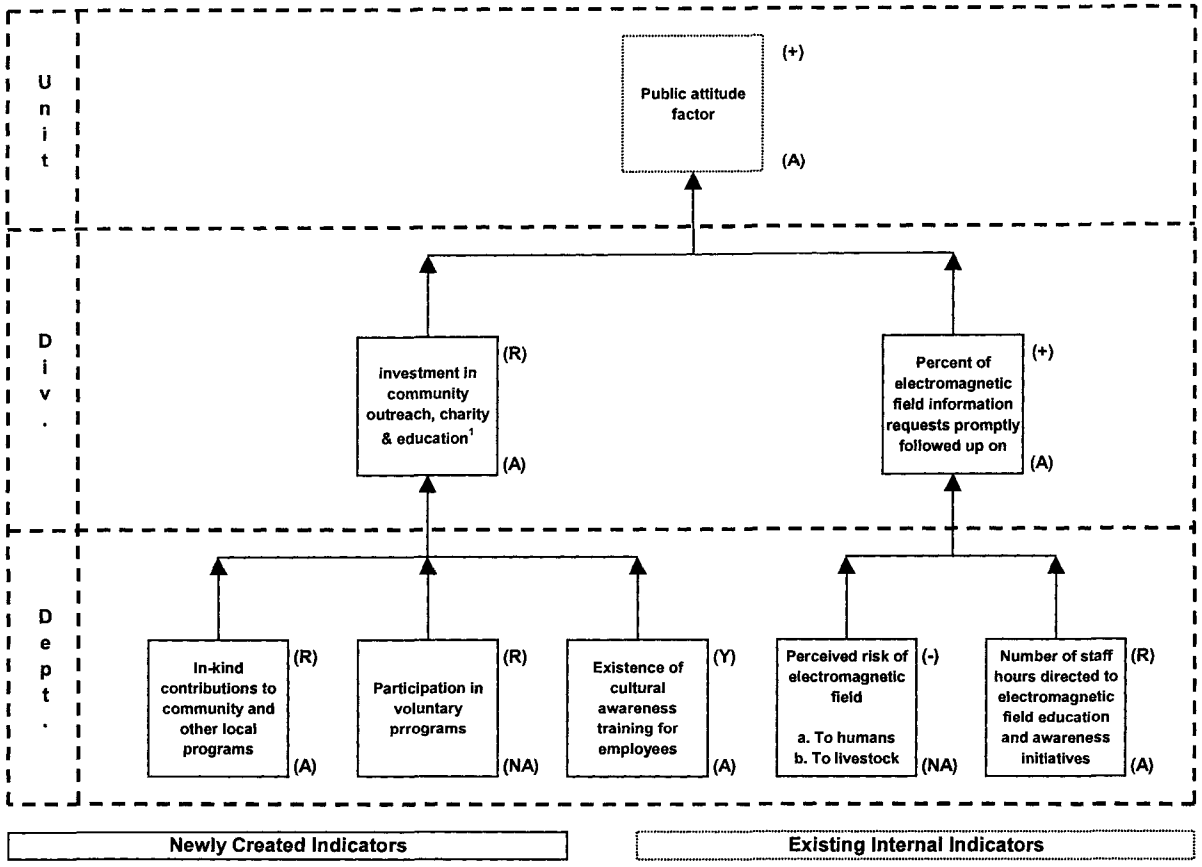


FIGURE 5.4

WORKING SYSTEM OF INDICATORS FOR COMMUNITY RELATIONS

Goal Legend: (+) = Increase over time, (-) = Decrease over time, (R) = Maintain an appropriate range over time, (Y) = Existence of plan, program, or policy is desirable
Data Legend: (A) = Currently available, (NA) = Not currently available
Sources: (1) GRI, 2002.

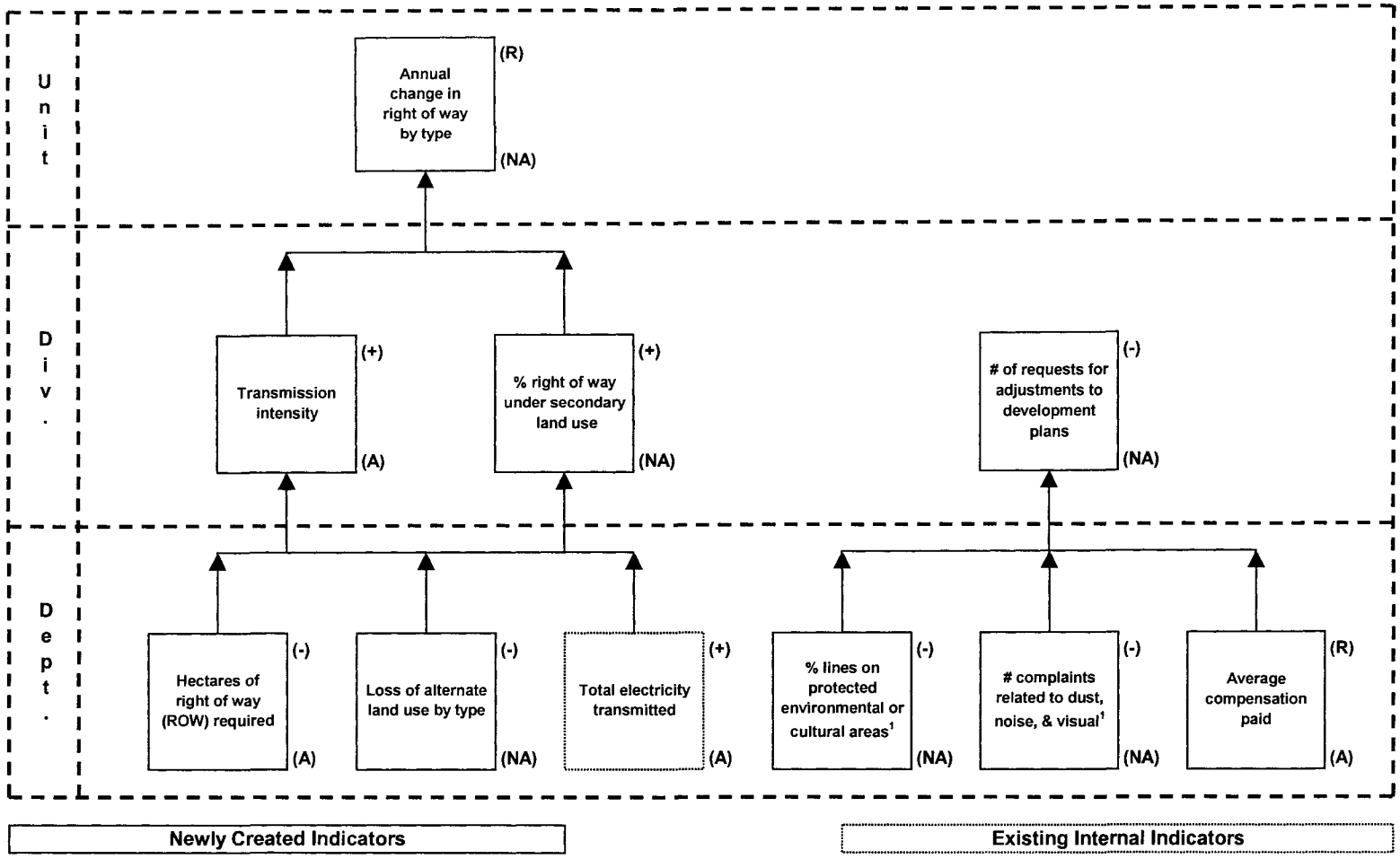
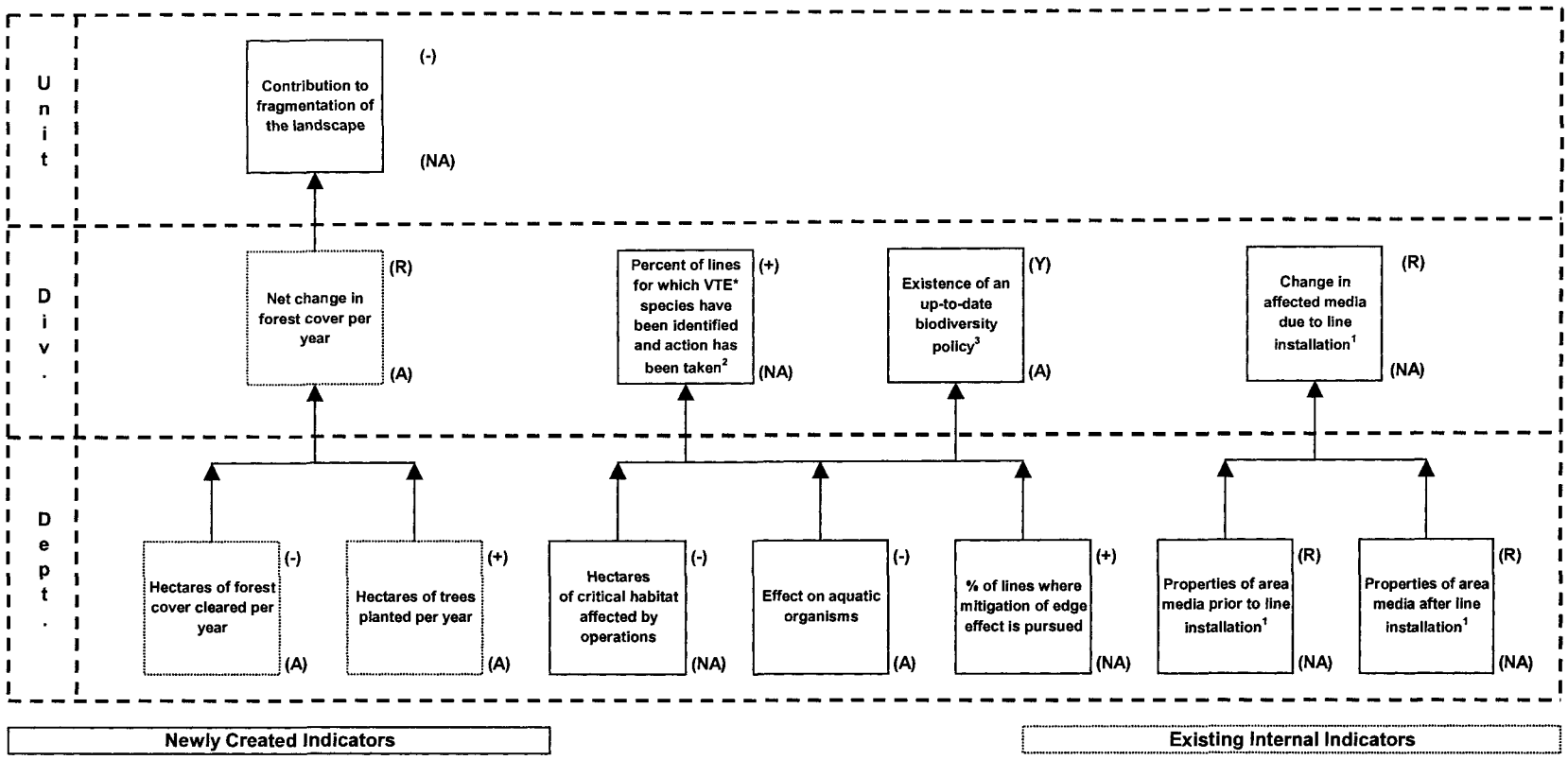


FIGURE 5.5

WORKING SYSTEM OF INDICATORS FOR PRIVATE AND CROWN LAND USAGE

Goal Legend: (+) = Increase over time, (-) = Decrease over time, (R) = Maintain an appropriate range over time, (Y) = Existence of plan, program, or policy is desirable
Data Legend: (A) = Currently available, (NA) = Not currently available
Sources: (1) Azapagic, 2004.

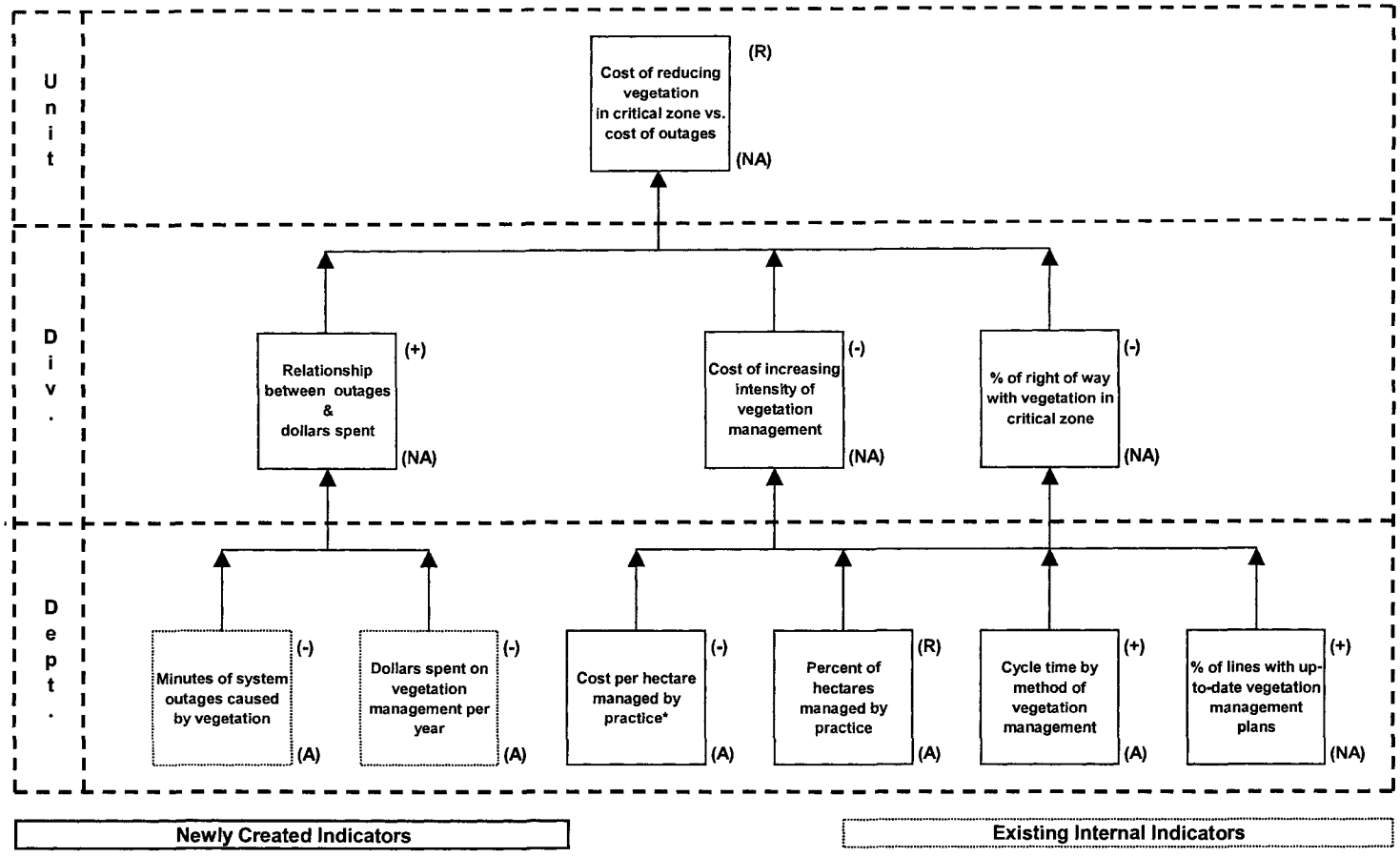


*VTE = Vulnerable, threatened, or endangered species.

FIGURE 5.6

WORKING SYSTEM OF INDICATORS FOR ALTERATIONS TO THE LANDSCAPE

Goal Legend: (+) = Increase over time, (-) = Decrease over time, (R) = Maintain an appropriate range over time, (Y) = Existence of plan, program, or policy is desirable
Data Legend: (A) = Currently available, (NA) = Not currently available
Sources: (1) Adapted from Belnap, 1998. (2) NRC, 2000. (3) GRI, 2002.



* Vegetation Management Practices include hand cutting, mechanical, chemical, biological, multiple treatment methods, and unmanaged rights of way.

FIGURE 5.7

WORKING SYSTEM OF INDICATORS FOR VEGETATION MANAGEMENT PRACTICES

Goal Legend: (+) = Increase over time, (-) = Decrease over time, (R) = Maintain an appropriate range over time, (Y) = Existence of plan, program, or policy is desirable
Data Legend: (A) = Currently available, (NA) = Not currently available

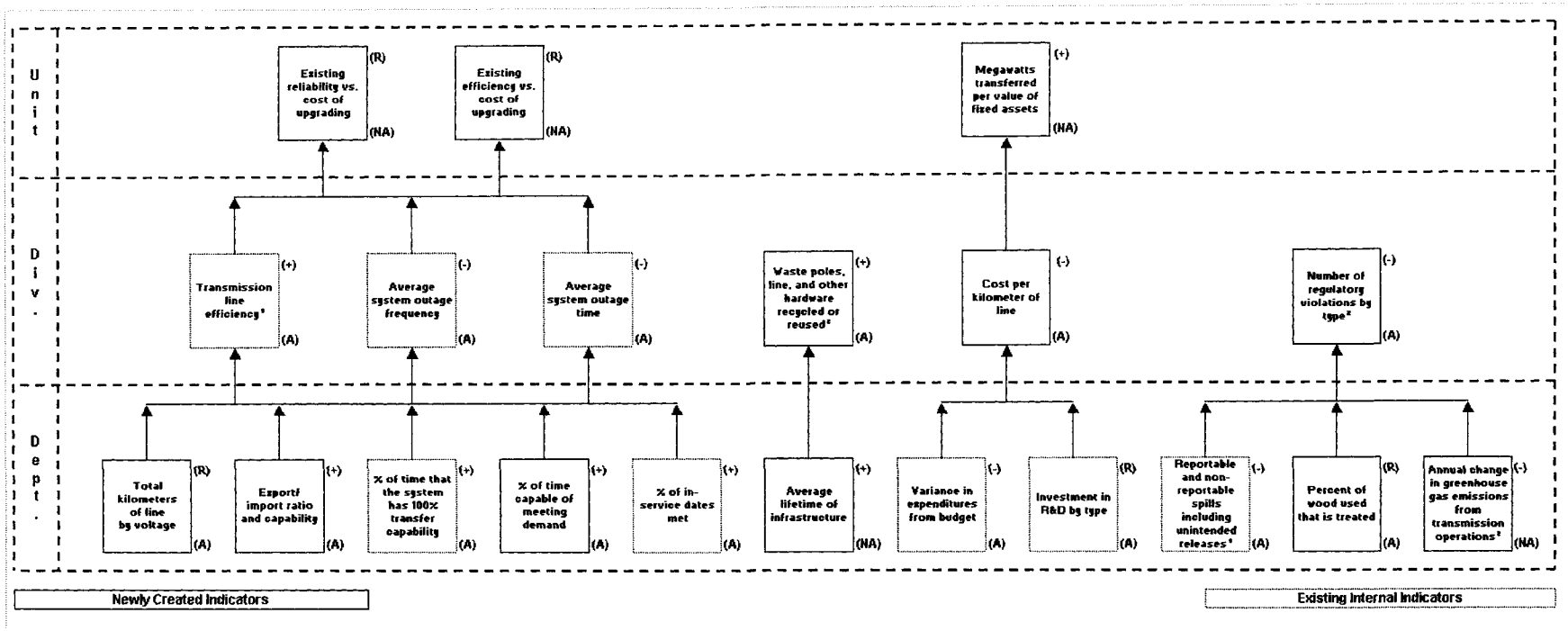


FIGURE 5.8

WORKING SYSTEM OF INDICATORS FOR GOVERNANCE AND MANAGEMENT ISSUES

Goal Legend: (+) = Increase over time, (-) = Decrease over time, (R) = Maintain an appropriate range over time, (Y) = Existence of plan, program, or policy is desirable
Data Legend: (A) = Currently available, (NA) = Not currently available
Sources: (1) CEA, 2004. (2) GRI, 2002.

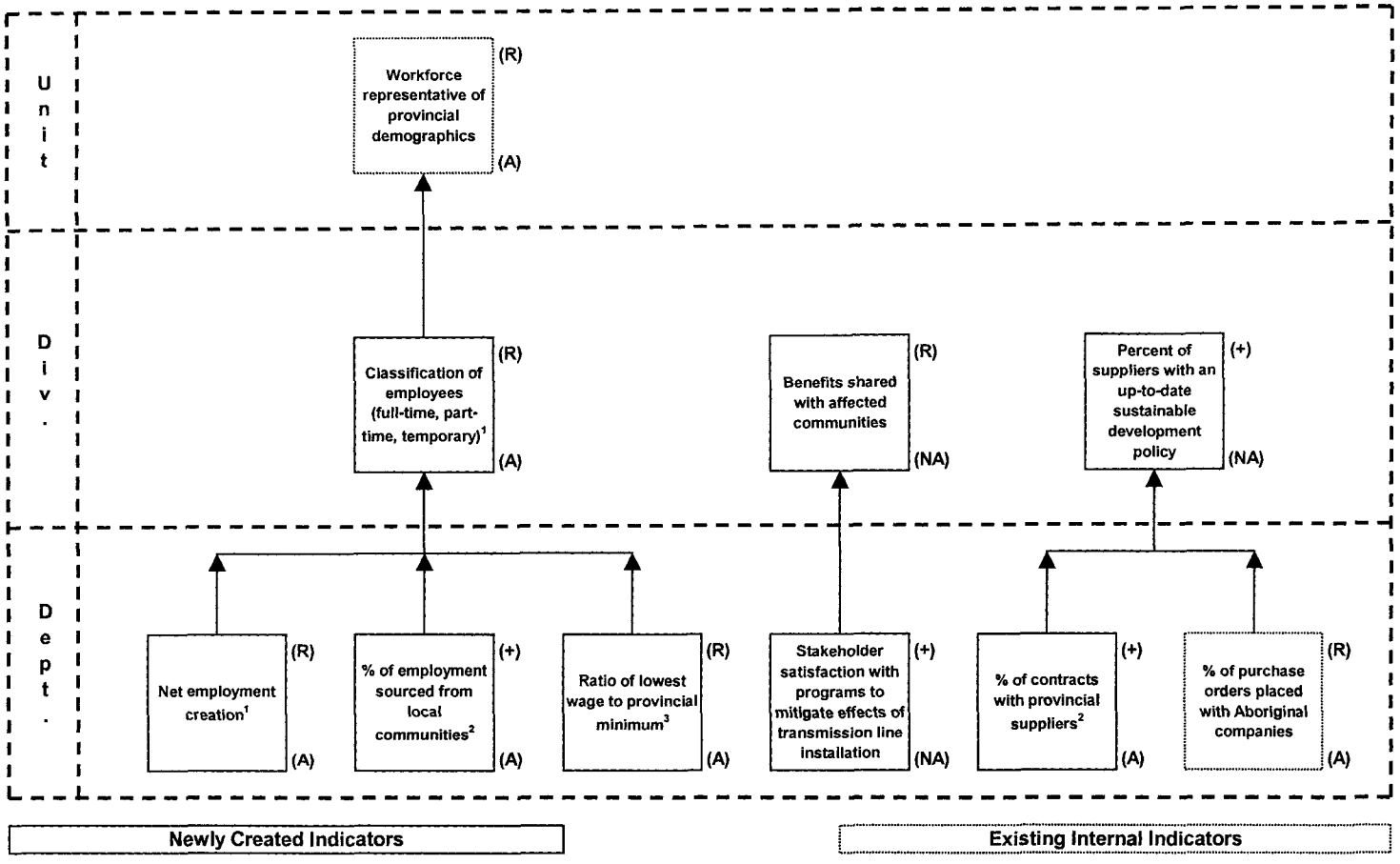


FIGURE 5.9

WORKING SYSTEM OF INDICATORS FOR BENEFITS TO CUSTOMERS AND STAKEHOLDERS

Goal Legend: (+) = Increase over time, (-) = Decrease over time, (R) = Maintain an appropriate range over time, (Y) = Existence of plan, program, or policy is desirable
Data Legend: (A) = Currently available, (NA) = Not currently available
Sources: (1) GRI, 2002. (2) Azapagic, 2004. (3) Veleva and Ellenbecker, 2001.

5.3.1 Identification of Goals

Figures 5.2 – 5.9 identify explicit goals for each of the new and existing indicators. This was in recognition of the fact that no indicator can be assessed without reference to a goal since there would be no way to know whether performance was improving or getting worse. To understand if the case utility is making progress towards its sustainable development goals, it must be clear if the value of the indicator should increase, decrease, or maintain an appropriate range. For example, in the indicators for the key issue "Alterations to the Landscape" (Figure 5.6), the value for the indicator "Percent of lines where mitigation of edge effect is pursued" should increase over time, the value for the indicator "Hectares of critical habitat affected by operation" should decrease, and "Net change in forest cover per year" should maintain an appropriate range. In cases where understanding of the issue is just beginning to emerge, a limited number of other indicators were based on a binary (yes/no) evaluation. The indicator "Existence of an up-to-date biodiversity policy" is an example of this form of indicator. In Figures 5.2 – 5.9, indicators that should increase over time are indicated by a (+), indicators that should decrease over time are indicated by a (-), indicators that should maintain a range are indicated by a (R), and indicators that are based on a binary assessment are indicated by a (Y).

5.3.2 Form of Measurement

Using a combination of quantitative and qualitative measures, the indicators were designed to be based on direct measurements, surveys, and descriptions. Examples of each form of indicator are provided in the key issue "Staff Relations"

(Figure 5.3). As an illustration, the indicator "Non-entry level positions filled with external candidates" is based on direct measurement, "Perceived opportunity for advancement" is based on an employee survey, and "Existence of succession plans" is based on a written description. The different forms of measurement recognize that the utility is at different stages of development for different issues. A variety of measures were therefore necessary to provide a balanced view of its sustainability performance from the perspective of its transmission system. The form of measurement for each indicator is available in Appendix F.

5.3.3 Hierarchical Structuring of the Indicators

One of the most important techniques used to increase the utility of the indicators was hierarchical structuring of the measures. It should be noted that this does not imply linear thinking about complicated issues. Rather, such an approach emphasizes systematic thinking since it explicitly requires a methodical, orderly approach to the development of the system of indicators.

As demonstrated in each of Figures 5.2 – 5.9, the indicator hierarchy was developed to mimic the company's business planning process. Indicators were therefore created for the business unit, division, and department levels. Ten indicators were incorporated into the business unit level, 32 into the division level, and 56 into the department level. This ensured that decision-makers at the business unit level would not be overwhelmed with information, but that they would have the option of accessing information at other levels of the organization if it was required.

Indicators at the lower levels of the business planning process were tied to indicators at higher levels. For example, in the key issue "Vegetation Management

Practices" (Figure 5.7), the indicators "Minutes of system outages caused by vegetation" and "Dollars spent on vegetation management per year" were tied to the indicator "Relationship between outages and dollars spent." The arrows in Figures 5.2 – 5.9 represent relationships between the indicators, but it is important to stress that they do not represent aggregation. Therefore, while indicators at the lower levels help measure contributors to indicators at higher levels of the hierarchy, not all of them are necessarily as tightly bound as the example given above. Aggregation of the indicators was considered later on in the development process (Section 5.5).

By highlighting the interdependencies within the system of indicators, the hierarchical approach also helped provide built-in rationale for why each indicator was included in the system. The participating experts noted that this would be particularly important in helping to obtain buy-in on the indicators with those who would collect the data and perform the analysis. For example, the approach employed demonstrates that it would be difficult to develop the indicators at the division and business unit levels without first collecting the information required by the indicators at the department level. This clearly illustrated how each indicator was an essential part of the overall system and helped limit the need to eliminate indicators at the lower level of the hierarchy.

5.3.4 Limitations of the Working System of Indicators

The indicators cover a wide variety of material. However, it is important to emphasize that they are not comprehensive. By their very definition, indicators cannot measure everything. Several key issues that were raised during the consultations with participating experts were not included in the system of indicators.

Furthermore, even on the issues that were considered, there were many indicators that were not included in the system. Both of these limitations are discussed further in the following sub-sections.

5.3.4.1 Issues Omitted from the System of Indicators

Issues such as safety and potential contamination were not explicitly addressed since the company already had numerous programs in place to help manage reporting and improvement on those issues. Other issues, such as the source of the power for the transmission system and the profitability of the company, were not considered since the participants felt that they are more appropriately covered by indicators for other parts of the company. The decisions on what to include in the system of indicators were all made in consultation with the participating experts.

However, while they were not ultimately included in the final system of indicators, it is important to note that indicators addressing many of these issues were considered at some point in the indicator design process. For example, draft sets of indicators for safety, potential contamination, and profitability were prepared. Indicators developed for safety included "Cost of preventing accidents vs. cost of reacting after the fact", "Lost-time accidents and near misses by cause", "Number of public injuries by cause", "Number of towers collapsing by cause", "Percent of workers exposed to noise levels above the legal minimum", "Expenditure on health and safety training", "Average number of hours of safety training per employee", and "Cost of safety features that will reduce most frequent incidents". Indicators developed for potential contamination included "Investment in environmental management", "Number of reportable and priority spills by cause", "Amount of

hazardous waste generated", "Amount of solid waste generated", "Global warming potential", "Acidification potential", "Ozone depletion potential", "Eutrophication potential", and "Ecotoxicity potential". Finally, indicators developed for profitability included "Profitability of the business unit", "Debt service", and standard financial measures such as "Return on investment", "Working capital ratio", "Total assets turnover", and "Times interest earned".

It is important to stress that many of the indicators noted in the previous paragraph were never formally tested in the expert consultations. Only indicators directly associated with the eight key issues ultimately selected (Figure 4.4) were formally tested. Safety and potential contamination issues were not explicitly addressed since the case utility was already required to report on them as a part of the regulatory process. Therefore, the participants noted that considering these issues again as a part of this process would not add meaningful value to the company. Issues related to profitability were excluded because profitability was computed at the corporate, rather than business unit, level at the case utility.

However, some of those issues were indirectly addressed in some cases. For instance, consider the indicators associated with the key issue "Governance and Management Issues" (Figure 5.8). Potential contamination issues are considered in the indicators "Reportable and non-reportable spills", "Percent of wood used that is treated", "Annual change in greenhouse gas emissions", and "Number of regulatory violations by type". Likewise, profitability was indirectly considered through the incorporation of several cost indicators. For instance, "Cost per kilometer of line",

"Variance in expenditures from budget", and "Megawatts transferred per value of fixed assets" all appeared in "Governance and Management Issues".

The key point is that only those issues most relevant to the sustainable development priorities of the utility's transmission system were directly considered in the system (i.e. those issues listed in Figure 4.4). However, it was recognized that leaving other issues out of the system could potentially create the perception that they were not "sustainable development issues". This is one of the reasons why integration with existing initiatives was such an important part of the process.

5.3.4.2 Indicators Omitted from the System of Indicators

Even on the eight key issues that were considered, there were many indicators that were not included in the system. For instance, several indicators explicitly linking the transmission system to other corporate and Provincial initiatives were ultimately removed. This was because the participants believed that these indicators would be most appropriately presented as a part of a broader corporate system of indicators. Examples of such indicators included "Percent of connection requests for alternative energy programs completed on time", "Investment in at-source energy generation options", "Need for new transmission infrastructure eliminated due to energy conservation", and "Renewable energy consumed vs. Total energy consumed in the Province". However, the participants stressed that these are important issues that must be noted and expressed in the recommendations for further work.

There were also many instances where more complex indicators were suggested than those that appear in the working system of indicators. However, it is critical to recognize that the people who will be working with the indicators must be

comfortable with the measures selected and believe that they are things the company can realistically address at this time. In cases where the company is taking a first step towards addressing an issue, it is particularly important that the indicators do not go beyond the company's ability to address the matter. Some of the indicators may therefore be viewed as starting points that will evolve over time. For instance, if the company is just beginning to consider the issue of biodiversity, an indicator such as "Existence of an up-to-date biodiversity policy" may be more appropriate than an indicator such as "Changes in population or diversity for selected species". As the company's ability to address more sophisticated indicators increases, and as the company's sustainable development goals change, indicators may be added, subtracted, or replaced. Further insight into the evolution of the system of indicators is provided by the assessment model in Section 6. Further details on the indicators ultimately removed from the system are available in Appendix F.

5.4 Data Assessment

While the participants emphasized it was important not to lose any of the information in the system of indicators, it was also recognized that immediate integration of nearly 100 indicators with the company's existing business planning process would not be practical. With that in mind, it was determined that the indicators should be phased-in over time. A staggered approach would allow the company to integrate a more manageable set of indicators immediately while ensuring that the other indicators developed in the process would not be lost.

To determine which indicators should be integrated immediately, a data assessment was conducted for each indicator. The data assessment was conducted

through an email consultation with five internal experts. As illustrated in Figures 5.2 – 5.9, the data assessment revealed that data was either collected or readily available for 57 of the 98 indicators in the system. Indicators for which data was currently available were indicated by a (A) on the figures, while indicators for which data was not available were indicated by a (NA).

As established in the development of the indicator selection criteria, the experts recognized that a lack of current data did not disqualify the indicator from the system. The data assessment was used to establish the timing of integration, not whether the indicators should ultimately be used or not. Indicators for which data was available could be immediately integrated with the case utility's existing business infrastructure. For indicators where data was not available, it was discussed whether data would be worth the time and effort to collect. The participants agreed that all of the other indicators should remain in the system and that they would be phased in over time as data was collected.

In any case, it is critical to recognize that the system of indicators is a part of an overall hierarchy of information within the case utility. All of the measures in the existing business planning process and other internal programs are based on a foundation provided by the company's internal data collection systems. This must also be the case for newly created indicators.

As illustrated in Figure 5.10, each indicator ultimately rests on a foundation of primary data. The data used to develop each indicator varied, but was in any case based on either surveys or direct measurement. The indicators themselves form the basis for the development of another level of information: sub-indices for each key

issue and the overall composite index for the sustainable development of the transmission system. While the development of the aggregated indicators is discussed in Section 5.5, Figure 5.10 underscores that linkages between the indicators and existing data collection systems are critical. The method of calculating each indicator was therefore specified, as was the department responsible for collecting and analyzing the required information.

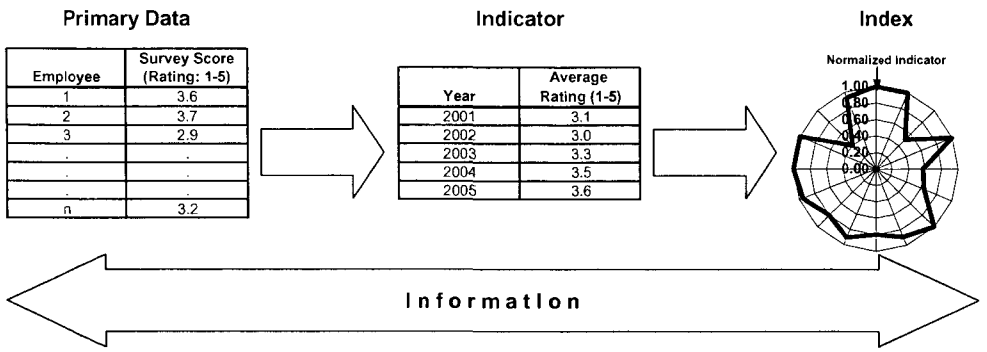


FIGURE 5.10
INFORMATION HIERARCHY
Source: Adapted from Segnestam, 2002.

The complete results of the data assessment, including a summary of the departments responsible for gathering the data, are available in Appendix F.

5.5 Develop a Method of Aggregating the Indicators

As illustrated in Figure 5.11, the aggregation method used was based on a model developed by Krajnc and Glavic (2005a and 2005b). In consultation with internal and external experts, a method for creating a sub-index was developed for each key issue and, using the sub-indexes, a method was also created to develop a composite sustainable development index for the case utility's transmission system. However, while the approach used in this research was similar, there were two main differences between the model proposed by Krajnc and Glavic and the model used as

a part of this process. The differences related to the weighting and normalization of the indicators. The weighting and normalization processes used in the case study are therefore discussed in the following sub-sections. A discussion of the presentation of the aggregated indicators is also provided.

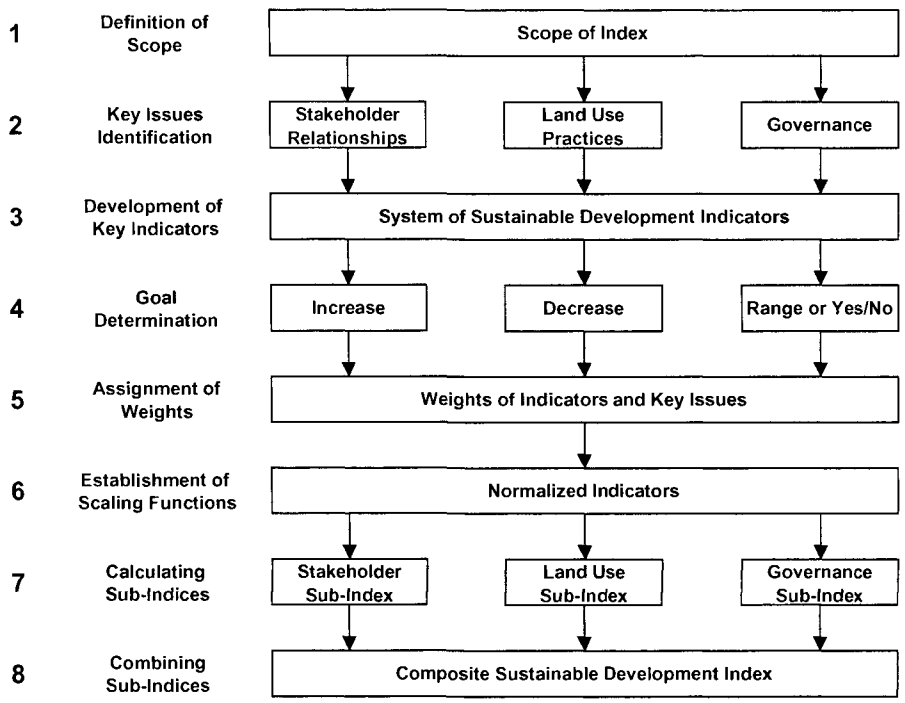


FIGURE 5.11
AGGREGATION METHOD
Source: Adapted from Krajnc and Glavic (2005a and 2005b).

5.5.1 Weighting of the Indicators

Rather than using the Analytic Hierarchy Process (AHP) to weigh the issues and indicators, the weighting was conducted through the assignment of a predetermined number of points (100). This means that for each of the eight key issues, 100 points were available to be assigned to the indicators in that issue. Assignment of the points was based on consultation with the participating experts.

The primary reason for using this method was that, in the opinion of the experts, it was clearer than the AHP method. Given that the utility had not worked with many of the indicators in the system, the participants determined that the weights would initially be set as equal for all indicators and issues. As an illustration of this point, the sixteen indicators in the "Staff Relations Sub-Index" were therefore all assigned a weight of 6.25 (i.e. 100/16). The decision to equally weigh the indicators was in recognition of the fact that the company would require the time and experience of several business cycles to determine the relative importance of each indicator. However, the participants did specify that the aggregation model should be capable of accommodating different weights. This would provide the case utility with the option to adjust the weights of the indicators in the future.

5.5.2 Normalization of the Indicators

Second, an adapted form of normalizing the indicators was used. For indicators where the goal was to increase or decrease in value over time, a modified version of the normalization method proposed by Krajnc and Glavic was used:

$$\text{Increasing Indicators} = \frac{\text{this period's value} - \text{minimum value over last 5 periods}}{\text{maximum value over last 5 periods} - \text{minimum value over last 5 periods}}.$$

$$\text{Decreasing Indicators} = 1 - \frac{\text{this period's value} - \text{minimum value over last 5 periods}}{\text{maximum value over last 5 periods} - \text{minimum value over last 5 periods}}$$

For indicators that increase or decrease over time, the only difference between the method used in this process and that used by Krajnc and Glavic was that "periods" of time were used instead of "years" in the formulas above. This accounted for the fact that the case utility reviewed their internal measures quarterly as well as annually.

The Krajnc and Glavic method offered the advantage of incorporating different kinds of units by normalizing them to a value between 0 and 1, 0 being the worst possible score and 1 being the best. However, many indicators in the system for the case utility were based on maintaining an appropriate range or were based on a binary (yes/no) assessment. To address those issues, indicators of a binary nature were calculated by setting the values at 0 for a "no" and 1 for a "yes". For indicators seeking to maintain an appropriate range, the values were set based on the closeness to the target threshold. For each percentage point that the range was missed, 0.1 of a point was subtracted from the ideal score of 1. Two other alternatives were also discussed. In the first alternative, a value of 1 was assigned for indicators within a specified range and a value of 0 to indicators falling outside of the range. The second alternative was similar to the first, but instead of 0.1 of a point being subtracted for each missed percentage point, the penalty would be exponential. These methods of calculating the normalized values for binary- and range-based indicators addressed one of the main weaknesses in the method proposed by Krajnc and Glavic.

Finally, it is important to note that the form of normalization described by Kranjc and Glavic does have another weakness: it indicates whether the company is getting better or not over time with respect to its own performance. In other words, Krajnc and Glavic's normalization method is normalizing to the company's *past* performance. This is acceptable as a first step in the aggregation process; however, the company should be aware that improvement in this method would likely be required over time. As the company becomes more comfortable with the aggregation process, the normalization method may be replaced with one based on targets and

ranges for each indicator. This would allow the company to normalize the data to its desired *future* performance. This is a key distinction. Rather than being based on past performance, scores would be assigned based on the company's closeness to its established targets. Although this would represent a significant upgrade to the aggregation process, it will require time for the company to develop appropriate targets, particularly for newly created indicators. While normalizing to past performance is acceptable as a first step, the ultimate goal should be normalizing to desired future performance.

5.5.3 Presentation of the Aggregation Method

A sample radar plot for the aggregation of the indicators for the key issue "Staff Relations" is presented in Figure 5.12. The radar plot provides a concise visual summary of the normalized value for each indicator. This helps make the radar plots a useful decision-making tool, particularly in illustrating changes in the company's performance over time. As Krajnc and Glavic (2005a and 2005b) note, the larger the area covered by the plot, the better the company's sustainable development performance on that issue and vice versa.

To calculate the index, an automated Excel spreadsheet using the weighting method and normalization formulas outlined previously was prepared. The aggregate was presented in Excel format for two reasons. The first is that it illustrated how the information, the indicators, and the index may be easily and efficiently linked together in a user-friendly format. It was demonstrated that all of the formulas were automated and that changing the data cells automatically lead to new calculations for each indicator, for the index, and also automatically generated updated graphs.

Therefore, the spreadsheets were capable of accommodating any changes to the weights of the indicators. Among other benefits, this would permit an easy sensitivity analysis of the indicators. The second reason for choosing the Excel format was that it showed how the indicators and the indices may be easily integrated with the corporate intranet. The participants observed that this type of electronic presentation would also allow for relatively easy integration with other reporting methods. An electronic copy of the aggregation examples is presented in the CD attached to the back of the dissertation.

Further details on the aggregation method are available in Kranjc and Glavic (2005a and 2005b). Further details on the aggregation consultations are available in Appendix F.

5.6 Summary

This section presented the results of the testing and adjusting of the indicators. The results of the critical review of the draft indicators were presented first. It was then demonstrated that the comments received during the critical review were used to develop the working system of indicators for the case utility. Key components of the system of indicators were discussed, including the identification of goals for each indicator, the different forms of measurement, and the hierarchical structuring of the indicators. It was explained that a data assessment for each indicator was conducted. Finally, the method of aggregating the indicators was discussed.

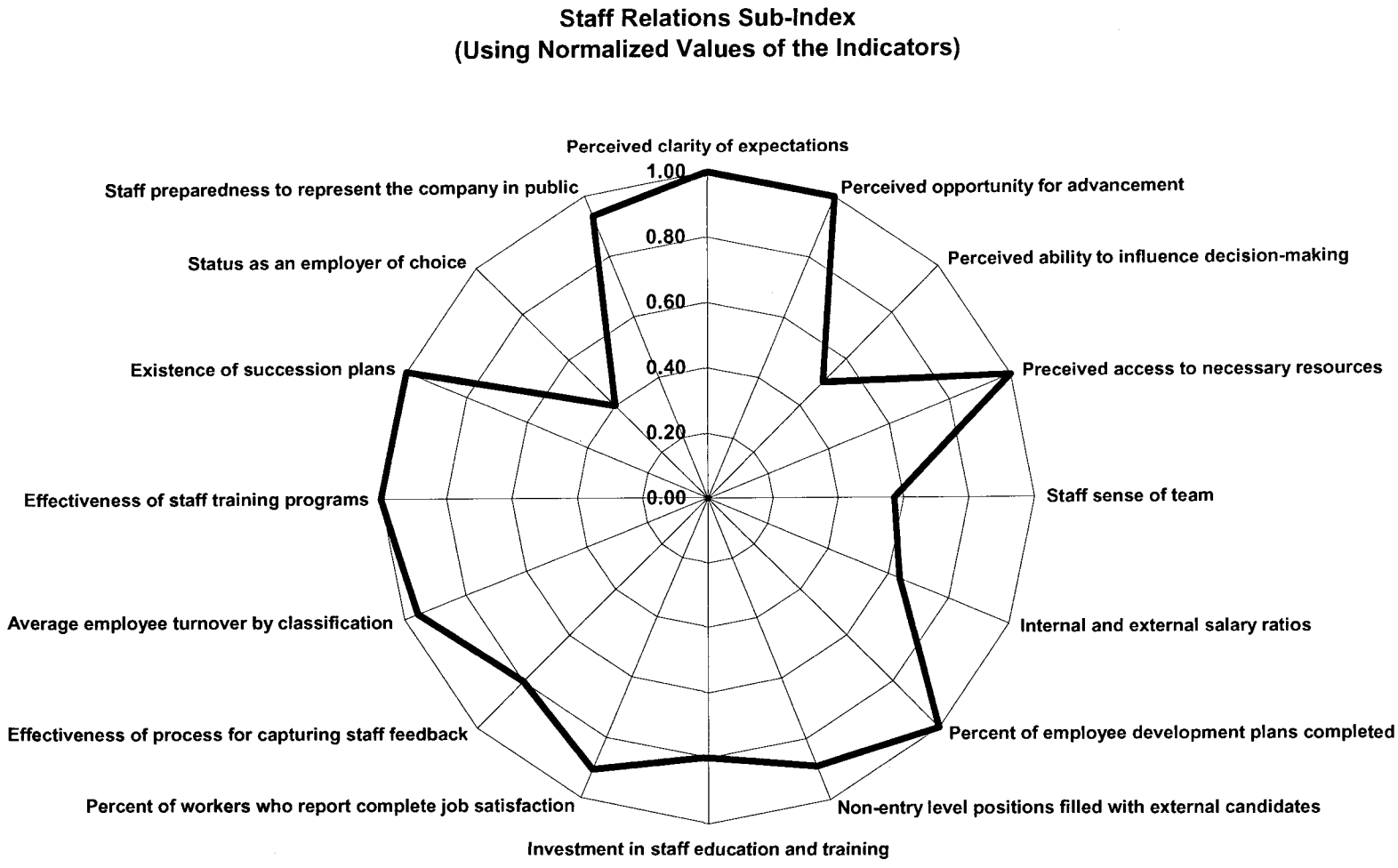


FIGURE 5.12
AGGREGATION EXAMPLE: STAFF RELATIONS SUB-INDEX

6 INTEGRATE THE INDICATORS

6.1 Introduction

The integration of the indicators with the case utility's existing business infrastructure was discussed and considered throughout the entire project. There was an overriding focus on the role of the indicators in the overall management system from the very first meeting with the participating experts. However, it was recognized that it was important to tie all of the relevant information received together to illustrate how the indicators relate to existing internal initiatives.

Therefore, this step focused on developing a model for integrating the indicators with the case utility's existing systems. It consisted of two key components: an indicator integration model and an assessment protocol to help guide the ongoing evolution of the indicators. A summary of the company's existing management systems is provided in Appendix G.

6.2 Indicator Integration Model

To provide a method of structuring and communicating the integration of the indicators at the case utility, three proposed indicator integration models were developed. The proposed models are available in Appendix G. The models were developed based on comments received from the internal and external experts throughout the entire SDI Design Process. The comments received indicated that the integration model must:

- Be represented in a clear, concise diagram that will assist in the communication of the integration plan.

- Link the indicators to relevant existing initiatives, particularly the business planning process, sustainable development report, and corporate intranet.
- Be capable of responding to changes in the utility's requirements over time.

The three proposed models were critically reviewed in consultations with four key internal experts and three external experts. The comments on the proposed models were then used to develop an indicator integration model for the case utility. The complete set of comments received is available in Appendix G.

The model is illustrated in Figure 6.1. It addresses all three of the key requirements noted above. First, the model is illustrated in a straightforward diagram based on a common representation of a feedback control system. Second, it emphasizes that the indicators must build on existing business infrastructure if the integration effort is to be successful. Third, the model builds on elements that are common to all initiatives within the case company. This enhances its ability to accommodate both existing and future initiatives within the company as well as any changes to the indicators. Each of these features is discussed further below. To provide additional guidance on how the indicators may address the company's changing requirements, an indicator assessment model is discussed in Section 6.3.

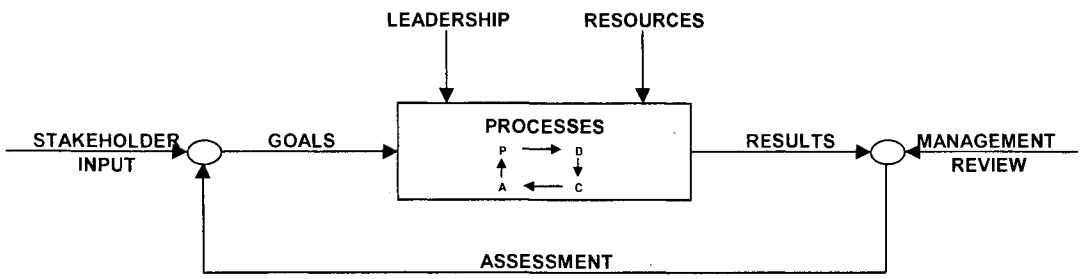


FIGURE 6.1
INDICATOR INTEGRATION MODEL

6.2.1 Visual Representation of the Integration Model

The model is designed to mimic a feedback control system. This approach clearly emphasizes that any process must begin and end with stakeholder input. This is a fundamental requirement since the needs of internal and external stakeholders will form the basis for setting overall organizational goals. As illustrated in Figure 6.1, those goals are then transformed into results through a series of processes. Drawing on the needed human, informational, material, and financial resources, and guided by input from leadership, the model highlights that the processes are designed to operate on an iterative Plan-Do-Check-Act (PDCA) cycle of continuous improvement. The results generated by the processes are then subjected to an assessment. Since results cannot be assessed in the absence of stakeholder feedback, the model illustrates that the key internal and external stakeholders must be involved in the assessment. Finally, the model highlights that the company's top management must periodically review the indicators to ensure their continuing suitability, adequacy, and effectiveness.

There are several benefits to representing the integration model as a feedback control system. The primary advantage is that it highlights that feedback is what ultimately drives the improvement of the indicators over time. As in any system, feedback is the function that compares the actual performance of the system to the desired performance of the system. The second advantage in this approach is that it demonstrates that the role of all stakeholders is dual: they provide input into the development of the indicators and are also involved in the assessment of the system's output. Finally, a third advantage of using this representation is that many of the

employees at the case utility are already familiar with the concept of feedback control systems. This enhances its usefulness as an internal communication tool.

Finally, it should be noted that an alternate version of the integration model was also well received by the participating experts. This was in recognition of the fact that different models may be needed for different people. However, it is important to stress that the primary difference between the models is in the visual presentation, not the content. The alternate model is available in Appendix G.

6.2.2 An Element-Based Approach to Integration at the Case Utility

The purpose of the model is to help structure thinking and discussion about the integration of the indicators. The model therefore consists of eight key elements common to all initiatives within the case utility. Approaching the integration of the indicators in an element-based fashion allows the company to systematically consider all areas where the indicators are most relevant to its existing internal initiatives. For each element, the company must consider how the indicators can help it to meet existing commitments, enhance existing programs, and build on things the company is already doing. However, it is important to stress that any model will not actually integrate anything on its own. It is a tool to aid the integration process, not an end in itself. With that in mind, each of the eight elements depicted in Figure 6.1 are briefly described below.

1. Stakeholder Input: Stakeholder input is the starting point of all indicator initiatives. While each company will have unique stakeholders and will consult with them at different times, the key stakeholder categories considered at the case utility included: the general public, Aboriginals, non-governmental

organizations, landowners, federal and provincial regulators, and federal and provincial technical advisors.

2. Goals: While it is necessary to create a specific goal for each indicator, it is critical that sustainable development indicators contribute to existing goals within the organization. The indicators built strongly on the case utility's Transmission and Distribution Strategic Plan goals.
3. Processes: Every organization already has processes in place that can be used to facilitate the integration of sustainable development indicators. At the case utility, the business planning process was the primary vehicle for integration of the indicators. The indicators were therefore linked to the business planning process at the business unit, division, and department levels.
4. Leadership: The support, commitment, and leadership from key decision-makers are necessary if any initiative is to succeed over time. These factors could be demonstrated at the case utility by identifying a corporate champion for the indicators and actually using the indicators as an input to decision-making.
5. Resources: Recognizing that the organization may need to allocate some new resources to integrating the indicators, it is essential that any new performance measurement system draws on the resources that are already in place wherever possible. The indicators at the case utility were therefore constructed to build on existing data collection and analysis systems in the business planning, EMS, CEA ECR, and sustainable development reporting processes.

6. Results: Results represent the achieved level of performance, which is indicated by the analyzed indicators. At the case utility, the indicators were designed to enhance, rather than replace, existing performance measurement systems by addressing key gaps identified by the participating experts.
7. Assessment: The effectiveness and efficiency of the indicators and their integration with other initiatives must be assessed on an ongoing basis. The assessment model in Section 6.3 provides further details on this element. It is essential that the organization build on existing self-assessment, benchmarking, and auditing experience.
8. Management Review: Given the many linkages between the indicators and existing programs, the review of the indicators should be incorporated into existing management reviews. At the case utility, the review of the indicators may be integrated with the quarterly and annual reviews of the Transmission and Distribution Strategic Plan, EMS, and CEA ECR programs.

Building on the discussion above, some of the essential lessons regarding the integration of the indicators at the case utility are summarized in Table 6.1.

TABLE 6.1
KEY LESSONS ON INTEGRATING THE INDICATORS AT THE CASE UTILITY

Stakeholder Input
- Key internal and external stakeholders must be involved in the development of the indicators.
- The indicators must address the issues identified by key stakeholders.

Goals
- Design the indicators to help meet existing commitments within the company.
- Identify specific goals for each individual indicator.

TABLE 6.1
KEY LESSONS ON INTEGRATING THE INDICATORS AT THE CASE UTILITY

Processes
- Incorporate the indicators into the company's widely used existing management systems.
- Incorporate the indicators into additional internal initiatives as they emerge over time.

Leadership
- Identify a corporate champion to promote the indicators throughout the company.
- Ensure top management conveys the importance of the indicators to those who will collect the data, conduct the analysis, report on the indicators, and use the indicators in decision-making.

Resources
- Link the indicators to existing data collection and analysis systems wherever possible.
- Stagger the integration of the indicators so that staff has the time and resources necessary to properly address each indicator.

Results
- Avoid duplicating existing performance measures.
- Monitor whether the indicators are meeting established goals or not.

Assessment
- Conduct a regular assessment of both the indicators and the integration process.
- Build on existing auditing, self-assessment, and benchmarking experience.

Management Review
- Ensure the results of the assessment are implemented.
- Consider the indicators as a part of existing management review processes.

6.2.3 A Whole Systems Approach to Integration at the Case Utility

While it is important to consider the model from the perspective of each of the individual elements, it is also necessary to examine the entire integration model as a whole. This will enable the user to understand the assumptions made when considering each of the individual elements. For instance, it is particularly important to note again that the principles of sustainable development were already embedded in many of the case utility's policies. Rather than making new commitments, the indicators will therefore help measure progress towards the statements made in the company's vision, operating principles, and policies.

As Rocha *et al.* (2005) explain, another reason a whole systems perspective is important is because "trade-offs between conflicting goals will inevitably be required. Although sustainable development highlights that economic, environmental, and social objectives should be mutually supportive and reinforcing, in practice there will be situations where decisions made to improve the company's performance in one area will have consequences in another area. This will be particularly relevant during the early stages of the integration process."

To help decision-makers manage any possible conflicting objectives, a set of non-prescriptive indicator trade-off criteria were developed in consultation with the participating experts. When considering the adverse affects associated with any decisions, a hierarchy of (1) eliminate, (2) mitigate, (3) rehabilitate, and (4) compensate any adverse effects was suggested. A similar concept was applied to the decision-making process with a hierarchy of (1) integrate, (2) align, and (3) separate the issues under consideration being specified. Full integration of the decision-making process would imply that the inputs used to make the decision, in this case the indicators, are amalgamated (as is the case in aggregation). Alignment would imply that each of the inputs used in decision-making are considered in parallel with one another. Finally, separation of the issues implies that the inputs be considered on their own, without reference to the other inputs. Further details on the development of the indicator trade-off criteria are available in Appendix G.

For a more prescriptive set of indicator trade-off criteria, the interested reader is referred to Gibson (2004).

6.3 Assessment Model

The principle of assessment featured prominently in the indicator integration model. The feedback obtained from a regular assessment is necessary to drive both the improvement of the indicators themselves and the integration of the indicators with the company's existing initiatives. As illustrated in Figure 6.1, the purpose of the assessment is therefore to compare the results achieved with those desired and to specify any necessary corrective actions.

To provide a method of structuring an indicator assessment at the case utility, two proposed models were developed. Both of the proposed models are available in Appendix G. As in the development of the indicator integration model, the assessment models were developed based on the comments received throughout the entire SDI Design Process. It was determined the assessment model must:

- Be represented in a clear, concise diagram that will assist in the communication of the assessment plan.
- Be flexible enough to accommodate multiple levels of assessment.
- Complement the indicator integration model.

The proposed assessment models were critically reviewed in consultations with the same four key internal experts and three external experts. The comments on the proposed models were then used to develop an indicator assessment model for the case utility. The complete set of comments received is available in Appendix G.

The assessment model is illustrated in Figure 6.2. The model addresses all three of the key requirements identified above. It is presented in a single figure, accommodates several levels of assessment, and may be inserted directly into the

"Assessment" element of the indicator integration model. In addition to the comments received, the model was developed based on a set of steps common to many auditing and self-assessment models (Dale, 2004). The difference is that this model was focused on the continuous improvement of the indicators, was explicitly designed for the needs of the case company, and continued the emphasis on integration with other business infrastructure. The assessment model is discussed further in the following sections.

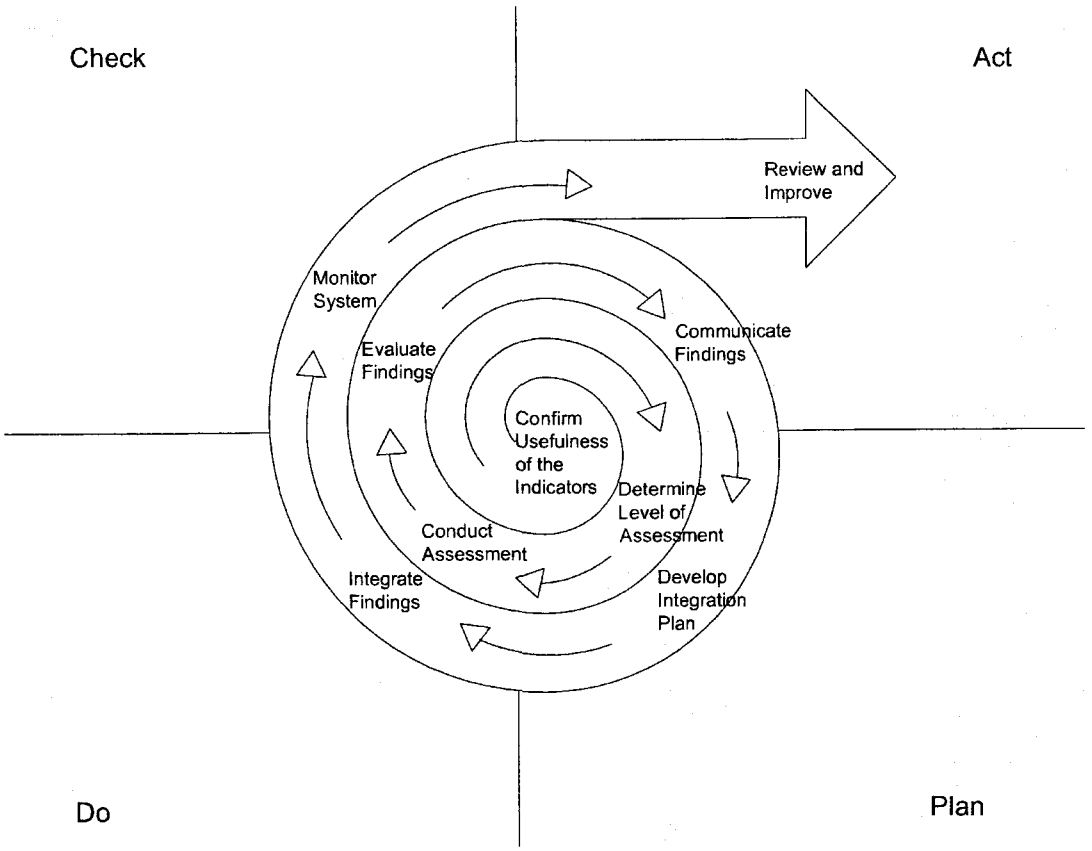


FIGURE 6.2
INDICATOR ASSESSMENT MODEL

6.3.1 Visual Representation of the Assessment Model

The unique spiral-based presentation of the model employs a systematic approach that emphasizes the circularity of and the non-linear approach to sustainable

development. Given that linear flow charts are very common within the case utility, its spiral-based form also distinguishes it from other processes. Another feature of the model is that it illustrates that the Plan-Do-Check-Act (PDCA) cycle is iterative and repeats several times. In the "Plan" element of the cycle, the steps "Determine Level of Assessment" and "Develop Integration Plan" are included. The "Do" phase includes "Conduct Assessment" and "Integrate Findings." The "Check" element includes "Evaluate Findings" and "Monitor System", while the "Act" phase incorporates the steps "Communicate Findings" and "Review and Improve." At the centre of the diagram is the initial step, "Confirm Usefulness of the Indicators." This step includes all elements of the PDCA cycle. Each step is described in the next sub-section.

6.3.2 Steps in the Assessment Process

As illustrated in Figure 6.2, the model consists of nine steps. Each step is discussed briefly below.

1. Confirm usefulness of indicators: This step would involve reaffirming the case utility's commitment to the indicators, conducting a preliminary gap analysis to help determine the required level of assessment, and identifying internal sponsors of the assessment process. The corporate planning manager or other executive sponsor could be responsible for initiating the assessment at the case utility. An alternative would be to integrate the responsibilities for conducting the assessment into the responsibilities of the case utility's Internal Audit Review Committee

and/or those of the Corporate Environmental Management Review Committee.

2. Determine level of assessment: This step is one of the features that distinguish the model from others, which typically focus on only one level of assessment. The three levels of assessment at the case utility are: (1) self-assessment, (2) benchmarking, and (3) third party assessment. A fourth option is to conduct an integrated assessment consisting of multiple options.
3. Conduct assessment: Given the lack of widely accepted indicators and analysis methods required for both benchmarking and third party assessments, it is likely that the case company would conduct only self-assessments in the near term. Using the elements in the integration model as a starting point, an illustrative list of key questions that might be addressed by the self-assessment is available in Table 6.2. Note that the assessment may not necessarily answer each of the questions in Table 6.2 and that the questions addressed by any particular assessment might vary depending on the needs of the company. In all cases, assessing what the organization is doing well is just as important as identifying weaknesses.

   Conducting the self-assessment will require a cross-functional team that involves people from all levels of the organization. While the case utility has extensive internal auditing experience, and even has an Internal Audit Department, it is essential that any additional training needs be identified. Furthermore, since many levels of the organization will be affected by the

assessment, communicating the key goals of the assessment to affected individuals will be essential.

TABLE 6.2
KEY QUESTIONS TO ADDRESS AS A PART OF THE ASSESSMENT PROCESS

Stakeholder Input

- Has the company identified the key internal and external stakeholders for the indicators?
- Do the key internal and external stakeholders feel that their input was fairly considered in the development of the indicators?
- Do the indicators address the priorities for sustainable development identified by key internal and external stakeholders?
- Are there any additional stakeholders that should be consulted on the indicators?

Goals

- Do the indicators contribute to the company's need to meet the commitments established in its vision, mission, values, and policies?
- Do the indicators measure progress towards the Corporate Strategic Planning goals and objectives?
- Do the goals for each of the individual indicators still make sense? Are new goals and/or targets needed for some of the indicators?

Processes

- Are the indicators adequately integrated with the business planning process, sustainable development reporting process, and corporate intranet?
- Are there any new management systems or other internal initiatives with which the indicators must be integrated?
- Have each of the individual indicators been adequately analyzed?
- Do any of the indicators require updated analysis methods?

Leadership

- How does top management demonstrate its leadership and commitment to the sustainable development indicators?
- Does top management refer to the indicators as a part of its decision-making process?
- Has an executive champion been identified?
- Have sponsors been identified for each of the company's relevant divisions and departments?

Resources

- Does staff have the time and resources they require to perform the required data collection?
- Are there any indicators for which data collection has proven difficult?
- Are there any indicators for which new data has become available?
- Does staff have enough time to perform the required data collection and analysis?

Results

- Are the indicators meeting the goals established? If not, why is this the case?
- Are there any indicators that allow for a comparison with other companies?
- Are any additional indicators required?
- Are any of the existing indicators obsolete?

TABLE 6.2
KEY QUESTIONS TO ADDRESS AS A PART OF THE ASSESSMENT PROCESS

Assessment

- Does top management publicly support the assessment process?
- What action has been taken from previous assessments?
- Does the assessment team have the skills it needs to complete the assessment?
- How often does the company undertake a complete assessment of the indicators?

Management Review

- How often does top management review the indicators?
- Are the indicators reviewed by top management as a part of the business planning, CEA ECR, and EMS review processes?
- How are any issues identified as a part of the management review ultimately addressed?
- Has top management identified what the company is doing well?
- Has top management identified what needs to be improved upon?

4. Evaluate findings: This step focuses on evaluating the results of the assessment. This will involve comparing the results achieved with the results desired. Particular focus should be devoted to identifying the strengths, weaknesses, opportunities, and threats (SWOT) that will form the basis for any improvement initiatives. The trends of each indicator, their progress towards specified goals and targets, the integration of the indicators with existing initiatives, and the actual use of the indicators should all be evaluated. Note that corrective action could include establishing more aggressive targets for indicators that have met their existing goals.
5. Communicate findings: The findings of the assessment must be communicated to those who collect the data, analyze the indicators, or use them as a part of a reporting or decision-making process. In addition to informing key stakeholders of the results of the assessment, this will provide other members of the case utility with the opportunity to provide feedback on possible improvement plans.

6. Develop integration plan: Taking into account the feedback received during the communication of the findings, the assessment team will need to develop a plan to integrate the findings of the assessment within both the set of indicators and with existing business infrastructure. Priorities for action should be identified, specific responsibilities should be assigned, and target dates for implementation should be established. The integration plan must also be communicated to those affected.
7. Integrate findings: The success or failure of the assessment will be determined by how the results are ultimately addressed. Integration of the results will also be critical to building support for future assessments. A key point of any assessment at the case utility will therefore be to incorporate the findings directly into the business planning process. Other initiatives where particular attention will be required include the corporate intranet and the sustainable development report.
8. Monitor system: Having integrated the findings, the success of the integration effort as well as the performance of the indicators themselves must be monitored. This is necessary for two reasons. First, it is important to follow-up on the integration efforts to determine if any further corrective action is required. Second, although a periodic assessment of the indicators will be undertaken as a part of the business planning process at the case utility, it is necessary to monitor the indicators in case action is required outside of the normal review process.

9. Review and improve: In addition to reviewing the improvements in the indicators and integration efforts, the company should consider reviewing the assessment process itself. Identifying any training needs for assessment personnel, difficulties encountered, and successful strategies employed will provide a basis for improving future assessments.

In addition to identifying opportunities to improve, the assessment process should help enhance the integration of the indicators with other internal initiatives, help focus attention on sustainable development, and help strengthen the company's commitment to the indicators over time. However, to gain these benefits it is critical that the organization takes action on the assessment findings. Further details on the process for conducting a self-assessment are available in a number of sources, including Dale (2004).

6.3.3 Relationship between the Assessment and Integration Models

The models are complementary rather than independent. The assessment model constitutes an input into the more comprehensive indicator integration model. It provides the structure needed to obtain the feedback required to drive the continuous improvement of the indicators and their integration with other initiatives at the case utility. However, since it is not possible to assess that which has not been implemented, the assessment model cannot be considered outside the context of the overall indicator integration model. Assessment is therefore a critical element in the integration model, but it is not the only component the company must consider when integrating the indicators.

6.4 Summary

This section presented a unique indicator integration model for sustainable development at the case utility. Based on eight key elements, the model was designed to mimic a feedback control system and to provide a structured approach to the integration process. It illustrated how the case utility could use indicators to build on and enhance its existing internal initiatives. A key component of the integration model was a complementary indicator assessment model. The assessment model outlined the key steps in the process required to drive the continuous improvement of both the indicators themselves and their integration with existing business initiatives.

7 REFLECTION ON PROCESS AND RESULTS

7.1 Introduction

This section summarizes the key lessons learned from the case study. A consultation on the lessons learned was conducted through email with key internal and external experts. The discussion of the lessons learned is organized into three sections corresponding to the three primary research objectives:

- Key lessons on applying the process for developing the indicators.
- Key lessons on developing the indicators.
- Key lessons on integrating the indicators.

A summary of the comments received during the email consultation with internal and external experts is provided in Appendix H.

7.2 Key Lessons on the Indicator Design Process

The research provided useful insight into the process of developing indicators. Although it is recognized that the process followed at the case utility is not a roadmap for another company, reflections on the indicator design process yield a number of key points. They are summarized below.

The process of developing the issues and indicators is just as important as the result.

Although previously developed sets of indicators serve as useful reference points, the organization must set its own priorities and develop indicators that are appropriate to its unique business situation. This was repeatedly demonstrated throughout the case study and is essential if the organization is to develop a sense of

ownership over the results and fully realize the benefits of organizational learning. Simply adopting existing indicator packages will likely not provide the commitment necessary to integrate the indicators with existing business systems. While the final set of indicators is certainly important, the value of the learning and change that takes place over the course of their development should not be underestimated. This point supports the findings of Keeble *et al.* (2003), Wackernagel *et al.* (2002), and Walter and Wilkerson (1998).

The needs of the company must drive the process from the very beginning.

While stakeholder concerns are important and must be considered, the company must also remember that its many stakeholders will each have different needs. For this reason, the purpose of consultations with people outside of the company may be to focus on exploring differences of opinion on the indicators, but not necessarily resolving every one of those differences. The key point is that the system of indicators must be designed with the company's needs in mind. Measurement of the indicators must be practical and the indicators must contribute to the decision-making process. This is why consultations with internal experts were so heavily emphasized throughout the process at the case utility.

Broad external consultation is ultimately required, but the company must first be prepared to address the comments received.

Prior to initiating broad external consultations, the company must ensure that its internal systems are capable of addressing and responding to the comments it will receive. For this reason, broad external consultation may be best left until after the

company has a preliminary system in place. This is a point that is often overlooked in literature pertaining to corporate sustainable development indicators. While many emphasize that all stakeholders should be involved throughout the entire process, conducting broad consultations too early may create unrealistic expectations that the company is not capable of meeting. This is one of the reasons the consultations in this research focused on the comments of sixteen internal experts and ten key external experts rather than broad engagements with the general public.

The process of designing indicators is highly iterative and a flexible plan is essential.

As noted in Section 3.5.2, the process of developing indicators is emergent and the process must remain dynamic. It was not always possible to identify all of the required steps in advance. For instance, the amount of time required to identify the key issues required considerably longer than initially anticipated. Rather than simply identifying the issues in one meeting, an iterative process of individual, small group, and large group meetings was required. The outcomes of these meetings, and in many cases the need for further meetings, could not have been identified in advance. This underscored the fact that the development of the issues and indicators is a learning process that will require significant time.

Staying within scope is a constant challenge.

Given the breadth of the concept of sustainable development, the participants may be tempted to try and address everything at once. However, while linkages to other organizational initiatives should be considered as a part of the integration process, the issues and indicators themselves must focus on the system under study.

In the case study, the indicators focused on issues relevant to the utility's major high-voltage transmission system. This illustrated that the company's attention must be devoted a few critical key issues that it can actually address. Although over one hundred potential issues were initially identified, this is why the process at the case utility focused on developing indicators for only eight key priority areas. A continuous emphasis on those eight key issues was necessary to keep everyone focused and to keep the process manageable. For this reason, all consultations on the development of the draft and working systems of indicators were preceded by a review of the specific issues to be addressed.

The company must have the will to engage in sustainable development.

As has been discussed widely in the literature (see, for example, Neely, 1998), measurement alone will not improve performance. If the process is to succeed, the company's employees must be convinced of the value of sustainable development and recognize that pursuing it makes sound business sense. The case study demonstrated that involvement in the process to develop the indicators is one strategy to increase the commitment to the indicators. The participants also suggested that appointing an executive champion for the indicators will provide one tangible demonstration of management's commitment to the system.

It is the process of developing issues and indicators that is transferable, not the issues or indicators.

The process used in the case study may provide a common framework for other organizations to help structure the development of issues and indicators, but it

does not identify a generic set of issues or indicators. As was repeatedly demonstrated throughout the case study, this means that the details of sustainable development will be specific to the unique context of each organization (Bell and Morse, 2003). The research shows that it was the needs of the case utility that determined the indicators. It is important to remember that other companies, even within the same industry, may not necessarily make the same choices. For example, another Canadian electric utility may have different priorities than the ones focused on in this case study. On the other hand, other industries may find that indicators relating to Aboriginal issues, for example, are not relevant. Therefore, although the indicators identified in this research may provide a useful starting point for other organizations, the resulting indicators may be different.

Pursuing sustainable development does not mean abandoning old ideas.

Sustainable development is not an entirely new idea, nor is it something that can be viewed as a stand-alone concept. As noted in Section 2.1, this builds on a point made by van den Burgh (1996). Any indicator development initiative must build on what the company already has in place. Although the specific programs may vary from company to company, existing quality, safety, business planning, and environmental programs will provide a strong basis on which to build any future initiatives. This is why the research at the case utility focused so strongly on the integration of the indicators with the company's business planning processes, environmental management systems, and other initiatives. The system of indicators must always be viewed as only a part of the company's overall management system.

7.3 Key Lessons on the System of the Indicators

A system of ninety-eight indicators was developed for the transmission system of the case utility. The indicators addressed the key environmental, economic, and social priorities of the case utility's transmission system. However, while the indicators address the key issues for the case utility, it is recognized that different indicators will be required for different companies. The contribution of this research is therefore not only in the accuracy and completeness of the indicators themselves, since they will vary, but in the lessons the indicators provide for other companies. A review of the system of indicators reveals the key lessons that are summarized below.

No system of indicators will ever be comprehensive.

Since sustainable development is such a broad concept, the potential indicators for each issue are nearly limitless. If the company is to develop a manageable set of indicators, compromises are therefore inevitable. There is no optimal solution since it is impossible to meet the needs of all stakeholders all of the time. The case study demonstrated that, even with a hundred or more indicators, it is not possible to measure everything and that something will always be missed. For instance, a review of the appendices will reveal dozens of indicators that were ultimately not included in the system. The company must therefore recognize that the process of developing indicators is iterative and that the system must be continuously improved over time. This finding supports points made in most literature on performance measurement and sustainable development indicators.

The purpose of any indicator program is not to duplicate existing initiatives.

The indicators are a complement to, not a replacement for, existing organizational initiatives. As the case study demonstrated, relevant internal measures must be incorporated into the system of indicators. Creating another parallel, stand-alone system of indicators that duplicates much of the company's previous work will reduce the potential for adding value to the company's management system. It is important that any indicator design process therefore focus on areas where the most value may be added to the company's existing management systems. This is why a needs assessment must be a component of any indicator design process. As noted in Section 2.4, this finding builds on points made by Lohman *et al.* (2004), Tangen (2004), and Wouters and Sportel (2005).

A variety of quantitative and qualitative indicators with specified goals should be used.

While this concept was noted previously in Section 2.3, this research provided further insight. Not all indicators can be based on direct measurement, nor will the values of all indicators need to move in the same direction. Some indicators must increase or decrease, while others must maintain an appropriate range. Still others may be based on binary or descriptive assessments. The system of indicators at the case utility provided examples of each of these types of indicators. Whether the indicator is quantitative or qualitative, it is therefore essential that clear goals be established for each indicator.

The system of indicators must reflect the fact that the company will be at different stages of development for different issues.

For issues where internal programs are already strong, it may not add much value to heavily focus on those issues again. This is the reason issues such as safety and potential contamination were not explicitly considered as a part of the process at the case utility. On the other hand, for issues that are only beginning to emerge, it does not make sense to develop indicators that are overly prescriptive. This may mean that the most sophisticated indicator is not necessarily the right choice for the company. For instance, if the company is just beginning to consider the issue of biodiversity, an indicator such as "Existence of an up-to-date biodiversity policy" may be more appropriate than an indicator such as "Changes in population or diversity for selected species." Practicality must be an overriding objective. Binary or descriptive indicators may be viewed as a first step towards improved measurement of an issue.

A lack of current data for an indicator does not necessarily mean it should be removed from the system of indicators.

If the company determines that it is worth collecting data in the future, the indicator should be phased into the system as data becomes available. Through the data assessment and phased approach to indicator integration, the case study demonstrated that the purpose of the process is to determine what the indicators should be, not to confirm everything the company is already doing. This finding supports points made in many sustainable development publications.

It is essential that the indicators be carefully structured to increase their utility.

It was recognized that using nearly one hundred indicators in any decision-making processes would be difficult unless they were carefully structured. In the case study, four techniques were therefore used to increase the utility of the indicators. The indicators were: (1) clustered around eight key priority areas, (2) organized according to a hierarchical approach linked to the company's business planning process, (3) designed to be phased-in over time (based on the data assessment), and (4) aggregated into a tiered set of indices. In addition to providing insight into how the indicators were related to one another and other internal initiatives, these approaches reduced the need to limit the number of indicators in the system.

Illustrating linkages between the key issues and the indicators is critical.

Since sustainable development cannot be viewed as a disconnected initiative, it is essential that the interdependencies between the issues and indicators be explicitly highlighted. Virtually all sustainable development indicator publications emphasize this point, however, few provide guidance on how this may actually be done in practice. In this study, a network diagram was found to be the most effective mechanism for the illustration of linkages between the key issues. Linkages between the indicators were represented by a hierarchical approach linked to the case utility's business planning process.

The conceptual framework must be tailored to the needs of the company.

The triple bottom line is useful for identifying key sustainable development issues but may not be the most appropriate framework for integrating the indicators

with existing business infrastructure. Several participants in the case study noted that dividing the issues along the traditional environmental, economic, and social lines may inadvertently promote further defragmentation of the issues despite the need for integration. This is why the indicators in this process were organized around the three key themes of "Stakeholder Relationships", "Land Use Practices", and "Governance", rather than the traditional three pillars of sustainable development.

Linking information to decision-making is a constant challenge.

Data should be used to help pursue commitments from the earliest stages of the decision-making process rather than only to justify decisions after they have already been made. It is therefore critical that the issues and indicators are linked to key business goals and targets. As Kaplan and Norton (1996) note, an effective program should really be about improved management, not just measurement. The participants therefore emphasized that the indicators are an aid to decision-making, not a replacement for it.

Creating an indicator will not necessarily create a need to apply it.

This is a point that is often overlooked in indicator projects. However, obtaining buy-in and support for the indicators is a critical task that cannot be neglected. Illustrating how the data would be used is therefore absolutely critical in obtaining buy-in on the indicators with those who have to collect the data. This is one advantage of employing a hierarchical approach to the presentation of the indicators. Aggregating the information can also provide valuable insight into how the necessary linkage between data collection and decision-making may be

accomplished. In particular, a radar plot showing the normalized values of the indicators on one figure was found to be a powerful way of presenting the information in a clear, concise manner.

Compliance with regulatory issues should not be presented as optional.

In earlier versions of the indicators, this may have been inadvertently implied. For instance, participants in the case study noted an indicator such as "Compliance with federal and provincial regulations" may imply that compliance with regulations is an option when it is not. The focus of indicators on regulatory issues should therefore be on instances of non-compliance. This is why indicators such as "Reportable and non-reportable spills including unintended releases" and "Number of regulatory violations by type" were included in the system.

7.4 Key Lessons on Integrating the Indicators

If they are to become a part of a company's decision-making process, the indicators must be integrated with existing business infrastructure wherever practical. To address this issue, this research presented a unique indicator integration model for sustainable development. Based on eight key elements, the model provides a structured approach to the integration process and illustrates how a company can use indicators to build on and enhance its existing internal initiatives. While one of the key points of the model is that any integration process must be specifically tailored to each company, the experience with the case company does provide several insights that may be of value to other companies.

The system of indicators must be integrated with existing business infrastructure.

The case study demonstrated that the key to successful implementation of the indicators is integration with existing business infrastructure. The issues and indicators must be closely linked to all forms of corporate action for sustainable development and also to other initiatives within the organization. This point reinforces the notion that the company must be careful not to ignore the factors that are not measured (Kaplan and Norton, 1996) as a part of the system of indicators. The case study illustrated how the indicators may be integrated through the development of the indicator integration model. However, it is important not to downplay the difficulty of actually implementing indicators. While it is important to build on existing initiatives and resources wherever possible, additional resources for data collection, analysis, and reporting will likely need to be made available.

Integration must occur at the appropriate level.

The model was developed on the premise that any indicators must be integrated with existing business infrastructure. However, that does not mean that the indicators must be integrated with every initiative that the organization is undertaking. In this case study, the business planning process, the corporate intranet, and the sustainable development reporting process were identified by the participants as the most relevant internal initiatives for the indicators.

Integration should not be left until the end of the process.

The integration of the indicators with the company's existing business infrastructure will only be successful if existing initiatives are considered throughout

the entire indicator development process. From the first meeting with the participating experts at the case utility, it was clear that the indicators must build on existing strengths and address gaps in the company's existing initiatives. This is why the relevant existing internal indicators were incorporated into the system and also explains why the priorities addressed by the indicators were selected. Furthermore, the case study demonstrated that early identification of the key initiatives on which the indicators must build will allow the company to consider the role of the indicators in the overall management system as they are actually being developed. This will enhance the possibility of the indicators making meaningful contributions to the decision-making process.

Assessment ultimately drives the continuous improvement of the system.

Since sustainable development is a dynamic concept, no set of issues or indicators will ever be perfect. The indicators must be re-evaluated as a part of a periodic assessment process. The continued relevance of the indicators must be confirmed, obsolete measures should be deleted, and new indicators should be created to address the company's changing requirements. Throughout the assessment it is always important to consider what the organization is actually doing versus what it has on paper. It is also essential that the assessment process identify opportunities to improve the integration of the indicators with other initiatives wherever possible. Insight into how these, and other questions, may be addressed was provided in the case study through the development of an indicator assessment model.

The integration model must be capable of accommodating the company's requirements as they change over time.

Existing initiatives within any company will continue to evolve and new initiatives will inevitably appear. This is one of the reasons it is important to fit the indicators to the company, rather than forcing the company to fit a standardized set of indicators. The case study illustrated that an integration model based on the elements common to all of the company's internal initiatives provides the flexibility needed to make these accommodations.

7.5 Summary

This section presented the key lessons learned from the process. The lessons most relevant to the overall indicator design process were presented first. The lessons relevant to the system of indicators itself and the integration of the indicators were then presented. Among the key lessons were that the process of developing the indicators is just as important as the result, that no set of indicators can ever be comprehensive, and that the indicators must be integrated with existing business infrastructure.

8 CONCLUSIONS AND RECOMMENDATIONS

This dissertation presented an original system of sustainable development indicators for the transmission system of a major Canadian electric utility. Using a unique process designed specifically for the case study, the indicators were developed based on extensive consultations with internal experts at the case utility and external experts in the field of sustainable development indicators. A total of 98 indicators were incorporated into the system of indicators, with 70 being developed as a part of this process and 28 representing indicators previously developed by the company.

One of the underlying themes throughout the entire process was ensuring that the indicators built on existing business infrastructure wherever possible. To this end, an original indicator integration model was developed to help facilitate the integration of the indicators with the case utility's most relevant business systems. Recognizing the evolving nature of the case utility's management systems, the indicator integration model was designed to accommodate both existing and future initiatives at the utility.

However, it was recognized that even with the integration model, it would be difficult for the utility to manage the indicators if they were not carefully structured. Four techniques were therefore used to increase the applicability of the system:

1. The indicators were clustered around eight key priority areas.
2. The indicators were organized according to a hierarchical approach linked to the business planning process.
3. The process of integrating the indicators with existing corporate initiatives was staggered over time.
4. A tiered aggregate was developed.

Each of these methods was designed to support previous research in performance measurement, aggregation, integrated management systems, and sustainable development in addition to making new contributions.

The following sections present the conclusions and recommendations. First, the research objectives established in Section 2.13 are briefly reviewed. Next, some of the major contributions of the research are summarized. Finally, in recognition of the fact that further research is required in some cases, recommendations for future work are also provided.

8.1 Revisiting the Research Objectives

Each of the objectives specified in Section 2.13 were addressed by the research. Table 8.1 illustrates the section of the dissertation that addressed each objective.

TABLE 8.1
REVISITING THE RESEARCH OBJECTIVES

Research Objective	Section(s)
1. To evaluate a process for creating sustainable development indicators in a corporate context.	
a. The application of the complete process to the case utility's transmission system.	3 – 7
b. An assessment of the lessons learned following the application of the process.	7.2 – 7.4
2. To develop a system of sustainable development indicators for the transmission system of an electric utility.	
a. The identification of key stakeholders whose needs must be addressed by the indicators.	4.2 – 4.3
b. The selection of a conceptual framework to structure the identification of priorities and indicators.	4.4.1
c. The identification of the key priorities to be addressed by the indicators.	4.4.2.1 – 4.4.2.4
d. The application of a structured approach to represent linkages between the key priorities.	4.4.2.5

TABLE 8.1
REVISITING THE RESEARCH OBJECTIVES

Research Objective	Section(s)
e. The development of indicator selection criteria to guide the selection of the indicators.	4.4.3
f. The identification of existing internal measures and newly created indicators to be included in the system of indicators.	4.4.4, 5.2 – 5.3
g. The identification of goals for each indicator.	5.3.1
h. The identification of a form of measurement for each indicator.	5.3.2
i. The development of a structured approach to represent linkages between the indicators.	5.3.3
j. An assessment of current data availability for each indicator.	5.4
k. The specification of an aggregation method that takes into consideration the varying goals for each indicator.	5.5
3. To develop an indicator integration model to incorporate the system of sustainable development indicators into existing business infrastructure.	
a. The identification of a generic set of integration elements that was common to all of the case utility's existing internal initiatives.	6.2.1
b. An analysis of how the integration elements may be used to structure the integration of the indicators at the case utility.	6.2.2
c. The development of indicator trade-off criteria to help guide the application of the indicators at the case utility.	6.2.3
d. The development of an assessment model to drive the continuous improvement of the indicators and the integration effort.	6.3

8.2 Contribution

The contributions of the research are divided into three sections: anticipated benefits to Canada, anticipated benefits to the case utility, and anticipated academic value of the results.

8.2.1 Anticipated Benefits to Canada

Sustainable development indicators help to ensure that the key social, environmental, and economic issues are considered by decision-makers. Although

there are many key issues that are specific to certain sectors, there are many others that must be addressed by all forms of industry. For instance, consider that in the social area, all Canadian companies must deal with issues such as equity, education, and stakeholder involvement. Key environmental issues include the responsible use of resources and complying with environmental regulations. From an economic perspective, companies must continuously improve efficiency while remaining profitable. Furthermore, all of these issues must be addressed while recognizing the inherent relationships between them.

There is an urgent need to take concrete steps to address these, and other, sustainable development-related issues. Moreover, these issues must be addressed in a manner that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. This research provides a valuable example of how to develop and integrate sustainable development indicators for companies in one of Canada's largest industrial sectors. While the reader should be cautious extrapolating the findings of this study to other industries, the many lessons learned may provide a needed starting point for other sectors as well.

8.2.2 Anticipated Benefits to the Case Utility

With over 20,000 kilometers of transmission lines spread over virtually every type of terrain in its home province, it is essential that the case utility places an increased emphasis on the sustainable practices of its transmission system. Some of the specific benefits of this project included:

- Providing a tangible demonstration of the company's commitment to considering sustainable development issues.

- Providing a means to measure progress in the performance of the system with respect to environmental, economic, and social issues.
- Enhancing understanding of the system and providing stronger justification for decisions.
- Providing perspective from which to view environmental and social considerations as opportunities to improve, rather than simply aspects or risks to be managed (Stratos, 2001).
- Demonstrating the company is managing all relevant risks and positioning itself to address emerging opportunities (Stratos, 2001).
- Helping to link sustainability issues with other initiatives in the company.
- Enhancing accountability to stakeholders through the provision of greater transparency on sustainability issues.
- Providing an internal example for future indicator development.
- Raising awareness in the company and the Province as a whole regarding sustainability and indicators.

Furthermore, with the importance of this topic still emerging, the creation and integration of the indicators will also contribute to the utility's desire to be seen in a position of leadership with respect to this work in Canada.

8.2.3 Anticipated Academic Value of the Results

In the long term (five to ten years), this project provides a basis for improved design of corporate sustainability indicators and performance measurement systems in general. Given the flexibility of the indicator design protocol, it provides a useful

template for any corporation undertaking an initiative of this nature. Among many other benefits, the indicator design process demonstrated how indicators and issues may be developed within existing corporate infrastructure, how the environment-economy-society conceptual framework may be tailored to the needs of industry, and how stakeholders must be carefully selected to ensure that the company's internal systems are able to address their comments.

The development of the indicators themselves provides a means, previously unavailable to the industry, for electric utilities to measure the progress of their transmission systems with regard to sustainable development. While not each of the individual indicators will be applicable to every electric utility, the process of developing the issues and indicators is transferable to other companies. Furthermore, the development of indicators for transmission systems provides a baseline for indicator development in other "corridor" type industries requiring extensive rights of way such as highways, railways, and pipelines. This baseline was further enhanced by the development of an improved, automated aggregation method that takes into account varying goals for each indicator and provides a method of clearly linking data to results. The aggregation method also provides a means of measuring the progress of the transmission system as a whole in addition to the key points measured by the indicators. Furthermore, the provision of an indicator integration model provides corporations with a method to effectively implement the indicators while the assessment protocol provides a needed guide to help structure ongoing improvements to the indicators. Finally, it is important to stress that one of the contributions of the research is in its integrative nature. In addition to each of the individual contributions

discussed above, the research demonstrates how a number of diverse areas may be brought together to develop a comprehensive solution for the design and integration of sustainable development indicators. Therefore, a major contribution of this research is in its totality, not just the individual lessons learned.

In the short term (within the time frame of the program of research), the academic and non-academic participating organizations gained valuable insight into the practical application of sustainable development principles. Of particular value was the organizational learning process that took place throughout the development of the indicators. Such learning was critical, because ultimately, the success or failure of the sustainable development concept rests in the hands of those who will actually apply its principles daily.

8.3 Recommendations for Future Work

The project provided several needed contributions to research in the areas of sustainable development, indicators, performance measurement, aggregation, and integration. However, further work is required. Specifically:

- **The system of indicators must evolve over time.** Throughout the process, the participants suggested many other indicators. As noted in Section 5.3.4, these indicators were not included for a variety of reasons. Lack of data, difficulty of measurement, and lack of relevance to the transmission system were some of the main reasons. However, as repeatedly noted throughout the process, the system of indicators must continue to evolve over time. For instance, it may be expanded to include other business units at the case utility. Additional data may become available and new methods of measuring and

calculating some of the indicators may be developed. The participants felt it would therefore be important to highlight some of the most interesting indicators generated throughout the process. The indicators that should be considered in future updates to the system are listed in Table 8.2. At the same time, any future updates to the indicators should also consider the usefulness of indicators currently in the system. Where an indicator is found to be obsolete, it should be deleted from the system.

TABLE 8.2
INDICATORS TO CONSIDER IN FUTURE UPDATES TO THE SYSTEM

- Percent of household income devoted to electricity
- Percent of connection requests for alternative energy programs completed on time
- Need for new transmission infrastructure eliminated due to energy conservation programs
- Investment in at-source energy generation options
- Renewable energy consumed vs. total energy consumed in the province
- Price per kilowatt hour relative to other utilities
- Importing cost vs. local rate charged
- Export profit margin vs. local profit margin
- Percent of unprofitable customers
- Profitability of business unit
- Respect for Aboriginal decision-making processes and traditional knowledge
- Minimum acceptable distance of line to residential or commercial buildings
- Benefits beyond those legally mandated
- Cost of hiring vs. cost of retention
- Percent of high performing employees retained
- Cost of preventing accidents vs. cost of reacting after the fact
- Investment in Aboriginal employment training in Northern communities
- Programs to preserve traditional ways of life in Northern communities
- Average intensity of electromagnetic fields (EMF) at edge of right of way (ROW)
- Investment in decommissioning and rehabilitation of ROW
- Programs to rehabilitate ROW
- Impact of future and existing ROW as pathways to ecologically/culturally significant spaces/habitat
- Integration of ROW management with forest management licenses
- Effect on aerial species
- Cost to adjacent biotic environment – ecotoxicological factors
- Cost to adjacent biotic environment – effects of biological loss
- Eutrophication potential
- Ecotoxicity potential
- System average interruption frequency index[1]
- System average interruption duration index[1]
- System average restoration index[1]
- Delivery point unreliability index[1]
- Environmental cost/benefit of using non-hydro electric energy sources

TABLE 8.2
INDICATORS TO CONSIDER IN FUTURE UPDATES TO THE SYSTEM

- Outages due to system failures in other jurisdictions
- Change in public attitude factor vs. investment in community relations
- Species at risk with habitat affected by operations
- Changes in population or diversity for selected species
- Number of meetings with local governments
- Strength of relationship with governments

[1]*Source: Chowdhury and Koval, 2000.*

- **The aggregation method must evolve over time.** As noted in Section 5.5, most of the indicators in the system have been normalized to the company's past performance. While this is acceptable as a first step, this method should be improved over time so that the company is normalizing the indicators to its desired future performance. As the utility becomes more comfortable with the indicators and the aggregation process, this may be accomplished by setting specific targets or ranges for each indicator.
- **The indicators should be tested and adjusted in broad public consultations.** Once the company has worked with the indicators for at least one business cycle and it is confident that its internal systems will be able to respond to external stakeholder concerns, a broad public consultation on the issues and indicators should be undertaken. While external experts were consulted throughout the process, the general public was not. Given the high profile of the utility in its home province, this will likely ultimately be a required step in order to gain broad public acceptance of the system.
- **The existing management systems at the case utility should be further integrated over time.** The participants agreed that the correct internal systems had been taken into account in the development of the indicator integration model. The business planning process, the corporate intranet, and

the sustainable development reporting process were the most relevant internal systems to the indicators. The integration plans proposed therefore addressed the appropriate level of integration for the purposes of this project. However, it was noted that the company's current management systems do suffer from incomplete integration. Although the purpose of this project was to focus only on those existing systems most relevant to the indicators, there is a need for further integration of the company's existing internal management systems. Building the three systems noted above into other systems such as the integrated financial forecast and the power resource plan is a long-term effort that the company may want to study in the future.

- **Study the success of the integration process.** How well the system of indicators are integrated with existing systems must be assessed on an ongoing basis. This is necessary if the indicators are going to become a part of the company's governance structures. While there are many performance measurement systems in use and published in the literature, there are few studies that report how well the system actually functioned in practice. The appointment of a corporate champion for the system of indicators as a whole and of performance coordinators for each individual indicator should assist in the improvement of the system. In any case, part of the review should be to assess the need for improved data and corresponding information systems.
- **Apply the indicator design process to additional companies.** Finally, to demonstrate its applicability to other electric utilities, and other corporations, the SDI Design Process should be applied in other organizations.

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APPENDIX A
ILLUSTRATIVE SUMMARY OF IMPACTS OF ELECTRIC UTILITIES

The activities undertaken by electric utilities are generally classified according to three primary sectors:

- Power generation,
- Transmission, and
- Distribution.

A fully integrated electric utility operates in all three sectors of the market.

Common options for generating electricity include non-renewable fossil-fuelled (primarily coal, natural gas, and oil) generation, nuclear power, and renewable hydropower. Emerging renewable energy technologies include wind, solar, biomass, geothermal, and wave power.

The transmission system transports electricity at high voltages from the generating stations to other parts of the power system. This is most commonly achieved using an alternating current (AC) transmission system, but direct current (DC) transmission systems do provide another option – particularly for transmission over long distances.

The distribution system transforms the higher voltages to useable levels for delivery to customers and maintains steady voltage levels. This is typically accomplished through a network of stations and substations, transformers, power lines, and voltage regulators.

Although each of the power generation, transmission, and distribution options mentioned above do face many similar sustainability challenges, they also have their own unique issues. For example, the major impacts caused by the fossil-fuelled generation options are primarily due to their high levels of emissions, particularly of greenhouse gases. Nuclear power has the special challenge of dealing with radioactive waste and also carries with it the risk of causing enormous harm to humans and the environment should something go wrong. Hydropower has significant effects on land use and habitat caused by the flooding of vast areas. Many of the emerging generation technologies have land issues as well in addition to their relatively high costs. Finally, in addition to causing fragmentation of the landscape, transmission and distribution systems carry with them the highly publicized challenge of electromagnetic fields (EMF).

To fully appreciate the impacts associated with the activities of electric utilities, it is necessary to adopt a holistic perspective based on life cycle thinking. This requires that all environmental, economic, and social impacts associated with particular generation or transmission options be considered. For instance, consider the impacts created during the raw material extraction of coal, oil, and uranium. As noted by Hardi and Zdan (1997), adopting an approach considering the full life cycle will provide a perspective on the entire system that facilitates an emphasis on prevention over reaction. For further information on the concept of life cycle thinking, the interested reader is referred to the published literature (see, for example, Graedel and Allenby, 1995, Graedel, 1998).

In the following paragraphs a brief overview of some of the major impacts associated with electric utilities is provided. The impacts were organized using the aspects and impacts suggested by ISO 14001 (ISO, 2004a) as a starting template. The relationship between aspects and impacts is discussed in Wilson (2002). Following the most widely accepted categorization of sustainable development, illustrative examples are presented in sections organized around environmental, economic, and social impacts. However, while they are presented in separate categories for the convenience of discussion, it is important to remember that sustainable development cannot be viewed as a disconnected initiative. Impacts in one category will frequently have ramifications in one or both of the other

categories. It should also be noted that the list of impacts is meant to be illustrative rather than comprehensive.

Among the key environmental aspects related to the operation and construction of electric utility infrastructure are emissions to the air, releases to water, generation of large amounts of solid waste, spills, disturbance of the landscape, contamination of land, manipulation of water flows, vegetation management, and use of natural resources. These aspects can cause numerous potential impacts. Some example impacts could include effects on fisheries, wildlife, water quality, air quality, soil productivity, and aesthetics; acidification of lakes; contribution to global warming; creating complex waste disposal issues; depletion of non-renewable resources; loss of biodiversity; loss of forest cover; and loss of productive agricultural land. Although all generation and transmission options generate environmental impacts, the types and degree of impact vary widely.

Given their prominent role in the economic sector, electric utilities have many impacts in the economic dimension of sustainable development as well. Aspects such as distribution of revenues, the provision of reliable service, pricing, profitability, investment in research and development, procurement strategies, and local community concerns all have impacts associated with them. Electric utilities can have significant impacts on employment, local and investor incomes, government revenue, efficiency, innovation, business development, and other investment. As with the environmental impacts, these can have many social consequences as well.

Electric utility operations can have a direct impact on the health of employees and the general public. Potential health concerns could emerge due to potential exposure to difficult working conditions, radiation, and EMF; particulates in the air; fire or explosions; and other toxic emissions. Through their support of ethical business practices, electric utilities could also have an influence on human rights, the provision of equal opportunities, income disparities, stakeholder involvement, and the creation of educational opportunities. Other social impacts could include forced relocation and depreciation of land values in areas adjacent to utility infrastructure. Finally, it is also important to consider the impact of electrification on poverty alleviation. Although access to electricity is not typically an issue for utilities operating in developed countries, electricity is a major factor in bringing developing countries onto a sustainable path (WBCSD, 2002c).

There is no question dealing with all of these environmental, economic, and social challenges is a difficult assignment, especially when it is considered that they must often be dealt with simultaneously. The design of a carefully selected system of sustainable development indicators can help address this challenge.

APPENDIX B
SUPPORTING MATERIALS FOR THE RESEARCH METHODOLOGY

This appendix presents the supporting materials for Chapter 3. It is divided into three sections. The first second provides further details on the case utility. The second section provides further details on the expert consultations. Participants, dates, agendas, and key questions are provided for each of the consultations that occurred throughout the research. In every case, the participants are listed using the reference scheme in Table 3.2. The third section presents the informed consent form. It should be noted that the locations of the meetings were deleted in order to protect the identity of the case utility.

Further Details on the Case Utility

This section summarizes the following as it relates to the case utility:

- Corporate Profile.
- Transmission System Profile.
- Vision, Values, and Goals.
- Operating Principles.
- Policies and Principles.
- Key Corporate Goals.

Corporate Profile

The case utility is a fully-integrated energy utility providing generation, transmission, and distribution services. The provincial Crown Corporation provides electricity to nearly 750,000 customers located throughout the Province while also exporting electricity to over 50 electric utilities in Canada and the United States. The company is based in a regulated energy market.

The case utility is governed by a Board, whose members are appointed by the Lieutenant Governor in Council. A representation of the corporate organizational structure is provided in Figure B-1.

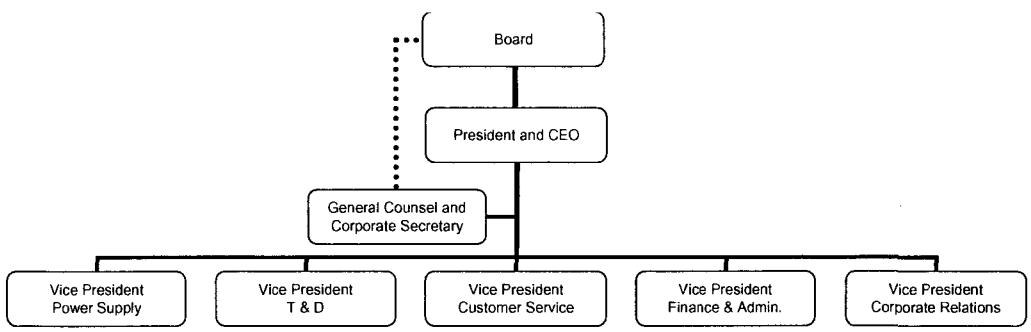

FIGURE B-1
CASE UTILITY CORPORATE ORGANIZATIONAL STRUCTURE

As illustrated in Figure B-1, the company is organized into five business units: Transmission and Distribution (T&D), Power Supply, Customer Service and Marketing (CS&M), Finance and Administration, and Corporate Relations.

Transmission System Profile

This study focused on the major-high voltage transmission system, a part of the T&D Business Unit. An organizational chart of the T&D Business Unit is provided in Figure B-2. Specifically, there were three divisions within the T&D Business Unit that were considered: Transmission Planning and Design, Transmission Line Construction and Maintenance, and Transmission System Operations. Within each division, there are numerous departments.

Error!

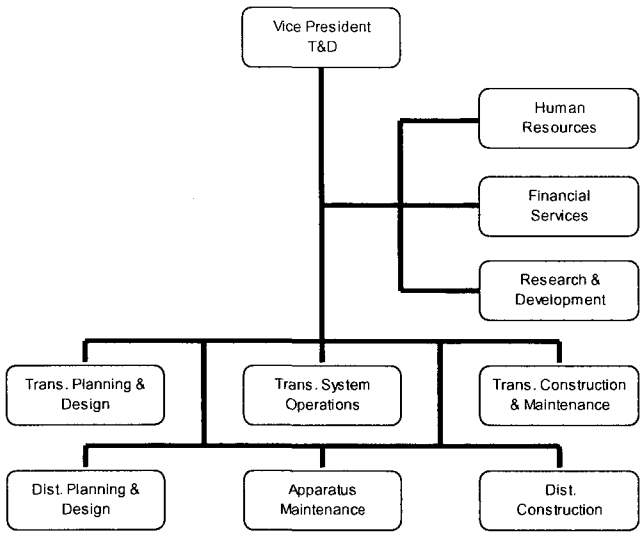

FIGURE B-2
TRANSMISSION AND DISTRIBUTION ORGANIZATIONAL STRUCTURE

Vision, Values, and Goals

The case utility's vision is "to be recognized as the best utility in North America with respect to safety, rates, reliability, customer satisfaction, and environmental management, and to be considerate of all people with who we have contact." This vision is supported by a set of operating principles, corporate policies, and corporate goals.

Operating Principles

The company's six key operating principles are:

1. Work together for the success of the organization as a whole, recognizing that all our activities are interrelated.
2. Establish long-term, cooperative relationships with all employees, customers, suppliers, and other stakeholders, aimed at achieving our shared Vision.
3. Create a working environment that removes barriers to effective performance and which fosters mutual respect, trust, and open communication.
4. Provide opportunities for all employees to develop their full potential, recognizing people's inherent desire to do their best.
5. Measure outcomes, develop an understanding of the causes of variation from planned performance, and take appropriate action.

6. Practice continuous improvements through ongoing coaching, learning, and innovation, focused on the needs and wants of internal and external customers.

Policies and Principles

The case utility's two principle corporate polices are the Corporate Policy Statement on Relationships and the Corporate Policy Statement on Operations. These top-level policies build on the vision and operating principles and therefore incorporate sustainable development concepts such as efficient use of resources, nurturing continuous improvement, ensuring corporate stewardship, and minimizing adverse environmental impacts. However, more explicit policies and principles are available to guide the implementation of sustainable development. Of particular relevance are the Environmental Management Policy and the Sustainable Development Guiding Principles.

The Environmental Management Policy outlines the utility's commitment to the environment. It recognizes the need to prevent or minimize any adverse impacts, to meet or surpass regulatory requirements and other commitments, to consider the interests of key stakeholders, to annually review objectives and targets, and to document and report on environmental activities.

In its Sustainable Development Guiding Principles, the utility states it "will apply the principles of sustainable development in all aspects of its operations to achieve environmentally sound and sustainable economic development". More explicitly, the company recognizes the need for:

1. Stewardship.
2. Shared Responsibility.
3. Integration of Environmental and Economic Decisions.
4. Economic Enhancement.
5. Efficient Use of Resources.
6. Prevention and Remedy.
7. Conservation.
8. Waste Minimization.
9. Access to Adequate Information.
10. Public Participation.
11. Understanding and Respect.
12. Scientific and Technological Innovation.
13. Global Responsibility.

Key Corporate Goals

Like any large corporation, the case utility has developed numerous goals and objectives throughout all levels of the organization. To provide overall guidance for each business unit, division, and department, there are ten goals outlined in the Corporate Strategic Plan:

1. Continuously improve safety in the work environment.
2. Provide customers with exceptional value.
3. Be a leader in strengthening working relationships with aboriginal peoples.
4. Improve corporate financial strength.
5. Maximize export power net revenues.
6. Have highly skilled, effective, innovative employees and a diverse workforce that reflects the demographics of the Province.
7. Be proactive in protecting the environment and be a recognized leader in doing so.

8. Be an outstanding corporate citizen.
9. Proactively support agencies responsible for business development in the Province.
10. Be a leader in implementing cost effective energy conservation and alternative energy programs.

The goals used by the T&D business unit are nearly identical to those listed above. A summary of the T&D strategic plan goals and indicators is provided in Table B-1. Many of the indicators in Table B-1 were incorporated in the system of indicators. The major exception was indicators pertaining to safety, which were not considered due to the fact that this area is already extensively measured within the company. Indicators applying exclusively to the distribution system were also excluded or modified in the system of indicators.

TABLE B-1
T&D STRATEGIC PLAN GOALS AND EXISTING INDICATORS AT THE CASE UTILITY

Goal	Existing Indicators
1. Continually improve safety and wellness in the work environment.	• High risk accidents • Accident severity • Accident frequency • Preventable vehicle accidents • Average sick leave per employee • Perceived leadership commitment to safety • Work site visits
2. Provide T&D customers with exceptional value.	• Percentage of in-service dates met on TIER 1 major capital projects • Transmission facilities development services internal customer satisfaction survey score • Average outage time per customer per year • Average outage frequency per customer per year
3. Be a leader in strengthening working relationships with Aboriginal peoples.	• Percent of employees who are Aboriginal • Value of PO's placed with Aboriginal companies
4. Improve T&D financial strength by focusing on core business.	• T&D net cost of operations - variance • Major capital projects - variance • Number of major capital projects with a variance greater than 5% and $1,000,000 • Domestic capital projects - variance • Number of domestic capital projects with a variance greater than 3% and $300,000
5. Maximize transmission system transfer capability to the United States.	• Transmission transfer capability performance • Percentage of time that the system has 100% transfer capability • Outage cost savings as a percentage of estimated savings • Percentage increase in overall system firm transfer limits
6. Have highly skilled, effective, and innovative employees.	• Percentage of completed surveys returned • Workplace culture index • Your work index • Employees are skilled sub-index • Employees are effective sub-index • Employees are innovative sub-index

TABLE B-1
T&D STRATEGIC PLAN GOALS AND EXISTING INDICATORS AT THE CASE UTILITY

Goal	Existing Indicators
	• Communications with employees are effective sub-index • Percentage of jobs filled by external applicants • Percentage of designated group members in T&D's workforce • Percentage of employee development plans complete
7. Be a leader in protecting the environment.	• Reportable and non-reportable spills including unintended releases
8. Be an outstanding corporate citizen and an outstanding member of the community.	• Public attitude factor
9. Proactively support agencies responsible for business development in the Province.	• Number of connections to the case utility's broadband telecommunications infrastructure
10. Be a leader in implementing cost-effective energy conservation and alternative energy programs.	• Percentage of generation connection requests for alternative energy program completed on time

Further Details on the Expert Consultations

Step 1 – Conduct Needs Assessment

Step 1 consisted of one individual meeting with the principal informant and one small group meeting with key internal experts. The individual meeting with the principal informant was conducted on January 22, 2004. The agenda for the meeting is displayed in Table B-2.

TABLE B-2
AGENDA FOR INITIAL MEETING WITH PRINCIPAL INFORMANT

1. Confirmation of Agenda
2. Review of Research Proposal
3. Progress Report
   - 3.1 Ethics and Contract Approvals
   - 3.2 Academic Steering Committee
   - 3.3 Literature Review
4. Discussion of Action Plan (Approach and Timelines)
   - 4.1 Conduct Needs Assessment
   - 4.2 Conduct Process Planning
   - 4.3 Develop Draft Set of Indicators
5. Discussion of Next Steps

The small group consultation was held on March 10, 2004 and was facilitated by a professional facilitator. Based on the initial discussion with the principal informant, it was determined that consultation was required with internal experts at the case utility. Specifically, experts were required from Corporate Planning as well as both major divisions in the Transmission and Distribution Business Unit; Construction and Maintenance and Planning and Design. The internal experts who participated in the small group needs assessment consultation are identified in Table B-3.

TABLE B-3
EXPERTS PARTICIPATING IN THE NEEDS ASSESSMENT CONSULTATION

Title	Case Utility Division
Corporate Planning Manager / Environmental Management Systems Coordinator	Corporate Planning and Development
Transmission Construction and Maintenance Projects Manager	Transmission and Distribution Construction and Maintenance
Senior Environmental Assessment Officer (1)	Transmission and Distribution Planning and Design

The goals of the consultation included clarifying the current situation, identifying what the company needed to do better, and how best to meet the needs of those who will utilize the research. To meet those needs, eight open-ended questions were created. The questions posed to participants are presented in Table B-4.

TABLE B-4
QUESTIONS POSED TO PARTICIPANTS IN NEEDS ASSESSMENT CONSULTATION

1. Who will use the indicators?
2. How will the indicators be used?
3. What types of internal indicators are currently available?
4. What are the major gaps in existing information systems?
5. Which policy commitments require substantiation?
6. What are some of the key anticipated challenges?
7. What are the best ways to communicate the indicators to the interested parties?
8. What are the characteristics of a sustainably managed transmission system?

The small group meeting was organized around the agenda in Table B-5. All participants were provided with an agenda, an information sheet, and an informed consent form prior to the meeting.

TABLE B-5
AGENDA FOR NEEDS ASSESSMENT CONSULTATION

1. Confirm Agenda
2. Project Overview and Progress Report
3. Review and Signing of Informed Consent Form
4. Brainstorming on Selected Key Questions
5. Summary of Next Steps

Step 2 – Conduct Process Planning

Step 2 consisted of one individual meeting with the principal informant and two small group meetings with key internal and external experts. The individual meeting with the principal informant was held on March 18, 2004. The agenda for the meeting is displayed in Table B-6.

TABLE B-6
AGENDA FOR PROCESS PLANNING MEETING WITH PRINCIPAL INFORMANT

1. Review Project Purpose and Scope
2. Review of Step 1 Results
3. Discuss Consultation Plan for Process Planning
   3.1 Questions

TABLE B-6
AGENDA FOR PROCESS PLANNING MEETING WITH PRINCIPAL INFORMANT

3.2 Participants
3.3 Information Package
4. Summary of Next Steps

The detailed process planning involved consultation with two small groups. The first small group included internal experts and was facilitated by a professional facilitator. The second small group included external experts. The internal experts who participated in the Step 2 consultations are identified in Table B-7.

TABLE B-7
INTERNAL EXPERTS PARTICIPATING IN THE PROCESS PLANNING CONSULTATION

Title	Case Utility Division
Corporate Planning Manager / Environmental Management Systems Coordinator	Corporate Planning and Development
Transmission Construction and Maintenance Projects Manager	Transmission and Distribution Construction and Maintenance
Senior Environmental Assessment Officer (1)	Transmission and Distribution Planning and Design

The goals of the consultation included determining how to proceed with the development of the indicators, identifying key internal stakeholders, and identifying the extent of external stakeholder involvement in this phase of the research. To meet those needs, a series of open-ended questions was created. The questions posed to internal participants in the process planning consultation are presented in Table B-8.

TABLE B-8
QUESTIONS POSED TO PARTICIPANTS IN INTERNAL PROCESS CONSULTATION

1. How should the development of the indicators be approached?
2. Which internal stakeholders should be involved in the development of the draft indicators?
3. To what extent, if any, should external stakeholders be involved in this phase of the project?

The process planning consultation with internal experts was held on April 2, 2004. The meeting was organized around the agenda in Table B-9. All participants were provided with a copy of the agenda and an information sheet prior to the meeting.

TABLE B-9
AGENDA FOR INTERNAL PROCESS PLANNING CONSULTATION

1. Confirm Agenda
2. Project Overview and Progress Report
3. Review of Informed Consent Form
4. Brainstorming on Selected Key Questions
5. Summary of Next Steps

In addition to the internal experts, a process planning consultation was held with external experts. The participants in that consultation are listed in Table B-10.

TABLE B-10
EXTERNAL EXPERTS PARTICIPATING IN PROCESS PLANNING CONSULTATION

Provincial Government Sustainable Development Policy Analyst
Sustainable Development Indicators Project Manager

The goal of the process planning consultation with external experts was to obtain feedback on the indicator development plan. The meeting was held on April 16, 2004 following the agenda in Table B-11.

TABLE B-11
AGENDA FOR EXTERNAL PROCESS PLANNING CONSULTATION

1. Confirm Agenda
2. Review of Informed Consent Form
3. Project Status Report
   - 3.1 Project Overview
   - 3.2 Completed Tasks
   - 3.3 Current Status
4. Discussion of Indicator Development Plan
5. Summary of Next Steps

Step 3 – Develop Draft Set of Indicators

Step 3 involved ten small group meetings with twenty-one internal and external experts and six large group meetings with key internal and external experts. The details on the meetings are organized according to the key steps followed in Step 3.

Develop Conceptual Framework

To develop a conceptual framework, consultations were held with internal and external experts. The external experts who participated in the consultation are identified in Table B-12.

TABLE B-12
EXTERNAL EXPERTS PARTICIPATING IN CONCEPTUAL FRAMEWORK CONSULTATION

Provincial Government Sustainable Development Policy Analyst
Sustainable Development Indicators Department Manager

The consultation with external experts consisted of two primary components. In the first component, the experts focused on the development of evaluation criteria for selecting the most appropriate framework. In the second, the experts considered each of the following frameworks on the basis of those criteria: environment-economy-society, ethics-conservation-cooperation-competition, effectiveness-thrift-margin, pressure-state-response, and the capital stocks approach. The meeting was held on April 3, 2002 as a part of the face validity test of a University of Manitoba Master of Science thesis (Searcy, 2002).

The results of the meeting were reviewed, and approved by, internal experts at the case utility in a meeting on April 26, 2002. The internal experts participating in the review of the conceptual framework are listed in Table B-13.

TABLE B-13
INTERNAL EXPERTS PARTICIPATING IN REVIEW OF THE CONCEPTUAL FRAMEWORK

Title	Case Utility Division
Corporate Planning Manager / Environmental Management Systems Coordinator	Corporate Planning and Development
Senior Environmental Assessment Officer (1)	Transmission and Distribution Planning and Design

Identify Key Issues

As noted in Figure 4.3, a five-phased approach was employed to identify the key issues that must be addressed by the indicators for the case utility's transmission system:

- Develop a Preliminary List of Key Issues
- Conduct Consultation on the Preliminary List of Key Issues
- Prioritize List of Key Issues
- Finalize List of Key Issues
- Illustrate Linkages between the Key Issues

Each phase involved consultation with relevant experts. A description of the process, including the participants, key questions, and agenda for each set of consultations, is provided in the following sections.

Develop a Preliminary List of Key Issues

As a part of the face validity test in Searcy (2002), the first consultation was held on April 26, 2002. The consultation method was a structured brainstorming session on the question: "what are the key issues that must be addressed by sustainable development indicators for the case utility's transmission system?" Excluding the members of the research team (i.e. the author and the Ph.D. dissertation advisors) and the professional facilitator, the participants in that consultation are listed in Table B-14.

TABLE B-14
EXPERTS PARTICIPATING IN THE IDENTIFICATION OF PRELIMINARY KEY ISSUES

Title	Organization
Corporate Planning Manager / Environmental Management Systems Coordinator	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility
Provincial Government Sustainable Development Policy Analyst	External Expert
Sustainable Development Indicators Department Manager	External Expert

Conduct Consultations on the Preliminary List of Key Issues

In April 2004 and May 2004 a second series of consultations on the key issues was conducted. To complete the second series of consultations, a three-phased approach was employed.

In the first phase, participants were consulted in ten small group and three large group meetings. Objectives of these meetings included introducing the participants to the project, responding to any initial questions, and to obtain feedback on the initial list of key issues. The experts participating in this phase of consultations are listed in Table B-15. Note that in some cases experts participated in multiple meetings.

TABLE B-15
EXPERTS PARTICIPATING IN REVIEW OF KEY ISSUES

Title	Organization
April 16, 2004	
Provincial Government Sustainable Development Policy Analyst	External Expert
Sustainable Development Indicators Project Manager	External Expert
April 20, 2004	
Transmission Construction and Maintenance Projects Manager	Case Utility
Line Maintenance Supervisor	Case Utility
Transmission Line Services Engineer	Case Utility
April 21, 2004	
Corporate Planning Manager	Case Utility
Senior Environmental Specialist (1)	Case Utility
Senior Communications Advisor	Case Utility
April 22, 2004	
Environmental Education Specialist	Case Utility
Aboriginal Liaison	Case Utility
Senior Environmental Specialist (2)	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility
Aboriginal Relations Consultant	External Expert
April 23, 2004	
Environmental Education Specialist	Case Utility
Environmental Specialist (1)	Case Utility
Environmental Specialist (2)	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility
May 3, 2004	
Chief Forester	Case Utility
Forester	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility

TABLE B-15
EXPERTS PARTICIPATING IN REVIEW OF KEY ISSUES

Title	Organization
May 20, 2004 (Morning Meeting)	
Environmental Impact Assessment Consultant (1)	External Expert
Senior Environmental Assessment Officer (1)	Case Utility
Senior Environmental Assessment Officer (2)	Case Utility
May 20, 2004 (Afternoon Meeting)	
Hazardous Materials Officer	Case Utility
Corporate Planning Manager	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility

All participants had extensive experience with the case utility and sustainable development. It is important to note that many of the participants also had extensive experience in stakeholder consultation, including environmental impact statements, open houses, public hearings, external reporting, and general inquiries. For this reason, it was determined that the most appropriate time for consultation with additional external experts was in Step 4: Test and Adjust the Indicators.

To achieve the objectives of the consultations on the preliminary key issues, two open-ended questions were created. The questions posed to participants in the small group and individual key issues consultations are presented in Table B-16.

TABLE B-16
QUESTIONS POSED TO PARTICIPANTS IN REVIEW OF KEY ISSUES

1. Did you identify any significant gaps in the key issues for the transmission system?
2. What are some of the key themes you feel cut across the three dimensions of sustainable development?

All participants were provided with an agenda, an information sheet, and an informed consent form prior to the meeting. A copy of the agenda used in all of the meetings focused on the review of the key issues is in Table B-17.

TABLE B-17
AGENDA FOR REVIEW OF KEY ISSUES CONSULTATIONS

1. Introductions
2. Review of Informed Consent Form
3. Project Overview
   - 3.1 Purpose and Scope
   - 3.2 Action Plan
   - 3.3 Current Status
4. Review of Background Information
   - 4.1 Principles of Sustainable Development
   - 4.2 Key Issues for the Case Utility's Transmission System
   - 4.3 Key Issues Linkages
   - 4.4 Indicator Selection Criteria
   - 4.5 Indicator Development Tools
   - 4.6 Sample Indicators
5. Discussion of Selected Key Questions
6. Summary of Next Steps

Prioritize the Preliminary List of Key Issues

In the next phase of the key issues consultations, a large group meeting was held to finalize and prioritize the key issues to be addressed by indicators. All of the experts identified in Table B-15 were invited to the consultation. The attendees are listed in Table B-18. The meeting was facilitated by the professional facilitator.

TABLE B-18
EXPERTS PARTICIPATING IN PRIORITIZATION OF KEY ISSUES

Title	Organization
Environmental Education Specialist	Case Utility
Corporate Planning Manager	Case Utility
Provincial Government Sustainable Development Policy Analyst	External Expert
Aboriginal Liaison	Case Utility
Aboriginal Relations Consultant	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility
Environmental Specialist (2)	Case Utility
Senior Environmental Specialist (2)	Case Utility
Sustainable Development Indicator Project Manager	External Expert

The consultation was held on May 25, 2004. The agenda utilized for the consultation is presented in Table B-19.

TABLE B-19
AGENDA FOR PRIORITIZATION OF KEY ISSUES CONSULTATION

1. Introductions
2. Project and Consultation Overview
3. Discussion and Finalization of Key Issues
4. Establish Key Issue Prioritization Guidelines
5. Prioritization of Key Issues
6. Summary of Next Steps

Finalize List of Key Issues to be Addressed by Indicators

The final phase in the process to identify the key issues was an analysis of the results from the previous meetings and the development of a proposal for proceeding. The proposal was reviewed in a small group consultation prior to being presented to the wider participant group. The participants in the small group consultation are listed in Table B-20. The consultation was held on June 3, 2004.

TABLE B-20
EXPERTS PARTICIPATING IN PREPARATION OF FINAL KEY ISSUES PROPOSAL

Title	Case Utility Division
Corporate Planning Manager / Environmental Management Systems Coordinator	Corporate Planning and Development
Transmission Construction and Maintenance Projects Manager	Transmission and Distribution Construction and Maintenance
Senior Environmental Assessment Officer (1)	Transmission and Distribution Planning and Design

Determine Linkages between the Key Issues

Linkages between the key issues were discussed as a part of the June 23, 2004 group meeting on identifying indicators. Further information on that meeting is available in a later section.

Develop Indicator Selection Criteria

To guide the selection of indicators for each key issue, a set of indicator selection criteria was developed. This involved two sets of consultations. The first set of consultations was held on May 1, 2002 as a part of the face validity test in Searcy (2002). Excluding members of the research team and the professional facilitator, the experts consulted in that consultation are listed in Table B-21.

TABLE B-21
EXPERTS PARTICIPATING IN INDICATOR SELECTION CRITERIA CONSULTATIONS

Title	Organization
Corporate Planning Manager / Environmental Management Systems Coordinator	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility
Provincial Government Sustainable Development Policy Analyst	External Expert
Sustainable Development Indicators Department Manager	External Expert

The indicator selection criteria were revisited a part of a group meeting held on June 23, 2004. The key questions, agenda, and list of participants for that consultation are presented in a later section.

Develop Draft System of Indicators

The development of a system of indicators for the case utility's transmission system was organized into three distinct phases:

- Preliminary Indicator Development Meetings
- Development of Draft Indicators
- Development of a Draft System of Indicators

All three phases involved consultation with relevant expertise. A description of the process, including the participants, key questions, and agenda for each set of consultations, is provided in the following sections.

Preliminary Indicator Development Meetings

This phase consisted of a series of individual and small group meetings with internal and external experts. The purpose of these meetings was to prepare the participants for larger group meetings to develop the draft indicators. As illustrated in Table B-17, these meetings were combined with the individual and small group meetings on the key issues.

The internal experts who participated in the individual and small group meetings are listed in Table B-15. In addition to the questions relating to the key issues, the participants were asked the questions listed in Table B-22.

TABLE B-22
QUESTIONS POSED TO PARTICIPANTS IN PRELIMINARY INDICATOR CONSULTATIONS

1. What value do you see in pursuing sustainable development at the case utility?
2. How would you use sustainable development indicators?
3. What would you like to see in a group consultation to develop the indicators?
4. Is there anything else you would like to know before the group consultation?

Development of Draft Indicators

The development of a draft set of indicators involved consultation with relevant experts and an analysis of the meeting results. The purpose of the consultation was to brainstorm draft indicators for each selected key issue. To accomplish this task, all of the experts identified in Table B-15 were invited to participate in a structured brainstorming session. The experts that were able to attend are listed in Table B-23.

TABLE B-23
EXPERTS PARTICIPATING IN INDICATOR BRAINSTORMING CONSULTATIONS

Title	Organization
Environmental Education Specialist	Case Utility
Corporate Planning Manager	Case Utility
Line Maintenance Supervisor	Case Utility
Hazardous Materials Officer	Case Utility
Transmission Construction and Maintenance Projects Manager	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility

TABLE B-23
EXPERTS PARTICIPATING IN INDICATOR BRAINSTORMING CONSULTATIONS

Title	Organization
Environmental Specialist (1)	Case Utility
Transmission Line Services Engineer	Case Utility
Senior Environmental Specialist (2)	Case Utility
Forester	Case Utility

The indicator brainstorming consultation was held on June 8, 2004. The meeting was organized around the agenda in Table B-24 and was facilitated by the professional facilitator. All participants were provided with the agenda, relevant background information, and the informed consent form prior to the consultation.

TABLE B-24
AGENDA FOR INDICATOR BRAINSTORMING CONSULTATION

1. Project and Consultation Overview
2. Discussion of Key Issues to be Addressed by the Indicators
3. Review of Indicator Development Tools
4. Small Group Breakouts for Developing the Indicators
5. Report of Small Groups on Indicator Development
6. Summary of Next Steps

As noted in the agenda, the participants were divided into two small groups. The groups were asked to brainstorm possible indicators for each key issue. Time permitting, they were also asked to consolidate the indicators where possible and to note any omissions in the list of selected key issues. The participants in each group, and the issues they addressed, are listed in Table B-25. An experienced facilitator facilitated each group.

It should be noted that each group employed a different approach. The process used by Group 1 was: discussion, capturing of the key issues, brainstorming indicators, and organizing the results of the brainstorming exercise. Group 2 employed an approach where the brainstorming of the issues and indicators was simultaneous to a filtering and organization process.

TABLE B-25
SMALL GROUP ASSIGNMENTS IN INDICATOR BRAINSTORMING CONSULTATIONS

Group	Participants	Key Issues Addressed
Group 1	• Transmission Construction and Maintenance Projects Manager • Environmental Education Specialist • Environmental Specialist (1) • Transmission Line Services Engineer • Senior Environmental Specialist (2)	• Public Involvement • Staff Relations • Community Relations • Governance and Management Issues
Group 2	• Corporate Planning Manager • Line Maintenance Supervisor • Hazardous Materials Officer • Senior Environmental Assessment Officer (1) • Forester	• Private and Crown Land Usage • Alterations to the Landscape • Vegetation Management Practices • Benefits to Customers and Stakeholders

Following the brainstorming meeting, the results were reviewed. A range of sources were drawn upon including: conceptual frameworks, previously published sets of indicators, existing internal measures, and the participants in follow-up inquiries. In particular, the conceptual frameworks based on the Sustainable Development Records (SDR) approach, the Community Sustainability Auditing (CSA) approach, the Pressure-State-Response (PSR) approach, and the Capital Stocks approach were useful in analyzing gaps in the brainstormed indicators and provided context for necessary enhancements. Once the gap analysis had been completed, the indicators were organized and consolidated into a more manageable list – as requested by participants in the brainstorming meeting. This process resulted in a proposed set of sustainable development indicators for the transmission system.

Development of a Draft System of Indicators

The third phase involved another group consultation with internal and external experts. The purpose of this meeting was to discuss how the selected key issues may be best addressed with indicators. The participants in the meeting are identified in Table B-26. All experts identified in Table B-15 were invited to participate.

TABLE B-26
EXPERTS PARTICIPATING IN FINAL DRAFT INDICATOR SELECTION

Title	Organization
Corporate Planning Manager	Case Utility
Line Maintenance Supervisor	Case Utility
Senior Communications Advisor	Case Utility
Transmission Construction and Maintenance Projects Manager	Case Utility
Environmental Specialist (1)	Case Utility
Senior Environmental Specialist (2)	Case Utility
Forester	Case Utility

The consultation was held on June 23, 2004. The meeting was organized around the agenda in Table B-27 and was facilitated by the professional facilitator. All participants were provided with the agenda, relevant background information, and the informed consent form prior to the consultation.

TABLE B-27
AGENDA FOR FINAL DRAFT INDICATOR SELECTION CONSULTATION

1. Project and Consultation Overview
2. Review of Results from Previous Meetings
3. Roundtable Discussions on Selecting Indicators
4. Discussion of Linkages between Key Issues
5. Roundtable Discussions on Sample Indicators
6. Summary of Next Steps

As a part of the roundtable discussion on selecting indicators, participants were asked to provide comments on four key items. Table B-28 lists those key areas of consultation.

TABLE B-28
KEY AREAS OF CONSULTATION IN DISCUSSION ON SELECTING INDICATORS

1. The process for selecting the indicators.
2. The final structure of the indicators.
3. The usefulness of the existing internal indicators.
4. The number of indicators desired.

Step 4 – Test and Adjust the Indicators

Step 4 consisted of fourteen individual meetings, three small group meetings, one large group meeting, and one email consultation with key internal and external experts. The discussions of the consultations are organized around the following key sub-steps:

- Conduct critical review of draft indicators.
- Finalize working system of indicators.
- Conduct data assessment.
- Develop method for aggregating indicators.

Conduct Critical Review of Draft Indicators

Between January 2005 and September 2005, fourteen individual and small group consultations were held to conduct a critical review of the draft indicators. Although comments on the indicators were not limited in any way, participants were asked to consider the following general questions to help prompt thinking:

- Has anything been missed?
- Should any indicators be removed?
- Do any of the measures conflict with one another?
- If some of the measures do conflict with one another, what trade-off criteria would be appropriate to guide decisions pertaining to those indicators?
- Are the indicators presented at an appropriate hierarchical level?
- Are the indicators presented in the most appropriate key issue?
- Are the indicators correctly labelled as "existing" or "newly created"?
- Do you have any other suggestions on how the indicators might be improved?

The experts who participated in the critical review of the indicators are listed in Table B-29. Note that the Aboriginal Relations Consultant also provided brief comments via email.

TABLE B-29
EXPERTS PARTICIPATING IN THE CRITICAL REVIEW OF DRAFT INDICATORS

Title	Organization
January 11, 2005	
Corporate Planning Manager	Case Utility
June 9, 2005	
Corporate Planning Manager	Case Utility
Transmission Construction and Maintenance Projects Manager	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility

TABLE B-29
EXPERTS PARTICIPATING IN THE CRITICAL REVIEW OF DRAFT INDICATORS

Title	Organization
June 20, 2005	
Professional Facilitator	External Expert
June 23, 2005	
Senior Communications Advisor	Case Utility
July 5, 2005	
Senior Environmental Specialist (2)	Case Utility
July 11, 2005	
Forester	Case Utility
July 12, 2005	
Sustainable Development Indicator Project Manager	External Expert
July 19, 2005	
Transmission Line Services Engineer	Case Utility
Line Maintenance Supervisor	Case Utility
July 21, 2005	
Provincial Government Sustainable Development Policy Analyst	External Expert
August 5, 2005	
Environmental Education Specialist	Case Utility
August 18, 2005	
Environmental Interest Group Representative	External Expert
August 19, 2005	
Model Forest Manager	External Expert
August 31, 2005	
Environmental Specialist (1)	Case Utility
September 9, 2005	
Environmental Impact Assessment Consultant (2)	External Expert
September 16, 2005	
Professional Facilitator	External Expert
September 21, 2005	
Faculty of the Environment Ph.D. Candidate	External Expert

All participants were provided with a copy of the meeting agenda and the required information prior to the meeting. In cases where experts were consulted for the first time, the informed consent form was reviewed at the beginning of the meeting. A copy of the agenda used in all of the critical review meetings is available in Table B-30.

TABLE B-30
AGENDA FOR INDIVIDUAL AND SMALL GROUP CRITICAL REVIEWS

1. Project Status Report
   1.1 Project Overview
   1.2 Completed Tasks
   1.3 Remaining Tasks
2. Action Plan for Remaining Steps
3. Feedback on Draft Set of Indicators
   3.1 Vegetation Management Practices
   3.2 Alterations to the Landscape
   3.3 Private and Crown Land Usage
   3.4 Public Involvement
   3.5 Staff Relations
   3.6 Community Relations
   3.7 Governance and Management Issues
   3.8 Benefits to Customers and Stakeholders
4. Feedback on Draft Network Diagrams Illustrating Linkages between the Key Issues
   4.1 Land Use Practices
   4.2 Stakeholder Relationships
   4.3 Governance
5. Next Steps

Finalize Working System of Indicators

Once the individual and small group consultations were completed, a large group meeting was held. The purpose of the consultation was to derive a working set of sustainable development indicators and to finalize the key issues relationship diagrams. All of the experts previously consulted were invited to attend the meeting. The participants in the meeting, excluding the members of the research team and professional facilitator, are listed in Table B-31.

TABLE B-31
EXPERTS PARTICIPATING IN LARGE GROUP CRITICAL REVIEW OF THE INDICATORS

Title	Organization
Corporate Planning Manager	Case Utility
Senior Environmental Specialist (2)	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility
Forester	Case Utility
Line Maintenance Services Engineer	Case Utility

The consultation was held on September 30, 2005. The agenda utilized for the consultation is presented in Table B-32.

TABLE B-32
AGENDA FOR LARGE GROUP CRITICAL REVIEW

1. Project and Consultation Overview
2. Review Comments Received on Draft Indicators and Responses to Comments
3. Review Comments Received on Draft Network Diagrams and Responses to Comments
4. Summary of Next Steps

Conduct Data Assessment

The data assessment was conducted through an email consultation. The participants were provided with a complete list of the working system of indicators, the method of calculating each indicator, goals for each indicator, and the department or division responsible for each indicator. The participants were asked to comment on the appropriateness of the suggested calculations, goals, and responsible parties in addition to stating whether or not data was currently available for the indicator. The five key internal experts included in the consultation are listed in Table B-33.

TABLE B-33
EXPERTS PARTICIPATING IN THE EMAIL DATA ASSESSMENT CONSULTATION

Title	Organization
Corporate Planning Manager	Case Utility
Transmission Construction and Maintenance Projects Manager	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility
Forester	Case Utility
Line Maintenance Services Engineer	Case Utility

The information was sent on October 12, 2005 and it was requested that comments be received by October 19, 2005.

Develop Method for Aggregating Indicators

To develop and confirm a method of aggregating the indicators, two sets of consultations were held. In the first set, two individual meetings were held with external experts. The experts who participated are listed in Table B-34.

TABLE B-34
EXTERNAL EXPERTS PARTICIPATING IN THE AGGREGATION CONSULTATIONS

November 8, 2005
Sustainable Development Indicators Project Manager

November 14, 2005
Provincial Government Sustainable Development Policy Analyst

Following the individual meetings with the external experts, a small group meeting was held with key internal experts. The participating experts are listed in Table B-35. Members of the research team and the professional facilitator also attended the meeting.

TABLE B-35
EXPERTS PARTICIPATING IN THE AGGREGATION CONSULTATION

Title	Organization
Corporate Planning Manager	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility

The meeting was held on November 25, 2005. In addition to the participants in the meeting, the Transmission Construction and Maintenance Projects Manager, the Forester, and the Line Maintenance Services Engineer all reviewed the material by email.

The agenda for both the individual meetings with the external experts and the small group meeting with internal experts is presented in Table B-36. As illustrated in the table, the aggregation meeting was combined with the meeting for Step 5: Integrate the Indicators. All participants were provided with an electronic aggregation example and a summary of the integration plan in advance of the meeting. The participants had previously requested that proposals be prepared in advance of the meeting based on the comments received throughout the SDI Design Process.

TABLE B-36
AGENDA FOR THE AGGREGATION CONSULTATION

1. Project and Consultation Overview
   1.1 Review the Status of the Project
   1.2 Review the Purpose of the Consultation
2. Review Aggregation Example
   2.1 Discuss the Method of Presenting the Aggregate
   2.2 Review and Discuss the Key Aggregation Assumptions
3. Review the Integration Plan
   3.1 Discuss if Any Other Existing Internal Initiatives Should be Highlighted
   3.2 Review and Discuss the Proposed Integration Models
   3.3 Review and Discuss the Proposed Assessment Models
4. Summary of Next Steps

Step 5 – Integrate the Indicators

Step 5 consisted of one small group meeting with key internal experts, two individual consultations with key external experts, and one email consultation. As noted in the previous section, the consultations with external experts and the small group integration consultation were combined with the meeting for aggregation. The participants and agenda were presented in Tables B-34, B-35, and B-36 respectively.

In addition to the meetings, an email consultation was held on the indicator trade-off criteria. A set of sample trade-off criteria were emailed to the participating experts on December 8, 2005 and comments were requested by December 16, 2005. The participating experts are listed in Table B-37.

TABLE B-37
EXPERTS PARTICIPATING IN THE INDICATOR TRADE-OFF CRITERIA EMAIL CONSULTATION

Title	Organization
Corporate Planning Manager	Case Utility
Transmission Construction and Maintenance Projects Manager	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility
Sustainable Development Indicators Project Manager	External Expert
Provincial Government Sustainable Development Policy Analyst	External Expert

Step 6 – Review and Improve the Indicators

Step 6 consisted of one email consultation with key internal and external experts. The participants were sent a summary of the lessons learned from the research and were asked to provide comments. Participants were also asked to consider the questions:

- What did we learn from conducting this process?
- Do you feel that the objectives of the process were met?
- What worked well?
- What did not work well?
- What, if anything, would we do differently if we were to do this again?

The participating experts, excluding the members of the research team, are listed in Table B-38.

TABLE B-38
EXPERTS PARTICIPATING IN THE STEP 6 EMAIL CONSULTATION

Title	Organization
Corporate Planning Manager	Case Utility
Transmission Construction and Maintenance Projects Manager	Case Utility
Senior Environmental Assessment Officer (1)	Case Utility
Sustainable Development Indicators Project Manager	External Expert
Provincial Government Sustainable Development Policy Analyst	External Expert
Professional Facilitator	External Expert

The material was sent on December 8, 2005 and comments were requested by December 16, 2005.

Informed Consent Form

The informed consent form was approved by the Research Ethics Committee in the Faculty of Engineering at the University of Alberta. It was presented on a Faculty of Engineering letterhead and was reviewed with each participant during their initial consultation.

Informed Consent Form

Research Project Title:	Sustainable Development Indicators for [The Case Utility's] Transmission System
Investigators:	Mr. Cory Searcy, Ph.D. Student, Department of [Mechanical] Engineering, University of Alberta
	Dr. Daryl McCartney, Associate Professor, Department of Environmental Engineering, University of Alberta
	Dr. Stanislav Karapetrovic, Associate Professor, Department of Mechanical Engineering, University of Alberta
Project Sponsor:	[The Case Utility]

* * *

A copy of this consent form will be left with you for your records and reference. 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 the principal investigators, Cory Searcy, Daryl McCartney, or Stanislav Karapetrovic. Contact information is included at the end of this document. Please take the time to read this carefully and to understand any accompanying information.

* * *

Purpose of Research

In order to develop Sustainable Development Indicators for [The Case Utility's] Transmission System, we are organizing a consultation with selected experts at [The Case Utility] and selected external experts. These consultations will provide participants with the opportunity to provide input into the indicators and will provide the principal investigators with exposure to a wide variety of perspectives and ideas.

Consultation Procedure

The consultation will consist of individual meetings and facilitated group meetings between the principal investigators and the participants. Where participants are not available to meet in person, an opportunity will be provided for those individuals to submit their comments to the principal investigator in writing and/or through a discussion on the telephone.

Confidentiality

With their consent only, participants in the consultations will be identified by name, organization, and title as a part of the thesis report. However, comments will not be attributed to any one person, only to the entire participant group as a whole. Data will not, therefore, be attributable to any specific participant.

Please indicate below, by circling and initialing the appropriate answer, whether or not you agree to have your name listed as having participated in the consultations.

Do you agree to have your name listed in the thesis report? Yes No

In any case, to ensure confidentiality, raw data will be stored in a locked file cabinet or office to which only the principal investigators have access. Normally information is retained for a period of 1 year after publication, after which it will be destroyed.

Feedback

Once the consultations are completed, the comments raised therein will be used to help finalize the Sustainable Development Indicators for [The Case Utility's] Transmission System. All participants desiring further participation in the research project will be given the opportunity to view and submit comments on these indicators.

* * *

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 investigators, 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. If you decline to continue or you withdraw from the study, your data will be removed from the study upon your request.** 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.

Investigators:
Mr. Cory Searcy
Tel.: (XXX)-XXX-XXXX

Dr. Daryl McCartney, P.Eng.
Tel.: (XXX)-XXX-XXXX

Dr. Stanislav Karapetrovic, P.Eng.
Tel: (XXX)-XXX-XXXX

This research has been approved by the University of Alberta Research Ethics Committee. If you have any concerns or complaints about this project you may contact any of the above-named persons or Dr. John Whittaker, Chair of the Faculty of Engineering Research Ethics Board, University of Alberta at (XXX)-XXX-XXXX. A copy of this consent form has been given to you to keep for your records and reference.

_____

Participant's Signature Date

_____

Investigator's Signature Date

APPENDIX C
SUPPORTING MATERIALS FOR NEEDS ASSESSMENT

As noted in Table B-4, the needs assessment consultation focused on addressing eight key questions. A summary of the key comments expressed by participants is provided in Table C-1.

TABLE C-1
KEY COMMENTS RECEIVED DURING THE NEEDS ASSESSMENT

1. Who will use the indicators?

- The indicators will be of use to both internal and external stakeholders.
- Internally, the indicators will be a useful management tool particularly in the Corporate Planning division and the Transmission and Distribution business unit. They should also provide linkages with the Power Supply business unit.
- Externally, the indicators will be of use as a reporting mechanism for local stakeholders. Local stakeholders include employees, customers, governments, suppliers, local communities, landowners, non-governmental organizations, and aboriginals. The indicators will also be valuable to a wider external audience, particularly the Canadian Electricity Association.

2. How will the indicators be used?

- Internally, the indicators will be predominantly useful as a management tool. To maximize utility, they should ideally be quantifiable in monetary terms. Where this is not possible, they should be related to agreed upon goals and/or targets. As a management tool, the indicators will be useful in defending the decisions, both internally and externally.
- Externally, the indicators will provide key stakeholders with information on the progress of the transmission system towards sustainable development. One opportunity will be to tie the indicators to the Provincial sustainability indicator program.

3. What types of indicators are currently available?

- Internally, key measures are related to the Corporate Strategic Plan, the Transmission and Distribution Strategic Plan, and the Canadian Electricity Association's Environmental Commitment and Responsibility Program. Further, the ISO 14001 Environmental Management System draws on indicators from those programs. The sustainable development indicators developed in this project should complement the existing internal indicators.
- Another important question to ask early on is: what data is available? The participants suggested the indicators should help dictate what data is needed rather than relying solely on existing data.
- Externally, there are no known indicator programs for a transmission system. A summary of other relevant programs was presented in Section 2.

4. What are the major gaps in existing information systems?

- The key gap is that existing internal indicators are not widely applicable in decision-making. Further, those indicators that are used are, for the most part, small pieces of an informal process. Systematic tools are required to aid the decision making process. This requires that focus is placed on critical indicators areas that are most important from the corporate perspective. Particular effort will be required in the environmental and social indicator areas.
- It is important to note that the participants felt perceived gaps in existing information systems depend largely on who is asked. A broad internal consultation will help mitigate this point.

5. Which policy commitments require substantiation?

- The case utility's two principle polices are the Corporate Policy Statement on Relationships and the Corporate Policy Statement on Operations. Those policies discuss many concepts directly tied to sustainable development including efficient use of resources, nurturing

TABLE C-1
KEY COMMENTS RECEIVED DURING THE NEEDS ASSESSMENT

continuous improvement, ensuring corporate stewardship, and minimizing adverse environmental impacts.

- Other policies specifically relevant to the project include the Environmental Management Policy and the Sustainable Development Guiding Principles.
- The participants noted that it was important to pursue those policies in an organized, systematic, and transparent fashion from the beginning of a project rather than using them to justify decisions only in the final stages.

6. What are some of the key anticipated challenges?

- The primary challenge will be to ensure participants in future consultations remain within the scope of the project. Careful design and phrasing of consultation questions will be required.
- Participants did not believe uptake of the indicators will present a problem. If the indicators improve decision-making capability in a systematic fashion, it is likely they will be widely and eagerly accepted. User friendliness will also be an important consideration.

7. What are the best ways to communicate the indicators to the interested parties?

- The participants felt that it was difficult to answer this question prior to the development of the indicators. Integration with existing management systems and reporting infrastructure will likely be required, though the level of integration is as yet undetermined.

8. What are the characteristics of a sustainably managed transmission system?

- The participants felt that this question will be answered during the course of the indicator development. One consideration, however, that will be important in any sustainably managed transmission system is adopting a life cycle perspective in both decision-making and the consideration of key issues.

APPENDIX D
SUPPORTING MATERIALS FOR PROCESS PLANNING

The process planning was conducted in consultation with internal and external experts. To provide structure for the process, the planning consultation was organized around three key questions. The comments provided by participants during the discussion of the three questions are summarized in Table D-1.

TABLE D-1
KEY COMMENTS RECEIVED DURING THE PROCESS PLANNING CONSULTATION

1. How should the development of the indicators be approached?

- The development of the indicators will require a carefully designed consultation process. Although it is important not to engineer the outcomes, the consultation must be tightly managed.
- Though the key issues have been organized in accordance with the environment-economy-society framework, we must be careful not to create silos or islands where each dimension is looked at as being on its own. It is necessary to highlight the interdependencies between and within the groupings. In other words, the key to having a balanced set of indicators is both vertical and horizontal integration.
- The indicators should help provide a basis for discussions on the life cycle implications of decisions. In other words, the true test of whether the indicators will ultimately be useful is whether they are used in management decision-making. For this to occur, some of the indicators should address problems at their root cause wherever possible rather than simply measuring the symptoms of those causes.
- It will be necessary to ensure participants are properly briefed on both the project and the consultation in advance. If participants arrive at the meetings unprepared, it will be difficult to develop meaningful outcomes. One particularly relevant challenge will be overcoming the perception that sustainable development deals primarily with environmental issues.
- Therefore, part of the early process will be to assess the understanding of the participants with respect to sustainable development. In other words, it will be necessary to establish common ground on which to build to consultations. Nothing should be assumed. One method to build this needed capacity is through project orientation meetings with hold individuals or small groups.
- In any case, it will be necessary to provide strong justification for the project during the initial meetings with consultation participants. In particular, it will be important to demonstrate that the indicators are needed to help close feedback loops in the internal management cycle and answer the question why sustainable development is important to the transmission system.
- In order to keep the task manageable, it will be necessary to carefully consolidate similar ideas and concepts. However, since a wide variety of input must be accommodated, this point must be balanced with an awareness of the need to remain open to suggestions.
- In the indicator development consultations it will be critical to show how the indicators fit in the management cycle. Wherever possible, they should be related to goals and targets.
- Whatever procedures are used, the communication strategy must be clear at the beginning of every stage of the process.
- With the above points in mind, the participants suggested a starting point for the development of the indicators should involve:
    1. A consultation with internal experts on sustainable development. The purpose of this meeting will be to discuss the key sustainable development issues at the case utility. In particular, the group will be asked to identify linkages between the key issues.
    2. A series of individual and small group meetings with internal and external experts. The purpose of these meetings will be to prepare the participants for a larger group meeting.
    3. Three group meetings with internal and external experts on the key issues and indicators. The purpose of these meetings will be to finalize the key issues to be addressed and to discuss indicators for each key issue.
    4. A second consultation with the group of internal sustainable development experts. The purpose of this meeting will be to obtain perspective on the linkages between the indicators.

5. A consultation with key internal and external experts. The purpose of this consultation will be to conduct a critical review of the indicators.

- The above notwithstanding, it was noted that any process for developing indicators is iterative. The participants suggested that the participants in the individual and small group meetings should be asked for their opinions on how the indicator development process should proceed. This would provide the basis for further improvements to the process.

2. Which internal stakeholders should be involved in the indicator development?

- It was determined that consultation will be required from each of the company's business units.
- Within the Transmission and Distribution (T&D) business unit, consultation will be required from both the Planning and Design Division and the Construction and Line Maintenance Division. The departments to consider include:
  - Licensing and Environmental Assessment: expertise regarding sustainable development principles, site selection and environmental assessment, legislation, transmission line impacts, environmental protection and monitoring, non-governmental organizations (NGOs), and public consultation
  - System Planning: involved in transmission line planning criteria and studies
  - Transmission and Civil Design: relevant responsibilities include facility designs and designing options to mitigate environmental impacts
  - Property: expertise in land and water use policies and legislation
  - Transmission Line Maintenance: applicable duties include long term rights of way management, setting of field practices, monitoring, and information system input
  - Transmission Construction: in addition to developing construction practices, has had extensive public contact - particularly the aboriginal liaison
- Within the Power Supply business unit, the departments to consider include:
  - Environmental Land Use and Planning: involved in legislation, environmental policy, resource planning, externalities, export policies, climate change, and contact with NGOs
- Within the Customer Service and Marketing business unit, consultation will be considered with the Customer Services and Operations Division:
  - Customer Services and Operations: expertise in forestry, vegetation management, wood poles, preservative use, field practices, legislation, and public contact - particularly through the municipal liaison
- Within the Corporate business unit, consultation will be required with the Corporate Planning Division:
  - Environmental Management Systems: expertise in EMS, the CEA ECR Program, sustainable development reporting, and environmental processes

3. To what extent should external stakeholders be involved in the indicator development?

- The participants agreed that some external experts should be involved at this stage.
- When developing the indicators, a list of external stakeholder categories to consider includes:
  - Federal and Provincial Regulators and Technical Advisors: offer expertise in several relevant areas including indicators, regulations, and environmental data
  - Environmental and Public Interest Groups: relevant expertise includes perspective on key issues related to the environment and society as well as some experience working with sustainable development indicators
  - Aboriginals: interest may vary substantially though possibilities could include effects on traditional ways of life, employment opportunities, and other interests
  - Landowners and Rate Payers: offer perspective on key issues
  - Employees: offer perspective on key issues and possess relevant technical expertise
  - Industry Associations: offer relevant technical expertise
  - Other External Experts: offer expertise regarding indicators
- At this stage of the process, the experts felt the most relevant external stakeholders to involve include employees, government technical advisors, and other external experts. Others would be more appropriately involved at a later date.

APPENDIX E
SUPPORTING MATERIALS FOR THE DRAFT SET OF INDICATORS

Step 3 was divided into several stages:

- Develop a conceptual framework.
- Identify the key issues that must be addressed.
- Develop indicator selection criteria.
- Develop a draft system of indicators.

The supporting material for those sections is provided in this appendix.

Develop a Conceptual Framework

The conceptual framework was originally selected as a part of the face validity test in Searcy (2002). Further details on the methodology and the criteria used are available in that document.

Identify the Key Issues the must be Addressed

As illustrated in Figure 4.3, the consultations on identifying the key issues were divided into five sections:

- Develop preliminary list of key issues.
- Conduct consultations on preliminary list of key issues.
- Prioritize list of key issues.
- Finalize list of key issues.
- Illustrate linkages between the key issues.

Develop Preliminary List of Key Issues

The initial brainstorming of the key issues was conducted as a part of the face validity test of in Searcy (2002). For reference purposes, the results of the initial brainstorming are presented in Table E-1.

TABLE E-1
SUMMARY OF INITIAL BRAINSTORM ON KEY ISSUES

Land Use

- Fragmentation
- Impact on habitat
- Increased access
- Infringement on private property
- Loss of use (existing and future)
- Residential values and effect on property
- Public safety
- Local economic impact
- Secondary land uses
- Impact on individual economics

Economy

- Timing of expenditure
- Impacts to enable export products
- Revenue sharing with First Nations
- Reliability of the system
- Attracting industry (through competitive pricing and reliability)
- Interruptance energy rates
- Supporting efficiencies in industry (e.g. Power Smart)
- System capacity to meet needs
- Maintenance costs and durability
- Need to borrow (size of project, debt, and on speculation for export)
- Percent of energy exported
- Affordability to customers

Vegetation Management

- Damage from pesticides
- Economic opportunities (e.g. hand cutting)
- Bury the transmission lines
- Weed control issues
- Rights of adjacent property owners
- Handling of trees on adjacent property
- Loss of forest cover
- Anxiety (re: types of vegetation management)

Safety and Health

- Electromagnetic Field (EMF) - public perception vs. reality
- Climbing of towers
- Tower stability
- Noise and accompanying anxiety issues
- TV and radio interference
- Livestock safety (grounding problems, stray voltage, rubbing against treated poles, fence grounding, induced current, maintenance operations)
- Too easy to access
- Proximity to recreation areas
- Construction operations
- Public education

Aesthetics

- Aesthetics

Social

- Public attitude indices (public perception of transmission)
- Right to share in benefits when sharing costs
- Employment (types, job satisfaction, employee turnover, job security, income distribution, diversity and opportunity)
- Participation and involvement in decision-making
- Investment in staff development
- Compliance with regulations
- Accountability and transparency
- Is there proper management of the transmission system (governance, reliable system internally, public trust)
- Community involvement (corporate citizenship – extent to which practiced)

Water

- Pole treatment chemicals
- Stream crossing (construction processes)
- Distance between structure and streams
- Erosion (fish habitat)
- Use of pesticides and impact on fish
- Disposal of hazardous waste (products and containers)

Source: Searcy, 2002

Conduct Consultations on Preliminary List of Key Issues

The initial list of brainstormed issues was consolidated into a list of 17 keys issues organized according to the environment-economy-society framework. The consolidated list of issues is provided in Table E-2. It should be noted that the key issues were organized into

the environment, economy, and society categories primarily for communication and presentation purposes. Some of the key issues could appear in multiple categories.

TABLE E-2
CONSOLIDATED LIST OF PRELIMINARY KEY ISSUES FOR THE TRANSMISSION SYSTEM

Environment	Economy	Society
• Changes to Habitat • Increased Access • Vegetation Management Practices • Loss of Forest Cover • Potential Contamination • Public Involvement	• Risk to Livestock • Cost Issues • Benefits to Customers and Stakeholders • Governance and Management Issues	• Private Property and Land Uses • Aesthetics • Electromagnetic Field (EMF) • Public Safety • Education • Equity • Community Relations

Source: Searcy, 2002

The consolidated list of key issues in Table E-2 formed the basis for individual and small group consultations organized around two key questions: (1) did you identify any significant gaps in the key issues for the transmission system? and (2) what are some of the key themes you feel cut across the three dimensions? The key comments received from the participants in the individual and small group consultations are available in Table E-3.

TABLE E-3
KEY COMMENTS RECEIVED DURING THE INDIVIDUAL KEY ISSUES CONSULTATIONS

1. Did you identify any significant gaps in the key issues for the transmission system?

- It was emphasized throughout the consultations that focus will need to be devoted to a few key issues. In other words, of the 15-20 key issues identified, a few will need to rise to the top. This is a reflection of the fact that the case utility cannot address numerous keys issues at one time. The end result must be manageable. Although indicators for 5 or 6 key issues may intuitively seem like a small step, such an outcome will actually be significant for the company.
- Throughout the consideration of all of the key issues, the significance of geographic concerns should be remembered. Concerns in the Northern half of the Province are often very different from those in the South. For example, while Northerners may be very concerned with the impact of controlled waterways, more concern may be raised in the South regarding agricultural impacts. Similarly, urban and rural viewpoints may, in general, differ substantially. A challenge will be to balance those points of view. For example, separate calculations of template indicators may be needed to address the geographic realities.
- One issue to consider, either as its own category or as a part of every other category, is the issue of politics. In the electric utility industry, government intervention through regulations can trump any other consideration. Political drivers are particularly relevant at the case utility since it is a Crown corporation.
- Building on the politics issue, it is also important to consider the effect of legislation and regulations. Examples offered include ensuring compliance with regulations, measuring costs associated with increased regulation over time, recognizing the influence of the Public Utilities Board (PUB), and remaining current with government commitments in international treaties (such as the Kyoto Protocol).
- Consider rewording the key issue "Cost Issues" as "Profitability". Such a change will help highlight one of the most important considerations associated with any decision.
- Many participants felt that "Risk to Livestock" is too specific to be listed in the key issues. Relative to the other issues on the list, most felt that it was a minor issue that is covered in other categories. For example, the key issue "Vegetation Management Practices" could incorporate issues associated with the risk chemicals present to livestock.
- Several participants also noted that "Potential Contamination" was not a particularly relevant key issue to this project. Most contamination issues are associated with transmission stations

TABLE E-3
KEY COMMENTS RECEIVED DURING THE INDIVIDUAL KEY ISSUES CONSULTATIONS

or the distribution system. Given that the focus of this research is on the major high voltage transmission system, these issues are beyond the scope of the project. It was also noted that the case utility already has extensive programs in place to prevent and mitigate any potential contamination. Any other contamination issues associated with the actual transmission lines may be incorporated into other categories, such as "Vegetation Management Practices."

- Some participants noted that the categories "Changes to Habitat" and "Loss of Forest Cover" could be combined into a category entitled "Alteration of the Landscape."
- The term "Employee" should be added to the key issue "Education and Training."
- Some participants felt that concerns related to the key issue "Aesthetics" could be included in other categories such as "Public Involvement" and "Community Relations". Others felt that it should remain as its own category since it can be a very high profile issue when dealing with the public. In any case, it will be important to consider the impact of aesthetics on the tourism industry. For example, a transmission line may spoil views in areas frequented by tourists.
- It is important to consider the issue of alternate land uses. For instance, rather than being used as a transmission line corridor, the land might be useful as a forest, a farm, or a park - among a multitude of other uses. These factors should be considered under the "Private Property and Land Uses" key issue category.
- It is also critical to consider issues associated with the use of Crown Lands. With the growing international movement for protection of Crown Lands, the extensive regulations associated with their use, and the requirement that government consult with aboriginals on land use; it is essential that use of Crown Lands be given a more prominent role in the list of key issues. Several participants suggested that this be combined with the "Private Property and Land Uses" category.
- Some key issues to consider associated with business issues include competitive advantage, market share, green purchasing, avoidance of liabilities, and corporate image. It must also be acknowledged that profit is an extremely important issue.
- Construction practices should be considered as an underlying theme.
- One participant noted that although there is a "Benefits to Customers and Stakeholders" category, there is no explicit "Benefits to the Utility" category. Although numerous benefits to the case utility are implicit in the other categories, it may help to have it listed as its own issue. This would recognize a fundamental aspect of the company's business and tie into the company mandate of providing a reliable supply of electricity at a reasonable cost to consumers while being profitable.
- Although it was acknowledged such an issue may be considered under "Benefits to Customers and Stakeholders", one participant noted that it may be useful to separately consider issues associated with support for secondary industries, such as the industrial sector. The case utility's contribution to the Provincial economy is significant and this should be reflected somewhere.
- In the "Benefits to Customers and Stakeholders" category, it would also be useful to consider asking the question "what's in it for us?" For example, stakeholders are generally more accepting of transmission lines when they provide a direct service to the community. However, where a transmission line does not have direct benefits for affected communities (for example in a line going from the North to service the South), there are often difficulties in obtaining project buy-in.
- In the "Equity" category one important consideration is the perceived fairness of transmission line placement. One participant noted that many communities become very concerned when additional rights-of-way are created in their regions. These communities regularly note that they already have a transmission line and that other communities should help to "bear the burden". These feelings are in conflict with the corporation's preference of building new transmission lines in areas that already have an existing line. The rationale under such an approach is that less pristine wilderness is disrupted and less fragmentation of the landscape is created. These points, however, must be balanced against the community concerns noted above.
- Several participants felt that aboriginal issues should be made more explicit. Although it was acknowledged aboriginal issues could be included under a number of the existing headings, such as "Equity", "Public Involvement", "Benefits to Stakeholders", and "Community Relations", it is a critical issue for the case utility. For instance, traditional uses of land, traditional livelihoods, treaty rights, compensation policies, employment issues, and a desire for

TABLE E-3
KEY COMMENTS RECEIVED DURING THE INDIVIDUAL KEY ISSUES CONSULTATIONS

participation could all be related to a category explicitly focusing on aboriginal issues. There is also the consideration that aboriginals may be more than just stakeholders. As the original inhabitants of the land, they may be accorded special status and recognition.

- Participants noted that some issues to consider under the category "Increased Access" include concerns over trapping and impacts on wildlife migration patterns.
- Another significant issue that must be considered is system reliability. Although this may be considered a sub-component of several existing categories, it is an essential issue that may warrant its own category. The participants noted that if the system reliability becomes an issue, all other key issues really pale by comparison.
- Some other key considerations include knowledge transfer, workforce skills, employee attraction and retention, and value added by the workforce. Prevention of injuries/employee wellness, customer relations, customer satisfaction, mitigation of problems, and employment opportunities are other significant issues. These issues may best be addressed in the society category, but there is overlap in other dimensions and they may appear in another category too.

2. What are some of the key themes you feel cut across the three dimensions?

- A matrix can be a very useful method of presenting a visual representation of the linkages between the various key issues – particularly to help identify high priority areas. However, there are a couple of cautions to consider. First, it must be clear that the ratings in the matrix are only a snapshot in time. Many of the interrelationships are dynamic and may change over time depending on the circumstances. Second, it is important to consider how such information would be useful in decision-making. Third, it is important to remember that there are both positives and negatives associated with many of the key issues. This could impact how the relationships are ranked. Although the matrix is excellent for presenting information in a concise, visual way, further work will be needed to fully integrate the relationships into the decision-making process.
- Since the issues are often dynamic, it was suggested that a base matrix be developed to present an overall picture of the transmission system and that it be supplemented by matrices tailored to individual projects. It is expected that there would be a variance in the relationships depending on the project, but several key issues would likely be critical across the spectrum. Project specific matrices could also be very useful for internal scoping as well as external communication.
- Consider presenting the linkages with a little more context. For example, presenting a figure showing the relationship between the three dimensions of sustainable development could help provide the big picture while a key issues linkages matrix could be used to provide further detail.
- One useful analogy to consider is viewing sustainable development for the transmission system as a transmission tower. The three dimensions of sustainable development, namely the environment, the economy, and society, would be the pillars of the tower while the interlinkages between and within the three dimensions would be the cross bracings that help keep the tower together.
- Perception is an important point that must be considered in every category. Since it will influence how people behave, it is just as important as reality.
- Building on the importance of perception, corporate image cuts across all three dimensions and must be considered in every key issue. One of the case utility's key goals is to be recognized as a leader in environmental management. How the corporation is perceived as doing its work must be an underlying consideration at all times. For example, although something may be legally justified, the attitude and approach employed by the company are still important. An inconsiderate approach could have significant ramifications.

The comments received in the small group and individual consultations were used to update the key issues list in Table E-2. As noted previously, in the Environment dimension, the key issue "Potential Contamination" was deleted while the other categories remained unchanged. In the Economic dimension, "Cost Issues" was renamed "Profitability", "System Reliability" was added, and "Risk to Livestock" was deleted. Finally, in the Society

dimension, "Aboriginal Recognition" was added, "Private Property and Land Uses" was renamed "Private and Crown Land Usage", and the term "Employee" was added to the key issue "Education and Training".

In the facilitated, large group consultation that followed the updates, a roundtable discussion yielded the points listed in Table E-4.

TABLE E-4
KEY COMMENTS RECEIVED DURING THE GROUP DISCUSSION OF KEY ISSUES

- The participants agreed that "Community Relations" generally does not include public education and training. For this reason, it was suggested the term "Employee" be removed from the "Employee Education and Training" category. This change would better reflect the need to address public education in this area.
- The participants agreed "Potential Contamination" should be re-added to the list of key issues. Although it was acknowledged many contamination issues are associated with stations and the distribution network, it is important to remember the potential for contamination on the major high-voltage transmission system as well. For example, concerns were raised regarding wood pole treatment and the leaking of apparatus. Specific concerns were also raised regarding the impacts of these issues on ground water, surface water, soil, and air contamination.
- One participant noted that the "Governance and Management" category was primarily focused on corporate governance. This or other categories, such as "Community Relations", should capture issues associated with the involvement of the various levels of government. The case utility's involvement with all levels of government is significant and must be accounted for.
- The participants noted that to put the issues in context, it will be important to link them to existing planning processes. It was noted the company has many existing plans at the corporate, business unit, division, and department levels. Although this project ties most strongly into the business unit level, consideration should be given to planning processes at other levels as well.
- The participants noted that although some definitions are implicit, the final set of key issues will need to be carefully defined so that it is clear what is included/not included in each category.
- It was noted that explicitly depicting the process for addressing regulatory compliance issues may be helpful.
- Many participants felt that the term "Aboriginal Recognition" did not adequately capture the issues of aboriginal involvement. It was noted that this term did not give the full weight necessary to aboriginal issues and that the issue was more sensitive than mere recognition. Discussions briefly focused on making aboriginal issues a fourth dimension of the conceptual framework (in addition to environmental, economic, and social issues) to reflect the special attention required, before it was agreed that these issues should be woven into the existing framework. The term "Aboriginal Involvement" was ultimately agreed to as the title for this category.
- One participant noted that "Public Involvement" may be most appropriately considered as a means of how each key issue is addressed rather than an issue in itself. Under such thinking, public involvement could be considered an input into the other categories.
- Finally, it was noted that the issues and indicators ultimately selected must add value to existing initiatives at the case utility. The purpose of this project is not to duplicate existing initiatives, but rather to build on those and address fundamental gaps. It was also noted that this process of issue and indicator development should lead to improved understanding and utilization of those existing initiatives.

The comments in Table E-4 were then used to make another set of updates to the indicators. All participants agreed to the updated, although similar, set of key issues listed in Table E-5. The updated list of key issues formed the basis for the next sub-step in the process, prioritization of the key issues.

TABLE E-5
UPDATED LIST OF KEY ISSUES FOR THE TRANSMISSION SYSTEM

Environment	Economy	Society
[EN1] Vegetation Management Practices	[EC1] Profitability	[SO1] Employee and Public Safety
[EN2] Public Involvement	[EC2] Benefits to Customers and Stakeholders	[SO2] Equity
[EN3] Changes to Habitat	[EC3] System Reliability	[SO3] EMF
[EN4] Loss of Forest Cover	[EC4] Governance and Management Issues	[SO4] Community Relations
[EN5] Increased Access		[SO5] Private and Crown Land Usage
[EN6] Potential Contamination		[SO6] Education and Training
		[SO8] Aesthetics
		[SO9] Aboriginal Involvement

Prioritize the Key Issues

The results of the prioritization exercise were summarized in Section 4. In addition to the rankings, there was limited discussion that occurred during the prioritization exercise. A complete summary of the comments received during the prioritization of the key issues is provided in Table E-6.

TABLE E-6
KEY COMMENTS RECEIVED DURING THE PRIORITIZATION OF KEY ISSUES

- It was noted that chemicals are very high on the public interest scale. As a part of this discussion, it was also noted that conditions within the license for vegetation management practices govern the use of chemicals.
- It was discussed that the criteria "intergenerational impacts" may be most appropriately applied at the indicator level. However, it was agreed that it would be considered as a part of the prioritization process.
- There was some debate regarding the specific rankings ultimately agreed to. Particular areas of debate included: the interpretation of public interest (one participant felt that the group was occasionally considering all corporate issues rather than just transmission), the intergenerational ranking in "EMF", the interdependency ranking in "Education and Training", the liability ranking in "Private and Crown Land Usage", regulatory compliance in "Community Relations", and liability in "Potential Contamination". During the discussion of "Loss of Forest Cover" it was also noted that this issue had relevance to the larger issue of climate change. This lead to some debate regarding the ranking of this issue with respect to external policy influences.
- At the end of the prioritization process, it was noted that the element of risk may need further consideration. In some cases, there may be other systems in place to address some of the issues.

After reviewing the rankings illustrated in Section 4, the experts determined that the most critical issues for the transmission system at this time appeared to be:

- Aboriginal Involvement.
- System Reliability.

- Potential Contamination.
- Community Relations.
- Private and Crown Land Usage.
- Governance and Management Issues.
- Loss of Forest Cover.
- Benefits to Customers and Stakeholders.
- Profitability.
- Employee and Public Safety.
- Changes to Habitat.

It was agreed, however, that these categories required further review. This served as a useful reminder that even though the participants previously believed the identification of priorities was at an end, the selection process is iterative. Specifically, it was noted that:

- "Profitability" could be considered a "Governance and Management" issue.
- "Employee and Public Safety" already had numerous measures at the case utility.
- "Changes to Habitat" is similar to "Loss of Forest Cover".
- "Potential Contamination" was ranked surprisingly high.
- "Vegetation Management Practices" was ranked surprisingly low.
- "Public Involvement" could be considered an input into these categories.

Finalize the Key Issues

A summary of the comments received in the small group consultation on the selected key issues is available in Table E-7.

TABLE E-7
KEY COMMENTS RECEIVED DURING THE SELECTING OF KEY ISSUES

- A definitive proposal for the selected key issues is needed for the next group meeting.
- "Aboriginal Involvement" should be considered a part of the "Public Involvement" category. This category could include all interested publics such as aboriginals, landowners, and NGOs.
- A "Staff Relations" category is needed in the "Stakeholder Relationships" theme. Staff is a critical stakeholder that wasn't adequately accounted for in the updated list of key issues. This category could include education and training.
- "Alterations to the Landscape" could include the key issues "Changes to Habitat", "Loss of Forest Cover", and "Increased Access."
- Even though it was ranked relatively lowly in the prioritization exercise, "Vegetation Management Practices" could be added to the considered list. This is an important issue for sustainable development at the case utility and its low rank was a surprise.
- "Governance and Management Issues" could include "System Reliability" and "Profitability." System reliability is already extensively measured, while profitability is more of a corporate level measure. "Equity" could be considered in this category too.
- Although it was very highly ranked in the prioritization exercise, "Potential Contamination" does not need to be considered in this project. Considering the issue here would not add much value since it is already addressed through regulations and extensive internal practices.

The comments in Table E-7 were used to develop the key issues themes illustrated in Section 4. The selected key issues were confirmed in a discussion in the large group meeting preceding the development of brainstormed indicators.

Illustrate Linkages between the Key Issues

Although the network diagrams depicted in Section 4 were ultimately used to illustrate the linkages between the key issues, other strategies were initially employed.

In one approach, the issues were ranked by the internal and external experts in terms of their relationship to each other. To accomplish this task, a three-point scale was created to determine whether that relation was weak, moderate, or strong. The results of the ranking process are illustrated in Figure E-1.

		1			2			3	
	Key Issues	Public Involvement	Staff Relations	Community Relations	Private and Crown Land Use	Alterations to the Landscape	Vegetation Management	Governance and Management	Benefits to Stakeholders
1	Public Involvement	X	●	●	●	●	●	●	●
	Staff Relations		X	●	●	◍	◍	●	●
	Community Relations			X	●	●	●	●	●
2	Private and Crown Land Use				X	●	●	●	●
	Alterations to the Landscape					X	◍	●	●
	Vegetation Management Practices						X	●	●
3	Governance and Management Issues							X	●
	Benefits to Customers and Stakeholders								X

Relationship: ○ **Weak** ◍ **Moderate** ● **Strong**

FIGURE E-1
KEY ISSUES LINKAGE MATRIX

Although a matrix intuitively seems a useful method of visually presenting the relationships between the key issues, there are some cautions to keep in mind when employing the matrix. The primary caution is that the ratings in the matrix are only a snapshot in time. The interrelationships are dynamic and may change over time. Secondly, there was some debate over the rankings in the matrix. In particular, there was some debate on the categories ranked "moderate" as well as the relationship between "Vegetation Management Practices" and "Benefits to Customers and Stakeholders". In each case, the ranking was determined using a simple majority of votes by the participants. Thirdly, while the linkages matrix does illustrate significant relationships between the selected key issues, it does not help very much in terms of differentiation. Finally, it is important to note that the matrix does not show what issues may not be accounted for.

Recognizing that the matrix did not provide a particularly insightful illustration of the interconnections between the key issues, a relationship diagram was created as another alternative. Under this approach, the participants considered each issue relative to the others in terms of those that exert the driving influence. The relationship was indicated by an arrow

flowing from the dominant issue to those that it influences. The results of this exercise are depicted in Figure E-2.

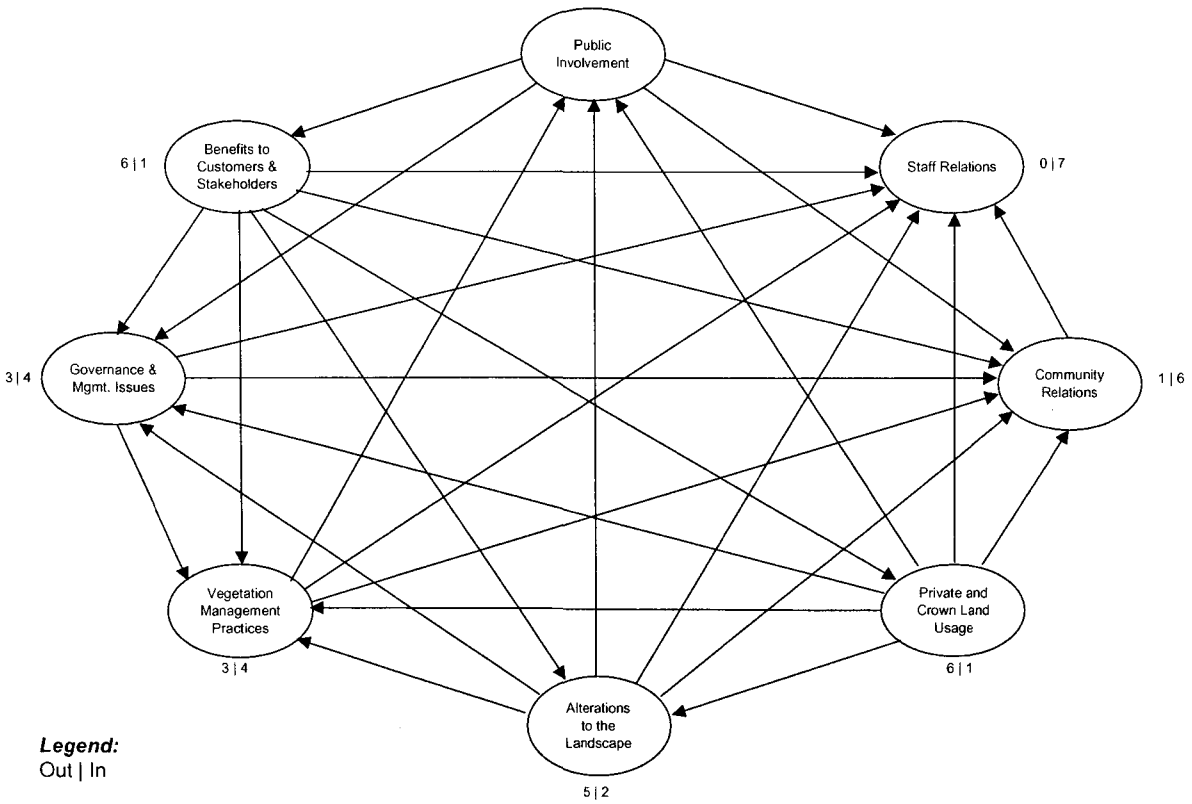

FIGURE E-2
KEY ISSUE DRIVING RELATIONSHIP DIAGRAM

It is important to note the relationship diagram was not meant as a ranking of the issues. For example, although "Staff Relations" may not be a driver of the other issues, it does provide the support necessary for the others. It was noted the purpose of the diagram is to help illustrate that nothing is done in isolation and to underline the issues that strongly influence the others.

A complete summary of the comments received during the initial consultations on linkages between the key issues is provided in Table E-8.

TABLE E-8
SUMMARY OF DISCUSSIONS ON LINKAGES BETWEEN THE KEY ISSUES

1. General comments on illustrating the linkages

- It is important to understand how the issues relate to each other as well as how they relate to the three pillars of sustainable development.
- It is important not to oversimplify the representation of the linkages. At the same time, it was noted that it is important to fill gaps in stages.
- It was noted that the relationships between the key issues may be useful in weighting possible indicators.

2. Comments on the key issues linkages matrix

- The matrix did show lots of cross-bracing between the key issues.

TABLE E-8
SUMMARY OF DISCUSSIONS ON LINKAGES BETWEEN THE KEY ISSUES

- However, the matrix did not help very much in terms of differentiating between the issues.
- The matrix did show that all of the key issues were strongly related, but it did not provide insight into what issues may be missing.
- The matrix may be useful in identifying areas where cross-cutting indicators that address multiple issues would be useful.
- There was some debate on the categories ranked "moderate" as well as the relationship between "Vegetation Management Practices" and "Benefits to Customers and Stakeholders". In each case, the majority opinion was used to rank the relationship.

3. Comments on the relationship diagram

- The purpose of the diagram is to provide a quick illustration of the dominant relationships.
- It must be emphasized that it is not a ranking of importance.
- The fact that an issue is not a driver does not mean it is not important. "Staff Relations" was discussed as an example. It was noted that although it is not a driver, it provides the underpinning support necessary for the others. Without a proper staff relations program, the ability to address other issues might collapse.
- The diagram can help focus on key spots first.
- There was some debate regarding the relationships on some items, particularly on the issue "Public Involvement". In each case, the majority opinion was used.
- It is possible to develop a logic chain on the relationship between drivers.

Recognizing the need to experiment with another method of representing the linkages, a draft set of network diagrams was created for each of the three overriding themes. One network diagram was created for Stakeholder Relationships, another for Land Use Practices, and a third for Governance. The draft network diagrams are presented on the following three pages.

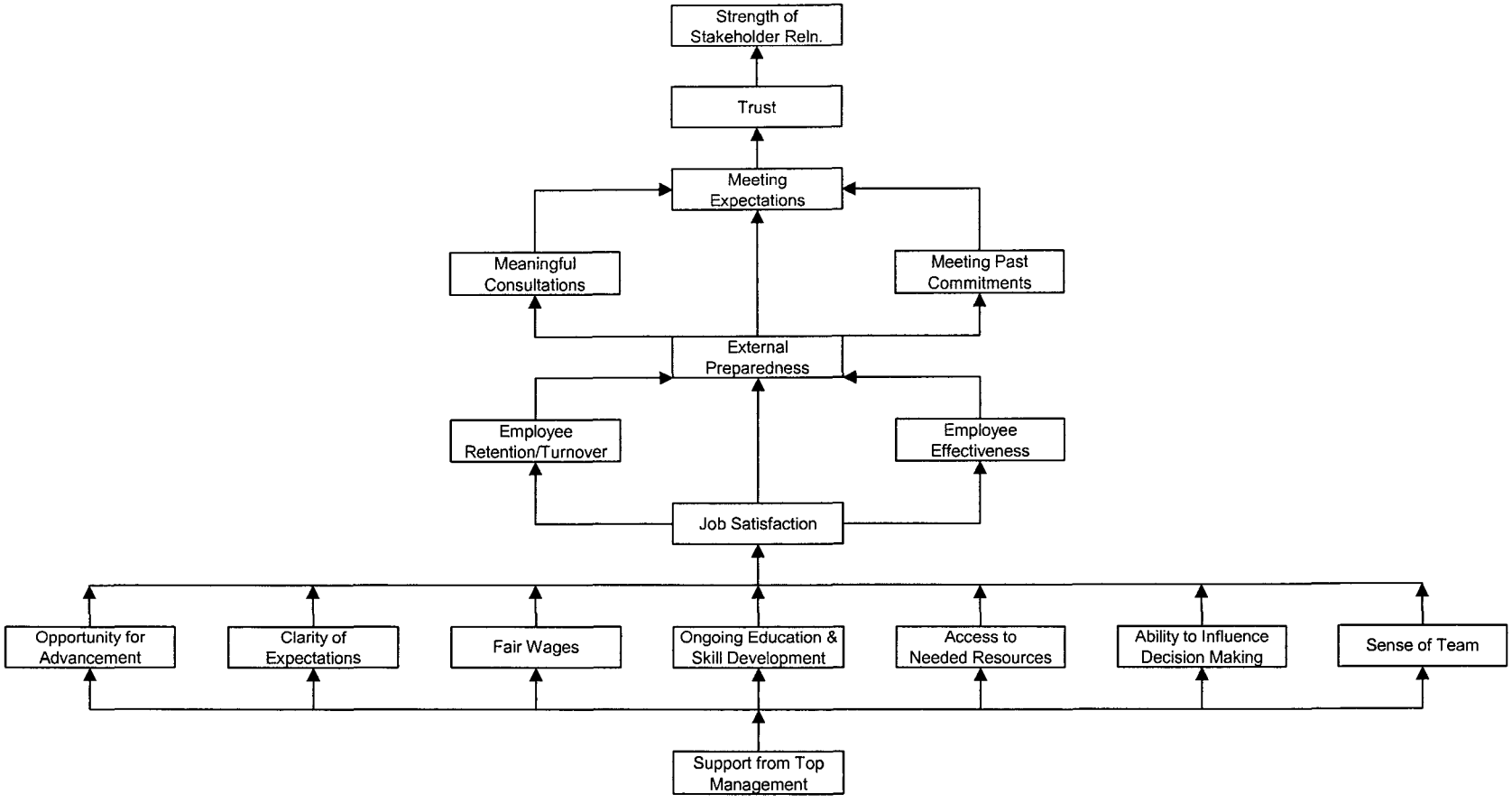

FIGURE E-3
DRAFT NETWORK DIAGRAM FOR STAKEHOLDER RELATIONSHIPS

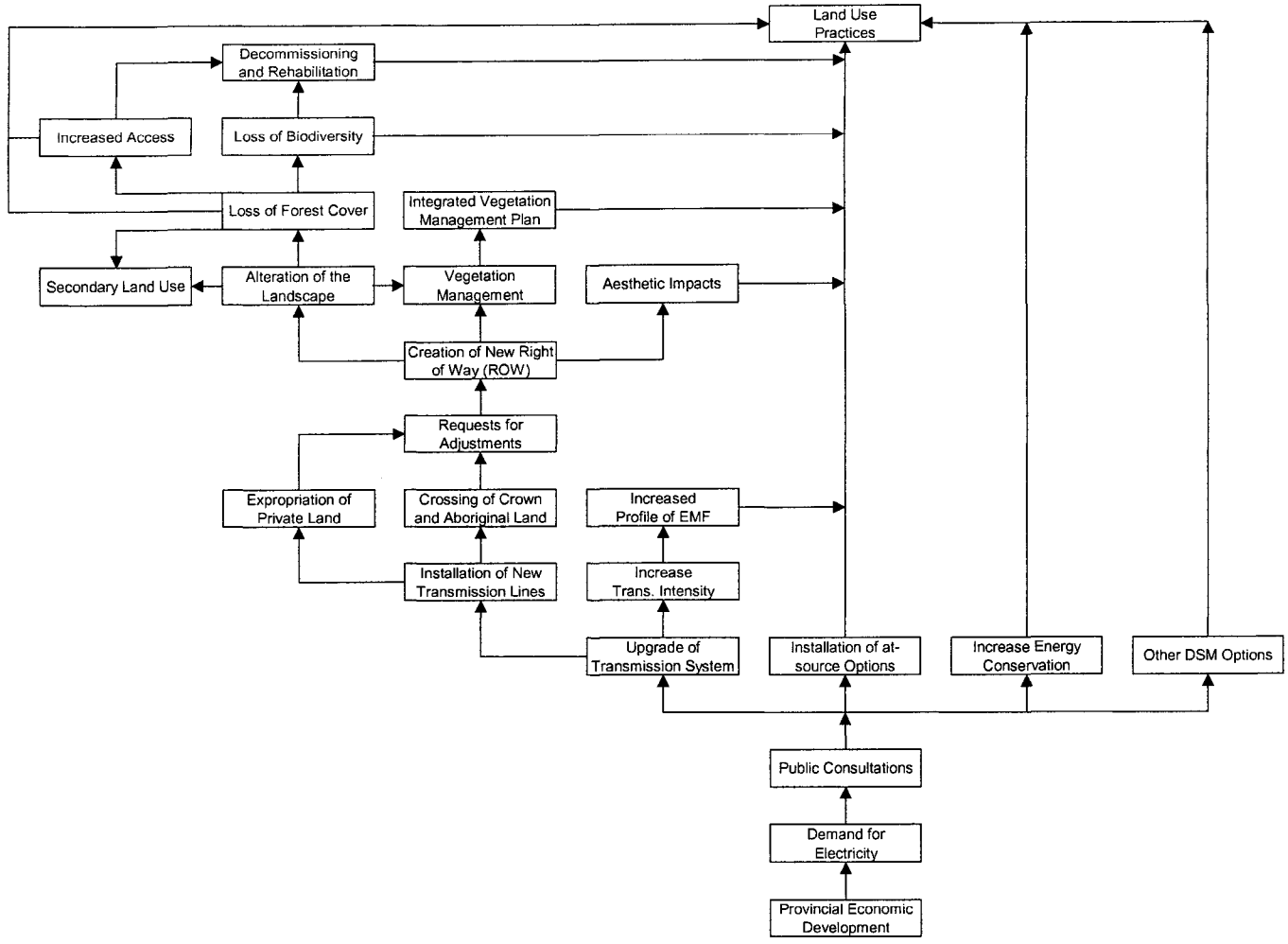

FIGURE E-4
DRAFT NETWORK DIAGRAM FOR LAND USE PRACTICES

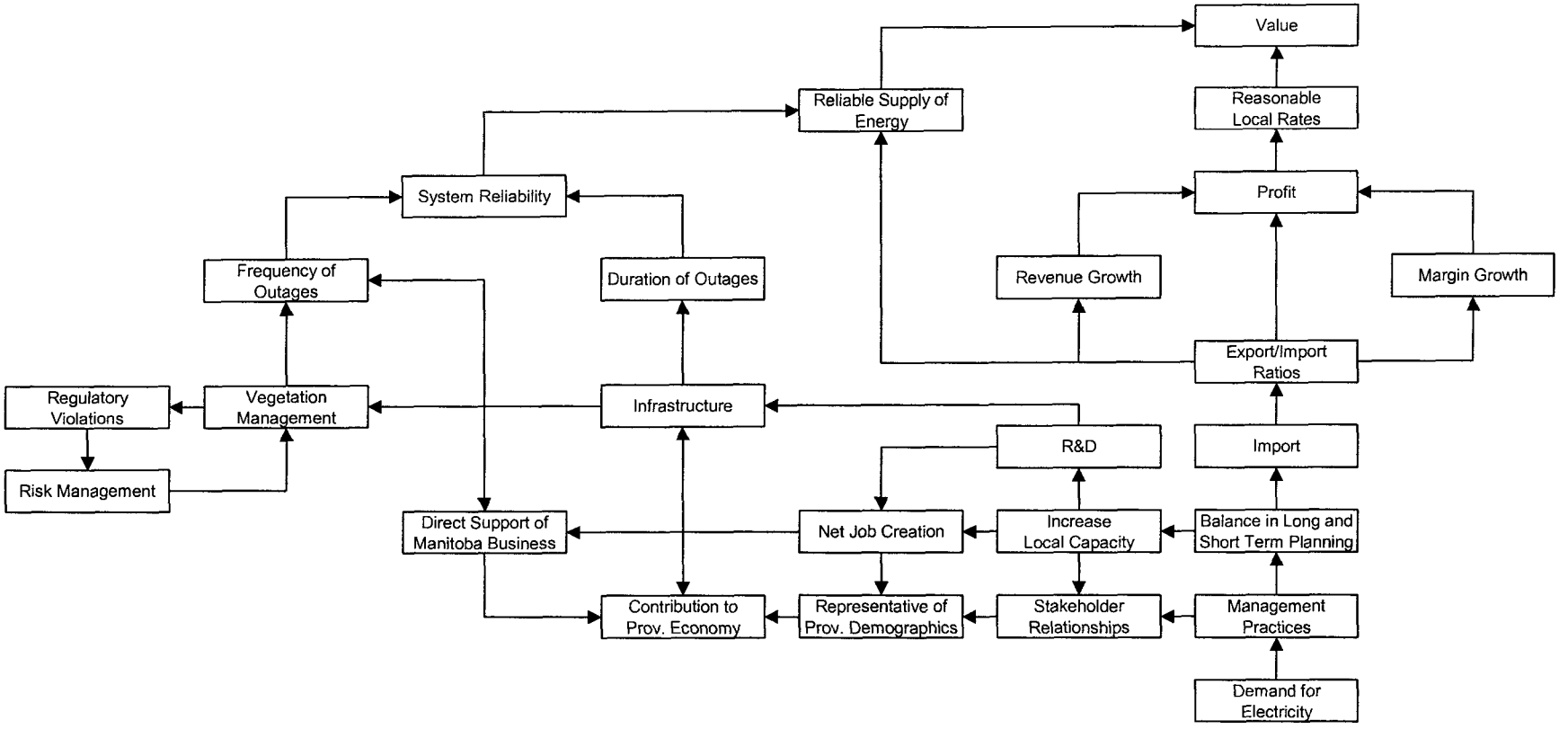

FIGURE E-5
DRAFT NETWORK DIAGRAM FOR GOVERNANCE

In subsequent individual and small group consultations, over twenty internal and external experts provided comments on the network diagrams. The discussions provided a wide variety of input. Some key findings, in no particular order, included:

- The diagrams should use neutral language. For example, "Loss of forest cover" should be labeled "Change in forest cover."
- Some issues could be added to the diagrams. For example, impact on Aboriginal treaty rights is not currently represented in the diagrams.
- The "Stakeholder Relationships" diagram is primarily focused on staff issues.
- The "Governance" diagram is confusing. It should also include regulatory issues, energy conservation, and infrastructure development.
- The network diagrams may imply linear relationships between the key issues. Listing the key issues in a circle may remedy this concern.

The complete set of comments is presented in Table E-9.

TABLE E-9
KEY COMMENTS ON DRAFT NETWORK DIAGRAMS

- One participant noted that it is important to use neutral language in the diagrams. For example, rather than labeling an issue as "Loss of forest cover" it should be labeled as "Change in forest cover."
- For the "Land Use Practices" diagram, it was suggested that boxes for "Export Opportunities" and "Capacity Development" be added. "Export Opportunities" could be presented parallel with "Demand for Electricity" and also feed back into "Provincial Economic Development" while "Capacity Development" would be an intermediate box between those two boxes and "Public Consultations." It was also noted that impact on Aboriginal treaty rights might be a better representation than "Crossing of Crown and Aboriginal Lands." It was noted that Aboriginal lands are considered Crown lands, except that they are under federal rather than provincial jurisdiction.
- For the "Stakeholder Relationships" diagram, it was noted by one participant that the focus appears to be on staff rather than external stakeholder relationships. A sense of balance should be considered in the presentation of the diagram.
- Another participant noted that although the "Stakeholder Relationships" diagram appears to be focused on staff, this is the area where the utility has the most influence. However, it is important to keep in mind that staff relations are not the only factor that influences stakeholder relationships. Although this is represented in the diagram, a more balanced presentation might be considered.
- One participant noted that the "Stakeholder Relationships" diagram should include community relations.
- In the "Stakeholder Relationships" diagram, one participant suggested that attracting employees and succession planning may be issues to consider adding.
- For the "Governance" diagram, one participant felt it was confusing. The participant felt that a more appropriate flow would include proposals, planning, development of infrastructure, regulatory work, construction, and other issues that are currently unclear from the diagram.
- In the "Governance" diagram, one participant emphasized that there are maintenance issues other than vegetation management to consider. Including a relationship between the "Infrastructure" box and the "Frequency of outages" could represent this issue.
- One participant felt that the network diagrams were too complex and implied linear relationships between the issues when that is not always the case. It was also noted that all of the boxes and arrows have the same weight, when this may not be the case. To remedy this, it was suggested that all of the issues in each diagram be listed within a circle. No lines would be necessary between each element since it would be implied that all are related if they are in the same circle. An alternate suggestion was to create three or four clusters of issues linked together with overall themes.

The comments received provided the basis for updating the network diagrams. The updated network diagrams were previously presented in Section 4. To address the fifth bullet point on the previous page, an alternate method of representing the relationship between the key issues was developed. This alternative emphasizes the circularity of and non-linear approach of the concept of sustainable development. The alternate method is illustrated in Figure E-6.

In the discussions of the updated network diagrams, the participants agreed that the network diagrams were a powerful method of highlighting the linkages between the issues. It was emphasized that the purpose of the network diagrams was to break down the linearities between the issues and to help communicate the linkages between the key issues within the company. It was also noted, that although the diagrams themselves are a linear representation of the issues, they are a part of an overall management system that takes a holistic approach to sustainable development.

However, the participants did not find the alternative diagram focusing on the circularity of the issues useful. It was agreed that the alternative diagram did not add much value to the project. However, it was acknowledged that this method of presentation might be more appropriate for presenting the linkages to people external to the company.

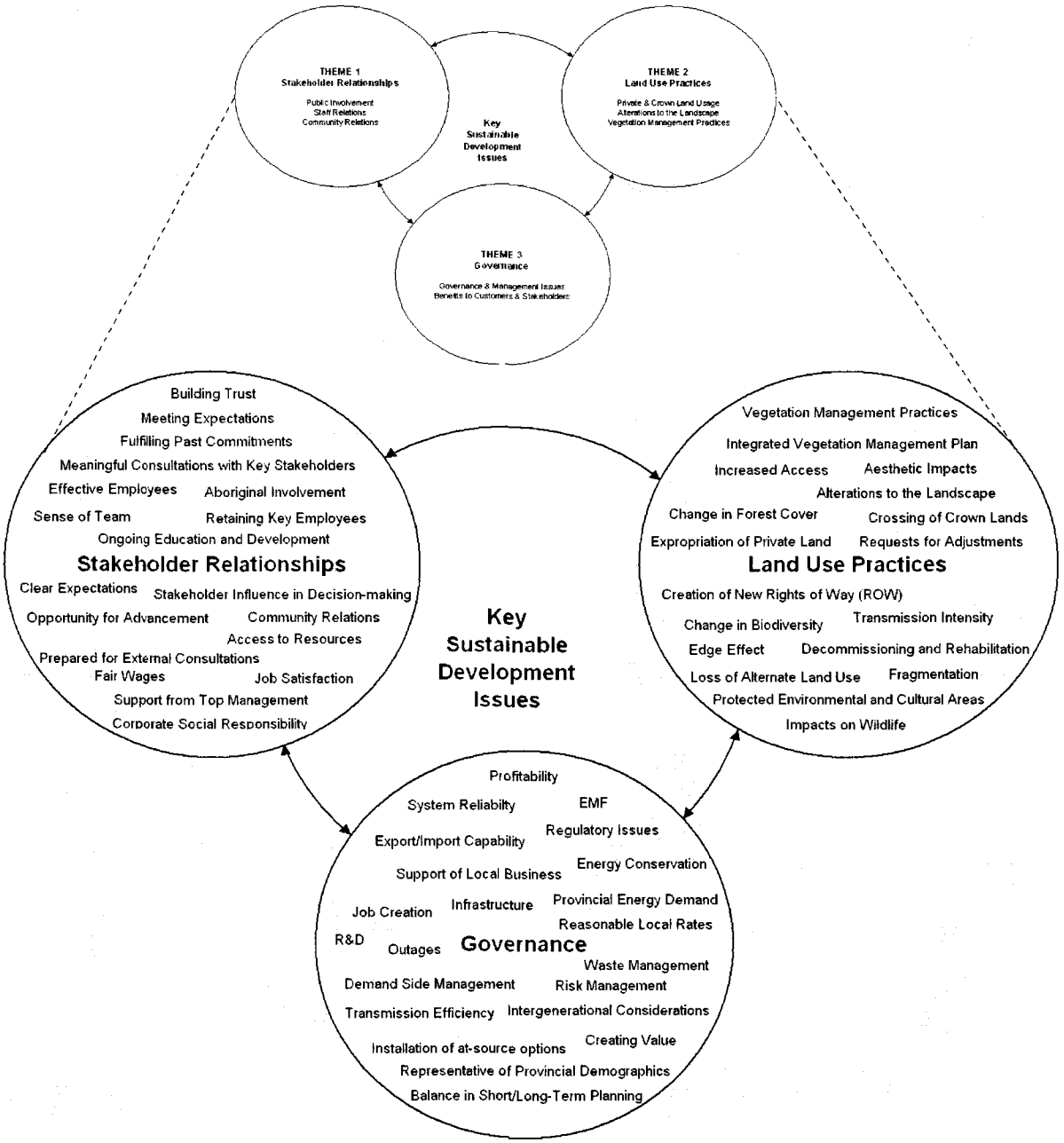

FIGURE E-6
ALTERNATE REPRESENTATION OF THE KEY ISSUES LINKAGES

Developing Indicator Selection Criteria

The initial set of indicator selection criteria is described further in Searcy (2002). A summary of the comments obtained on the selection criteria in the Ph.D. phase of the research is provided in Table E-10.

TABLE E-10
SUMMARY OF COMMENTS ON THE PROCESS FOR SELECTING THE INDICATORS

- The company should have the ability to measure the indicator. It should be noted this does not limit selection to indicators for which data is currently available.
- There should be a feeling the indicator will be used as a part of a decision-making process. The indicator should therefore be action-oriented and focused on improvement.
- The indicator must be credible.
- The indicator must be relevant. In particular, the indicator must be relevant to the transmission system and the T&D business unit.
- The indicator must be acceptable to senior management, to those who will use them, and to those who will collect the data. Only then will the indicators yield the information necessary for them to continue to cycle.
- Comparability should be a consideration. Indicators used by other utilities would provide a point of comparison and an opportunity for benchmarking.
- It is important to consider whether the indicators are meant to drive or support policy. The participants felt that an indicator could provide both functions, but not at the same time.
- The indicator should be objective.
- It is important to consider the need to develop indicators internally before they are imposed by external entities.
- The perspective of interested publics should be considered when selecting indicators.
- Any set of indicators should address all three pillars of sustainable development.

Developing a Draft System of Indicators

The supplementary material for developing a draft system of indicators is divided into five sections:

- Preliminary individual and small group consultations to clarify the process.
- Brainstorming of draft indicators for each key issue.
- Preparation of an organized set of indicators for each selected key issue.
- Preparation of a preliminary system of draft indicators.
- Finalizing the draft system of indicators.

Preliminary Consultations to Clarify the Process

In addition to providing a project orientation, the preliminary individual and small group consultations focused on addressing three key questions. The comments received from participants in the discussions of these questions are available in Table E-11.

TABLE E-11
KEY COMMENTS RECEIVED IN THE PRELIMINARY INDICATOR CONSULTATIONS

1. How should the indicator development meetings be structured?

- Several participants recommended that the meetings not be divided by environmental, economic, and social lines. They felt that participants will likely want to discuss issues across the full spectrum and that dividing the meetings according to the three categories might stifle discussion and innovation. Such an occurrence risks reducing the value of the meeting.
- It is recommended that the consultations be kept fairly simple. A few well-designed open-ended questions should be sufficient to get to the desired end result. Although background

information and context is important, the amount of material provided in advance should not limit the thought process of the participants.

- The previous comment notwithstanding, one potentially useful piece of information to provide is the "Risk = Hazard + Outrage" equation. This will help to underscore the fact that perception is just as important as real hazards. It will be important to bridge the information gap between the key issues and the indicators. The above equation supplemented by a few indicator analysis tools would be very helpful in bridging the gap.
- Although it was not been selected as the conceptual framework to organize the indicators, the participants felt the pressure-state-response (PSR) framework should prove to be useful as one analytical tool. It is important to look at the indicators in different ways. In particular, the PSR framework will be useful to help provide a starting point for participants to identify indicators they will find most useful. The goals associated with each key issue will help inform the selection of the indicator.
- It may also be helpful to quickly review the existing internal measures. This will emphasize that the effort of this project is not to re-create what has already been done.
- It will be important to keep the meeting on track. Due to the diversity of the issues covered by sustainable development, the participants felt that it will be very easy to get off track in the large group meetings. For example, consider that many of the key issues categories could in and of themselves be topics for a Ph.D. thesis. Past history could also present relevancy challenges since past negative experiences tend to linger. A clear understanding of the scope will be critical. To help mitigate this point, it was recommended that a professional facilitator lead the meetings.
- Be clear that the purpose of the indicator development consultations is to determine what the indicators should be rather than simply confirming what has already been developed.
- Some participants emphasized the need to develop a few good, useful indicators rather than an unmanageable list. As previously noted, what may seem like a small step may in reality be a very big one.
- The indicators will need to have direct linkages to the transmission system. Broader, top-level indicators may be useful from an organization-wide view, but the focus here is on transmission.
- The indicators must be reflective of the case utility's Sustainable Development Guiding Principles. The principles were developed in an intensive process that involved over two years of internal and external consultations. They are a widely agreed upon, critical piece of work that informs operating policy and decisions.
- It will be important not to focus on issues solely from a negative perspective. Remember the good things too.

2. What value do you see in pursuing sustainable development at the case utility?

- All participants agreed that there are many benefits of pursuing sustainable development at the case utility.
- One area where sustainable development will particularly help is to tangibly demonstrate the consideration of key issues across the spectrum. In recent years, public concern has mounted to new development. This has helped create more obstacles to development and the process of getting plans approved continues to become more challenging. A commitment to sustainable development will help the company demonstrate thought, effort, and leadership in areas of concern to key stakeholders.
- Building on the previous point, applying sustainable development principles will provide stronger justification for decisions. For example, consider the uproar associated with the development of new transmission lines. In addition to the general public, many developments now attract the attention of interest groups such as the National Resources Defense Council (NRDC) and the Sierra Club. These interest groups have been at the centre of a growing movement to protect the boreal forest.
- Adopting a perspective that incorporates key sustainable development principles will help guide decision-making as the business continues to change. In particular, such an approach will be helpful in considering the full life cycle implications associated with a decision and, as such, aid in the calculation of more accurate cost/benefit analyses.
- Viewing the transmission system from a sustainable development perspective will help develop a better understanding of the impacts associated with that system. Since a transmission

TABLE E-11
KEY COMMENTS RECEIVED IN THE PRELIMINARY INDICATOR CONSULTATIONS

system is a required piece of most energy systems, be it hydro, wind, fossil-fueled, or nuclear power, it is critical to understand the relationship of the system with sustainable development.

- In addition to justifying decisions, adopting sustainable development principles now will help prepare for the unexpected events of the future. For instance, though it is at the far end of the spectrum, there may one day be a certification system for a sustainable transmission system. Given that there is considerable undeveloped energy potential in the Province, this could be particularly relevant down the line.
- Sustainable development requires the consideration of social issues. This is important because although economic and, recently, environmental issues, receive considerable attention, there is often a hesitancy to include social issues as a significant decision making requirement.
- Applying sustainable development principles and effectively communicating that fact may help address problems associated with perception. In dealing with the public, perception is often just as, or more, important than reality. In other words, the whole systems approach taken by sustainable development may be useful in public education.
- With electric power systems increasingly integrated all across North America, it is critical that utilities taken a whole systems approach to challenges. Sustainable development provides a very useful lens to view issues in such a manner.
- All of these points will help put the company in a better position to "sustain" its operations. One of the objectives of implementing sustainable development principles at the case utility is that it will help balance short-term considerations with long-term ones.
- Finally, its important to note that the participants felt the case utility is already doing a significant amount of work in the environmental and social areas. Actively pursing the company's commitment to sustainability and providing measures of progress towards those goals will help provide the evidence necessary to convince stakeholders that not all impacts caused by the company are negative.

3. How would you use sustainable development indicators?

- The indicators will be useful in decision-making. By applying them to the work process, it should be possible to find better ways of managing the system.
- The indicators could be useful in helping make decisions at all stages of the decision making process. For example, it may be useful to consider indicators beginning in the planning stages and running right through to the construction, maintenance, and decommissioning of the line. Although all of these areas may be beyond the scope of this project, they are useful points to help think about which indicators will be most useful at this point in time. That is not to say that the indicators will be the only tool relied on, but rather, will provide another useful tool in the decision making process.
- The indicators will be useful in communicating with external stakeholders. In particular, they will provide a tangible means to demonstrate leadership with respect to sustainable development. In doing so, the indicators will help bring credibility to decisions which in turn should help the company get a "fair hearing" on development issues. One reason for this is that the indicators should ensure that issues are not looked at in isolation.

Brainstorming of Draft Indicators for Each Selected Key Issue

In the brainstorming meeting, the participants were divided into two small groups. The groups were asked to brainstorm possible indicators for each key issue. Time permitting, they were also asked to consolidate the indicators where possible and to note any omissions in the list of selected key issues. An experienced facilitator facilitated each group.

It should be noted that each group employed a slightly different approach. The process used by Group 1 was: discussion, capturing of the key issues, brainstorming indicators, and organizing the results of the brainstorming exercise. Group 2 employed an approach where the brainstorming of the issues and indicators was simultaneous to a filtering and organization process.

In the following sub-sections, the draft indicators generated during the brainstorming sessions are presented. As noted in the report, the participants recognized that additional indicators and ideas may have been generated given additional time. The brainstormed indicators should therefore be viewed as illustrative rather than comprehensive. However, it was also recognized that not all indicators generated would necessarily be in the final system of indicators. Since there was no screening of the indicators and ideas during the brainstorming, it was recognized that some of the ideas generated may not be practical in the end.

Group 1

Group 1 addressed Public Involvement, Staff Relations, Community Relations, and Governance and Management Issues. In addition to individually brainstorming indicators, Group 1 discussed each key issue and organized the indicators into similar groups. Therefore, in the following sections the key points emerging from the group discussions are listed prior to the presentation of the brainstormed indicators. In the list of brainstormed indicators, the organized groups are separated by a space. The organized groups are left unlabeled since there was insufficient time to agree on potential sub-headings.

Brainstormed Indicators – Public Involvement

The key points raised during the general discussion of the key issue public involvement are listed in Table E-12.

TABLE E-12
KEY POINTS RAISED IN GENERAL DISCUSSION OF PUBLIC INVOLVEMENT

- Specific groups to address
- Different needs
- Process issues – who is the particular public
- Historic issues may come to light
- Past/present/future
- Build trust with groups to be dealt with
- Incorporating public input/feedback
- Aboriginal – corporate requirement
- How are we living up to past commitments – evaluation process
- Availability of information to the public – how is it shared, how is it gathered, and is it credible
- How do we deal with bad information from the public
- Relevant to new and existing systems
- Key element: trust building – how to measure and quantify
- This discussion incorporates "Public Involvement" and "Community Relations"
- Public involvement refers to actions in the field while community relations refers to ongoing office management of relations with the public

The results of the individual brainstorming of indicators for public involvement are available in Table E-13.

TABLE E-13
BRAINSTORMED INDICATORS FOR PUBLIC INVOLVEMENT

- Monitor commitments: are we doing what we say we do; applies to pre-construction, during construction, and post-construction
- Legal requirements
- Participant process: groups involved and numbers
- Group feedback: contact to corporation

TABLE E-13
BRAINSTORMED INDICATORS FOR PUBLIC INVOLVEMENT

- Public meetings: number
- Integration of aboriginal process of decision making with the utility's
- Response rating to credible requests from the public

- Database on public's questions, frequently asked questions
- Public awareness of utility information available
- Education: workshops, open houses, seminars
- Public assistance in monitoring volunteers

- Build trust: acknowledge history and demonstrate commitment
- Measure of "trust"
- Measure of involvement process; i.e. stakeholder analysis/consultation
- Number of questions directed to elected officials (may show lack of trust)
- Build trust with publics on ongoing basis at all levels of corporate action
- Ongoing public consultations: regular meetings

- Identification of opportunities to cooperate with publics (win-win)
- Measure of staff training in social science measures, capacity building
- Adequacy of reporting in public's eye
- Operational commitments
- Aboriginal interests and concerns must receive special consideration
- Measure of relationships with publics (number and quality)
- Identification of interested publics

- Participant groups: list and numbers
- Public feedback on existing transmission system activities
- Public perception surveys: gauge corporate image
- Communicate: id public needs, disseminate info, respond to public concerns
- Media: newsletters, videos, internet

Brainstormed Indicators – Staff Relations

The key points raised during the general discussion of the key issue staff relations are listed in Table E-14.

TABLE E-14
KEY POINTS RAISED IN GENERAL DISCUSSION OF STAFF RELATIONS

- Staff training (understanding and integration – how it is applied)
- Staff retention
- Human resources issues (e.g. safety, accidents)
- Staff development
- Info for new and existing employees (orientation, education)
- Staff expectations – do they understand what is expected, clear on mandate, know how to communicate mandate
- Does management understand what staff needs from them
- Reflection on how staff projects the corporate perspective – is it well defined and communicated
- Key elements: linkage between public involvement and staff relations, conflict resolution as a tool to construct measures

The results of the indicator brainstorming exercise for staff relations are presented in Table E-15.

TABLE E-15
BRAINSTORMED INDICATORS FOR STAFF RELATIONS

- Staff turnover ratios
- Employee retention: quantifiable measure of cost to hire and train
- The case utility's status as an employer of choice: attracts new recruits
- Staff turnover: promotions vs. new hirings
- Job satisfaction by employee classification and department

- Innovation: encouragement to learn and innovate

- Measure of training and education of new employees with respect to: expectations of subordinate's, superior's, corporation's, and the employee
- Staff training: integration of knowledge on the function and operation of the case utility
- Training and education: encouragement to advance training and identification of training needs
- Staff qualifications and upgrades/training completions
- Effectiveness of staff orientation programs

- Measure of morale
- Measure of sense of "team"
- Capture staff feedback (focus groups?)

- Measure of staff and public comprehension of corporate perspective, culture, values, and beliefs
- Staff clearly understanding and presenting corporate views and values to customers and publics
- Corporate image: how well staff have been prepared to represent the corporation in public
- Staff opinion of corporation: interdepartmental

- Indicator on staff's knowledge base: a test?
- Ensuring that staff at all levels have the necessary information, resources, and support to effectively deliver their job functions

- Safety measures

Brainstormed Indicators – Community Relations

In the brainstorming meetings, issues associated with "Community Relations" were considered as a part of the "Public Involvement" category due to time restraints.

Brainstormed Indicators – Governance and Management Issues

The key points raised during the general discussion of the key issue governance and management issues are listed in Table E-16.

TABLE E-16
KEY POINTS RAISED IN GENERAL DISCUSSION OF GOVERNANCE AND MGMT. ISSUES

- Profit – revenue, market share
- Wages and benefits
- Risks of decisions (impacts)
- Safety and reliability
- Efficiency, emerging technologies (reducing waste, limiting the need for transmission systems through local power sources)
- R&D efforts
- Relationships with political masters
- Government mandates
- Government perspectives of the case utility and staff
- Reactionary vs. proactive approach
- Managing pubic perception

TABLE E-16
KEY POINTS RAISED IN GENERAL DISCUSSION OF GOVERNANCE AND MGMT. ISSUES

- Communicating the utility's perception
- Succession planning and changing demographics of the corporation
- Key elements: links to staff and community relations, integration between issues, and mechanisms in place by management to assist staff and address issues

The results of the individual indicator brainstorming exercise for governance and management issues are presented in Table E-17.

TABLE E-17
BRAINSTORMED INDICATORS FOR GOVERNANCE AND MANAGEMENT ISSUES

- Profit
- Revenue
- Market share
- Growth in North American utility markets

- Dollars spent on research and development related to sustainable development
- Percentage of R&D dollars spent specifically on new technology and development or operation efficiencies
- Supporting R&D: emerging technologies

- Measure of employee satisfaction
- Succession planning and staff training

- Number of regulatory violations
- Risk management: identification, how to address, results
- System reliability
- Lower market risk

- Measure of public perception of the utility's sustainable development efforts
- Reactionary vs. proactive approaches by management
- Managing public perception

- Measure of understanding of: political masters, staff, and interested publics
- Relationships with municipal, provincial, and federal governments

- Measure of balance between leading and lagging performance measures

- Efficiencies: emerging technologies
- Measure of strategic thinking, i.e. structured approaches (e.g. Bryson)

- Pro-active communications to the public on the corporation's position
- Media: issues brought to public attention, positive vs. negative, and corporate response

Group 2

Group 2 addressed Benefits to Customers and Stakeholders, Private and Crown Land Usage, Alterations to the Landscape, Vegetation Management Practices. As noted previously, Group 2 simultaneously brainstormed and filtered the indicators. The results of that process are presented in the sections that follow.

Brainstormed Indicators – Benefits to Customers and Stakeholders

The results of the group brainstorming exercise for benefits to customers and stakeholders are presented in Table E-18.

TABLE E-18
BRAINSTORMED INDICATORS FOR BENEFITS TO CUSTOMERS AND STAKEHOLDERS

- Rates and lower taxes
- Export sales
- Provision of quality employment
- Employee retention rates
- Corporate salaries relative to other Canadian utilities
- Review of employee survey
- Direct support to local business
- Contracts to aboriginal agencies
- Power Smart
- Reduction of greenhouse gases
- Employment equity
- CEA survey's: customer service and employee indexes
- Renewable energy use

Brainstormed Indicators – Private and Crown Land Usage

The results of the group brainstorming exercise for private and crown land usage are presented in Table E-19.

TABLE E-19
BRAINSTORMED INDICATORS FOR PRIVATE AND CROWN LAND USAGE

- Inquires from adjacent landowners on existing ROW, EMF, and aesthetics
- Number of requests for adjustments to development plans (e.g. number of concessions made in development planning)
- Public responses to proposals by type (e.g. written or phone calls)
- Attendance at public consultations – questionnaires also
- Issues referred by other agencies
- Compensation paid by acre and line
- Number of public hearings on land use
- Number of licenses denied vs. number approved
- Number of licenses with unreasonable or unrealistic conditions (e.g. financial)
- Number of violations
- Number of warnings issued
- Number of permits issues by regulatory agencies

Brainstormed Indicators – Alterations to the Landscape

The results of the group brainstorming exercise for alterations to the landscape are presented in Table E-20.

TABLE E-20
BRAINSTORMED INDICATORS FOR ALTERATIONS TO THE LANDSCAPE

- New hectares of ROW/Hectares in place
- Hectares of ROW salvaged/Hectares in place
- Hectares used/KM of line (average ROW width)
- Hectares used/Total hectares (fragmentation ratios)
- Dollars spent on biodiversity studies (e.g. SARA)

TABLE E-20
BRAINSTORMED INDICATORS FOR ALTERATIONS TO THE LANDSCAPE

- Improved access positives and negatives (more research needed)
- Documented sightings of wildlife
- Dollars spent on rehabilitation and repair of ROW (e.g. erosion)
- Wildlife contacts/mitigation performed
- Past damage restitution/compensation paid

Brainstormed Indicators – Vegetation Management Practices

The results of the group brainstorming exercise for vegetation management practices are presented in Table E-21.

TABLE E-21
BRAINSTORMED INDICATORS FOR VEGETATION MANAGEMENT PRACTICES

- Minutes of outages caused by trees
- KM treated/Total KM – all practices
- Presence of integrated management plan and how often it is updated
- Secondary land use/Total land use (e.g. agriculture or garden plots increasing in numbers)
- KM requiring treatment/Total KM
- KM actually treated/KM requiring treatment
- KM of ROW below standards/Total KM of ROW
- Number of complaints
- Number of notices given
- Number of violations issued
- Number of permissions denied/Number of permissions requested – adjacent landowners

Organized Set of Indicators for each Selected Key Issue

Following the brainstorming meeting, the results were reviewed. A range of sources were drawn upon including: conceptual frameworks, previously published sets of indicators, existing internal measures, and the participants in follow-up inquiries. In particular, the conceptual frameworks based on the Sustainable Development Records (SDR) approach, the Community Sustainability Auditing (CSA) approach, the Pressure-State-Response (PSR) approach, and the Capital Stocks approach were useful in analyzing gaps in the brainstormed indicators and provided context for necessary enhancements. Once the gap analysis had been completed, the indicators were organized and consolidated into a more manageable list – as requested by participants in the brainstorming meeting.

The organized sets of indicators are presented in the following sub-sections. A sample metric for each indicator was identified as a part of this process. Furthermore, each indicator was labeled as either a "leading" or a "lagging" indicator, though this division was later discarded due its creating additional confusion. Lagging indicators primarily monitor whether the business remains in control and signals when unusual events are occurring that require attention. Leading indicators help decision-makers manage the business now and in the future, rather than just measuring past events. In cases where indicators were drawn from published literature, the following reference scheme was used in all tables:

1. Canadian Electricity Association (CEA), 2005.
2. Velva, V. and Ellenbecker, M., 2001.
3. Case Utility, 2004.
4. Azapagic, A., 2004.
5. Global Reporting Initiative, 2002.
6. Meadows, D., 1998.

Organized Indicators – Public Involvement

The organized indicators for public involvement are presented in Table E-22.

TABLE E-22
ORGANIZED INDICATORS FOR PUBLIC INVOLVEMENT

Indicator	Metric	Classification
Level of public trust[1]	Scale (1-10)	Leading
Effectiveness of stakeholder involvement process	Scale (1-10)	Leading
Openness to stakeholder participation[2]	Scale (1-10)	Leading
Adequacy of reporting from public perspective	Scale (1-10)	Leading
Strength of relationship with key stakeholders	Scale (1-10)	Leading
Past commitments fully met	Percent	Lagging
Number of meetings with stakeholder advisory panel	Meetings/Year	Lagging
Number of open houses held	Open houses/year	Lagging
Number of attendees to public consultations	Number/Year	Lagging
Average response rate and time to external requests for information	Percent Days/Request	Lagging
Percentage of public complaints directed to MLAs	Complaints/Total	Leading
Respect for aboriginal decision-making process	Description	Leading

Organized Indicators – Community Relations

The organized indicators for community relations are presented in Table E-23.

TABLE E-23
ORGANIZED INDICATORS FOR COMMUNITY RELATIONS

Indicator	Metric	Classification
Corporate image[1]	Scale (1-10)	Leading
Effectiveness of communication programs with interested stakeholders	Scale (1-10)	Leading
Public attitude factor[3]	Scale (1-10)	Leading
Investment in community outreach, charitable projects, and public education[4]	Dollars/Year	Lagging
Number of educational opportunities by type	Number/Year	Lagging
Increase in value of corporate "goodwill"	Percent/Year	Leading
Corporate volunteerism	Hours/Year	Lagging
Number of complaints upheld by regulatory bodies[5]	Number/Year	Lagging
Awards received for social, ethical, and environmental performance[5]	Percent Days/Request	Lagging

TABLE E-23
ORGANIZED INDICATORS FOR COMMUNITY RELATIONS

Indicator	Metric	Classification
Participation in voluntary or above compliance level programs[5]	Description	Lagging
Representation of issues by the media	Description	Lagging

Organized Indicators – Staff Relations

The organized indicators for staff relations are presented in Table E-24.

TABLE E-24
ORGANIZED INDICATORS FOR STAFF RELATIONS

Indicator	Metric	Classification
Investment in employee education and training	Dollars/Employee	Lagging
Percent of required training modules complete	Percent	Lagging
Average number of hours of training by type[5]	Hours/Year	Lagging
Number of employees sponsored for further education[5]	Number/Year	Lagging
Access to necessary information, resources, and support to effectively perform assigned tasks	Description	Lagging
Staff preparedness to represent the company in public	Scale (1-10)	Leading
Perceived clarity of expectations	Scale (1-10)	Lagging
Classification of employees (temporary, PT, FT)[5]	Percent	Lagging
Average employee turnover by classification[5]	Percent	Leading
Perceived opportunity for advancement	Scale (1-10)	Lagging
Perceived ability to influence decision-making[2]	Scale (1-10)	Lagging
Non-entry level positions filled with internal candidates	Percent	Lagging
Workers who report complete job satisfaction[2]	Percent	Leading
Staff morale	Scale (1-10)	Leading
Staff sense of team	Scale (1-10)	Lagging
Utility's status as an employer of choice	Scale (1-10)	Leading
Cost of hiring and training new employees vs. cost of retention	Ratio	Leading
Employee benefits beyond those legally mandated[5]	Description	Lagging
Effectiveness of process for capturing staff feedback	Scale (1-10)	Leading
Effectiveness of staff orientation programs	Scale (1-10)	Leading

TABLE E-24
ORGANIZED INDICATORS FOR STAFF RELATIONS

Indicator	Metric	Classification
Average income of top/bottom ten percent[6]	Ratio	Lagging
Cost of preventing accidents vs. cost of reacting after the fact	Ratio	Leading

Organized Indicators – Private and Crown Land Usage

The organized indicators for private and crown land usage are presented in Table E-25.

TABLE E-25
ORGANIZED INDICATORS FOR PRIVATE AND CROWN LAND USAGE

Indicator	Metric	Classification
Transmission intensity	ROW/MWh	Leading
Percent of ROW under secondary land use	Percent	Lagging
Loss of alternate land use by type	Total hectares	Lagging
Annual growth rate of ROW	KM added/ KM removed	Lagging
Average compensation paid by acre, line, and percentage of market value	Ratios	Lagging
Average reduction in market value of property adjacent to lines	Percent	Lagging
Number of proposed developments that require resettlement[4]	Percent	Lagging
Number of requests for adjustments to the development plans	Number/Year	Lagging
Percentage of lines on land considered sacred by aboriginals[4]	Percent	Lagging
Inquires by adjacent landowners by type	Number/Type	Lagging
Public responses to proposals by type	Number/Type	Lagging
Percent of licenses denied by reason	Percent	Lagging
External complaints related to noise, dust, visual impact, and other[4]	Number/Year	Lagging
Cost of burying line vs. cost of above ground	Ratio	Leading

Organized Indicators – Alterations to the Landscape

The organized indicators for alterations to the landscape are presented in Table E-26.

TABLE E-26
ORGANIZED INDICATORS FOR ALTERATIONS TO THE LANDSCAPE

Indicator	Metric	Classification
Number of corridors created	Number	Lagging
Contribution to fragmentation of the landscape	Percent	Leading
Effect of fragmentation	Description	Leading
Percentage of new hectares of ROW added per year	Percent	Lagging
Hectares used per kilometer of line	Hectares/KM	Lagging
Average width of ROW	Metres	Lagging
Net change in forest cover per year	Hectares/Year	Lagging
Investment in decommissioning and rehabilitation of obsolete ROW[4]	Dollars/Year	Lagging
Species at risk with habitats in areas affected by operations	Number/Type	Lagging
Critical wildlife habitat in areas affected by operations	Hectares	Lagging
Number of wildlife contacts	Number/Year	Lagging
Investment in wildlife contact mitigation and biodiversity studies	Dollars/Year	Lagging
Edge effect	Description	Leading
Sites on environmentally protected areas	Hectares	Lagging
Effects of increased access vs. cost of inhibiting access	Ratio	Leading
Compensation paid for past damage	Dollars/Year	Lagging

Organized Indicators – Vegetation Management Practices

The organized indicators for vegetation management practices are presented in Table E-27.

TABLE E-27
ORGANIZED INDICATORS FOR VEGETATION MANAGEMENT PRACTICES

Indicator	Metric	Classification
Minutes of outages caused by vegetation	Minutes/Year	Lagging
Hectares managed by total land base by practice	Percent	Lagging
Cost per hectare managed by practice	Dollars/Hectare	Lagging
Cycle time by method of vegetation management	Years	Lagging
Tree growth rates	Percent	Lagging
Existence of integrated vegetation management program for each line	Description	Lagging

TABLE E-27
ORGANIZED INDICATORS FOR VEGETATION MANAGEMENT PRACTICES

Indicator	Metric	Classification
Frequency of update to integrated vegetation management program	Rate	Lagging
Percent of ROW with vegetation in critical zone	Percent	Leading
Percent of ROW requiring treatment	Percent	Lagging
Percent of requested permissions denied by landowners	Percent	Lagging
Cost of preventing outages by method of vegetation management vs. cost of outages	Ratios	Leading

Organized Indicators – Governance and Management Issues

The organized indicators for governance and management issues are presented in Table E-28.

TABLE E-28
ORGANIZED INDICATORS FOR GOVERNANCE AND MANAGEMENT ISSUES

Indicator	Metric	Classification
Profitability	Dollars/MWh	Lagging
System reliability	Percent	Lagging
Average outage frequency and time per customer[3]	Rate and Minutes/Year	Lagging
Transmission line efficiency[1]	Percent	Lagging
Investment in R&D by type[5]	Dollars/Year	Lagging
Number of regulatory violations and notices by type	Number/Year	Lagging
Understanding of all key stakeholder groups	Description	Lagging
Existence of up-to-date succession plans	Description	Lagging
Effectiveness of risk management programs	Scale (1-10)	Leading
Strength of relationship with governments	Scale (1-10)	Leading
Structured approaches to strategic decision-making	Description	Leading
Transmission lines by tower type	Percent	Lagging
Average lifetime of infrastructure	Years	Lagging
Percent of infrastructure designed for disassembly, reuse, and recycling[2]	Percent	Lagging
Export/import ratio	Ratio	Lagging
Cost of importing vs. rate charged to customers	Ratio	Leading

TABLE E-28
ORGANIZED INDICATORS FOR GOVERNANCE AND MANAGEMENT ISSUES

Indicator	Metric	Classification
Export profit margin relative to local profit margin	Ratio	Leading
Percent of unprofitable customers	Percent	Lagging
Capacity utilization	Percent	Lagging
Perceived risk of EMF	Scale (1-10)	Leading
Average intensity of EMF at edge of ROW	Rate	Lagging
EMF distance and intensity ratios	Intensity/Distance Intensity/Voltage	Lagging
Compliance with ICNIRP* standards on exposure to radiofrequency[5]	Description	Lagging
Balance between performance measures	Ratio	Leading

** ICNIRP: International Commission on Non-Ionizing Radiation Protection*

Organized Indicators – Benefits to Customers and Stakeholders

The organized indicators for benefits to customers and stakeholders are presented in Table E-29.

TABLE E-29
ORGANIZED INDICATORS FOR BENEFITS TO CUSTOMERS AND STAKEHOLDERS

Indicator	Metric	Classification
Price per kWh relative to North American utilities[3]	Percent	Lagging
Contribution to provincial economy	Description	Leading
Access to electricity in the Province	Percent	Lagging
Revenue shared with affected communities[4]	Dollars/Year	Lagging
Ratio of lowest wage to provincial minimum	Ratio	Leading
Ratio of salaries to other Canadian utilities	Ratio	Leading
Net employment creation[5]	Jobs/Year	Lagging
Representative of provincial demographics at all levels of the business unit[5]	Percent	Lagging
Increased energy efficiency	Percent	Lagging
Use of local suppliers[2]	Province/Total	Lagging
Value of PO's place with aboriginal companies[3]	Dollars/Year	Lagging
Perceived fairness of transmission line placement	Scale (1-10)	Leading
Communities affected by transmission receiving no benefits from that line	Percent	Leading
Communities with ROW in territory	Percent	Lagging

TABLE E-29
ORGANIZED INDICATORS FOR BENEFITS TO CUSTOMERS AND STAKEHOLDERS

Indicator	Metric	Classification
Programs to respond to employee survey	Description	Lagging
Programs to provide and maintain service in emergency situations	Description	Lagging
Cost of providing benefits vs. increase in "goodwill" or corporate image	Description	Leading

Preparation of a Preliminary System of Draft Indicators

Prior to soliciting comments on a draft set of indicators, the participants were asked to provide input regarding the selection of indicators. A complete summary of the roundtable discussions on selecting indicators is provided in Table E-30.

TABLE E-30
SUMMARY OF ROUNDTABLE DISCUSSIONS ON SELECTING INDICATORS

1. Comments on the final structure of the indicators

- It is important to ask how this project can be implemented.
- The business planning process is the primary vehicle for implementation. Internal business planning processes at the corporate, business unit, division, and department levels build on each other and integration with these processes provide the strongest opportunities for implementation.
- The indicators should build on existing goals in the business planning process. These goals are widely accepted in the organization and are unlikely to change significantly in the near future. Linkage to the existing goals provides the best way to sell the indicators to possible users. This is critical to obtain the necessary buy-in.
- A system of indicators could be based on the business planning hierarchy. Indicators could be developed for the business unit, the division, and the departmental levels.
- One question to ask in any indicator hierarchy is what "top-level" indicators mean at different levels. The participants noted that the indicators didn't necessarily need to be tightly bound together, but thinking about what indicators might mean at different levels would be useful. One example offered was the indicator "corporate image". Although this may be a higher level corporate indicator, there are many contributors to corporate image that could be measured at the lower levels.
- While relation to existing internal initiatives is important, the relation to external initiatives should be kept in mind as well.
- Throughout the implementation process, the business case should be emphasized.

2. Comments on the existing internal indicators

- The footprint of the existing system is not adequately measured. Establishing the current state is important to gain an understanding of the present day impact. To gain an understanding of the sustainability of the system, it is necessary to understand where the company stands now. Transitory vs. permanent impacts should also be considered.
- Although lots of data is available, it is not being fully utilized. In particular, the current data and indicators suffer from a lack of analysis. Several possible reasons for this were noted including: the need to analyze the data has not been adequately established, not everyone perceives a problem with existing intuitive decision-making processes, and there is a feeling to avoid looking for trouble.
- It was noted that creating an indicator does not necessarily create a need to apply it. A driver is needed to make the indicator matter.
- It was noted that a significant amount of information is gathered due to the company's membership in organizations, even though it may not be used for anything other than reporting

TABLE E-30
SUMMARY OF ROUNDTABLE DISCUSSIONS ON SELECTING INDICATORS

to that organization. Some examples provided were the CEA, EUCG, and COPE.
- It was noted that one shortcoming with some existing indicators and programs is that they are not directly linked to a specific project. One example that was discussed was the Forest Enhancement Program.

3. Comments on the number of indicators

- It was noted that any indicator set should apply the principle of "keep it simple". It is important to convey any message simply and concisely.
- It was noted that 5-10 indicators would likely be enough at the business unit level. Anything beyond that may reduce the effect of the indicators. However, it is important that the top-level indicators do cover the three pillars of sustainable development.
- The number of indicators at the lower levels of the business planning hierarchy should not be a particular concern. It was explained that decision-makers at those levels will decide which indicators to support and use.
- Any set of indicators should contain indicators that are meaningful externally as well as internally.
- Although comparison across industries may be useful, the case should be argued on the merits of the company's own industry.
- It was noted that any indicator set is by nature going to be illustrative rather than comprehensive.
- It was also noted that sustainable development should not be viewed as a balancing act, but rather should seek to take everything into consideration.

Building on the points in Table E-30, the participants were asked to provide comments on a sample set of consolidated indicators. It should be noted that the consolidated set of indicators was presented to help prompt further discussion. Focus was devoted to discussing what the indicators should be rather than confirming the sample set. With that in mind, the sample list of indicators presented in the meeting is available in Table E-31.

TABLE E-31
SAMPLE INDICATORS PRESENTED TO THE PARTICIPANT GROUP

1. Level of stakeholder trust
2. Corporate image
3. Staff preparedness to represent the corporation in public
4. Land use intensity
5. Contribution to fragmentation of the landscape
6. Minutes of outages caused by vegetation
7. System reliability
8. Rates relative to competitors by type
9. Investment in R&D by type
10. Staff turnover by classification
11. Contribution to sustainable development in the Province
12. Exceeding licensing and regulatory requirements

The discussions on the sample indicators provided a wide variety of input. In addition to feedback on specific indicators, some key comments included:

- Linkages to the existing business planning hierarchy should be enhanced.
- Existing initiatives should not be duplicated.
- Indicators measuring the current state could serve as useful anchors.
- Focus needs to remain on indicators explicitly relevant to the transmission system.
- Remember the importance of financial indicators.

The complete set of comments received on the consolidated set of sample draft indicators are presented in Table E-32.

TABLE E-32
SUMMARY OF ROUNDTABLE DISCUSSIONS ON SAMPLE INDICATORS

1. General comments

- Existing indicator programs should not be duplicated. For example, measures of trust and corporate image are included in the CEA ECR program.
- Indicators that measure the current state could serve as anchors.
- Top-level indicators should address multiple issues.
- The indicators should be designed to complement the business planning hierarchy. Direct linkages to existing goals would be helpful.
- Lower-level indicators should be consistent with top-level goals, but likely will appear in different form at those levels. For example, lower-level indicators could measure contributors to corporate image rather than corporate image itself.
- Focus needs to remain on indicators relevant to the transmission system.
- Keep in mind the indicators may be used by external stakeholders too.
- Keep in mind that decisions are ultimately driven by the financial component. The issue is making sure other issues are adequately factored in.
- An analysis of the indicators should be illustrative rather than comprehensive. It should demonstrate how the indicators might be used, recognizing that 100% of the data may not be gathered for each indicator.
- Indicators should be presented merely as useful indicators rather than social, environmental, or economic indicators. In particular, indicators explicitly listed as social indicators may be difficult to sell.

2. Comments on specific indicators

- Corporate image is more of a corporate-level indicator than a business unit indicator.
- System reliability is an important transmission indicator. Indicators do exist but are not widely analyzed.
- Consider effectiveness of training vs. effectiveness of delivery.
- A suite of vegetation management indicators could be useful at the departmental level.
- Staff turnover is something that is tangible and measurable. The underlying issue is an ability to attract and retain good people.
- Indicators for land use might include secondary land use or acres of improvement per year.
- Although profitability is a corporate indicator, cost issues and economic implications should be retained. Measuring how the transmission system contributes to profitability could be useful. Additionally, measuring life cycle costs could provide useful information.
- An example cost indicator could be cost per kilometer vs. income or volume transmitted.
- Increase in volume transmitted by existing infrastructure may be a meaningful indicator. Keep in mind though, that a consideration in land use is where the load is going as well as the intensity of the transmission.
- Existing efficiency vs. cost of upgrading was suggested as a possible indicator.
- Outage rates vs. dollars spent was suggested as a possible indicator.
- It was suggested a specific aboriginal indicator is needed.
- One participant suggested that indicators 1, 11, and 12 be eliminated due to difficulty of measuring while corporate image be toned down to a more appropriate business unit-level indicator.

Based on the comments received, an updated preliminary system of indicators was developed. The indicators were organized according to the key issues established in the expert consultations. To further increase their utility, the indicators were also organized according to a hierarchical approach linked to the business planning process. Indicators were developed for each of the three relevant organizational levels: business unit, division, and department. This approach illustrates linkages between the indicators and shows how

existing indicators can be utilized in the overall system. This highlights that the purpose of the indicator program is not to duplicate existing initiatives, but rather to build on them and make them more reflective of sustainable development.

With that in mind, the complete draft system of indicators is presented on the following pages. One page is devoted to the draft set of indicators for each of the key issues:

- Figure E-7: Public Involvement
- Figure E-8: Staff Relations
- Figure E-9: Community Relations
- Figure E-10: Private and Crown Land Usage
- Figure E-11: Alterations to the Landscape
- Figure E-12: Vegetation Management Practices
- Figure E-13: Governance and Management Practices
- Figure E-14: Benefits to Customers and Stakeholders

The draft system of indicators formed the basis for further consultations in Step 4: Test and Adjust the Indicators.

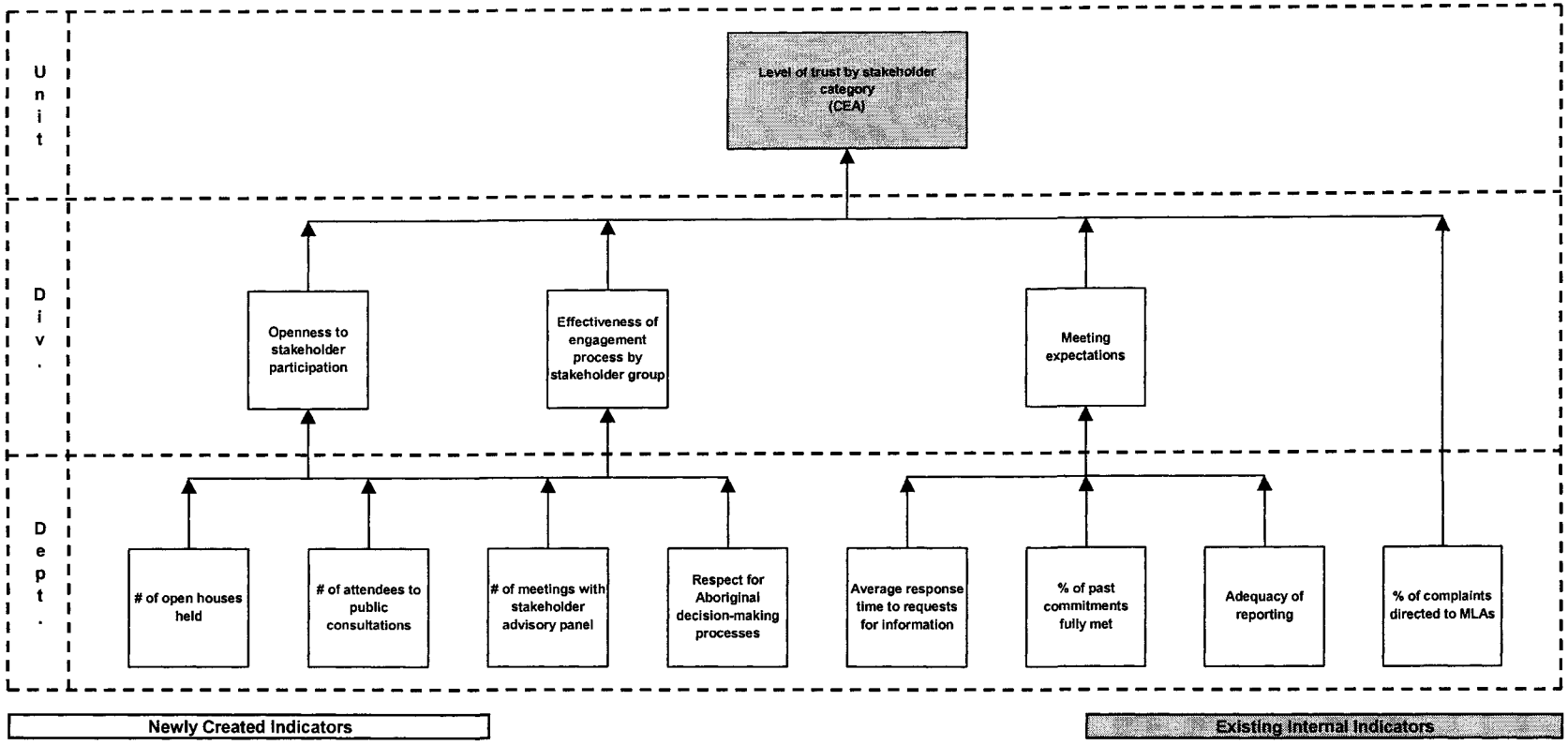

FIGURE E-7
DRAFT SYSTEM OF INDICATORS FOR PUBLIC INVOLVEMENT

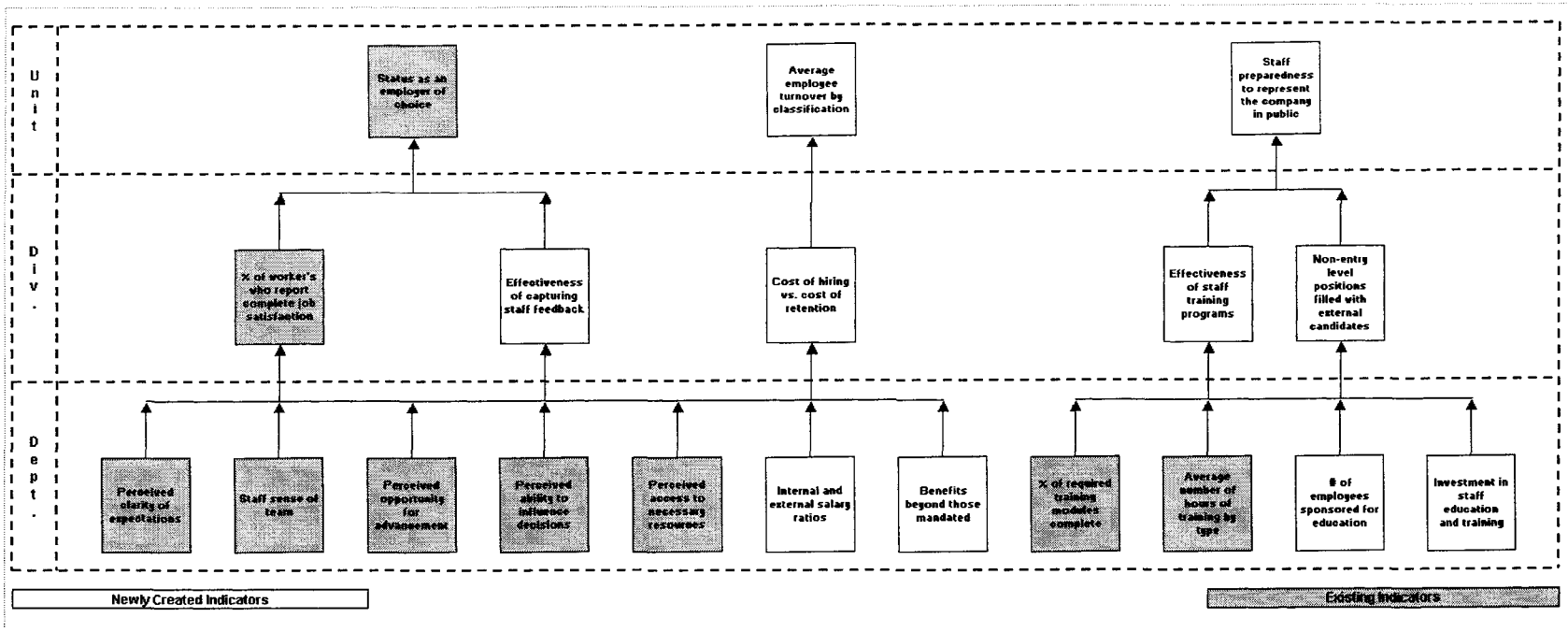

FIGURE E-8
DRAFT SYSTEM OF INDICATORS FOR STAFF RELATIONS

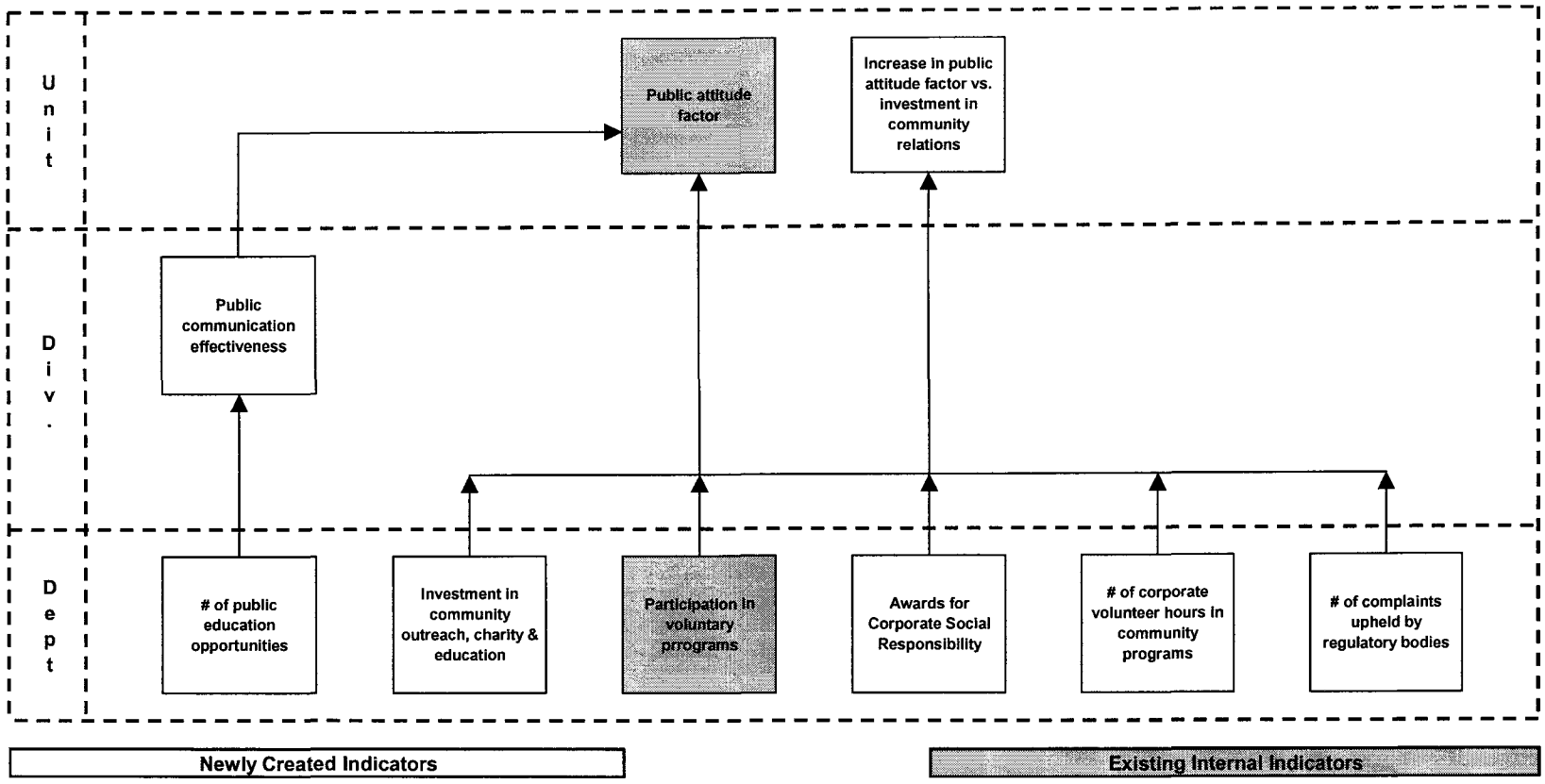

FIGURE E-9
DRAFT SYSTEM OF INDICATORS FOR COMMUNITY RELATIONS

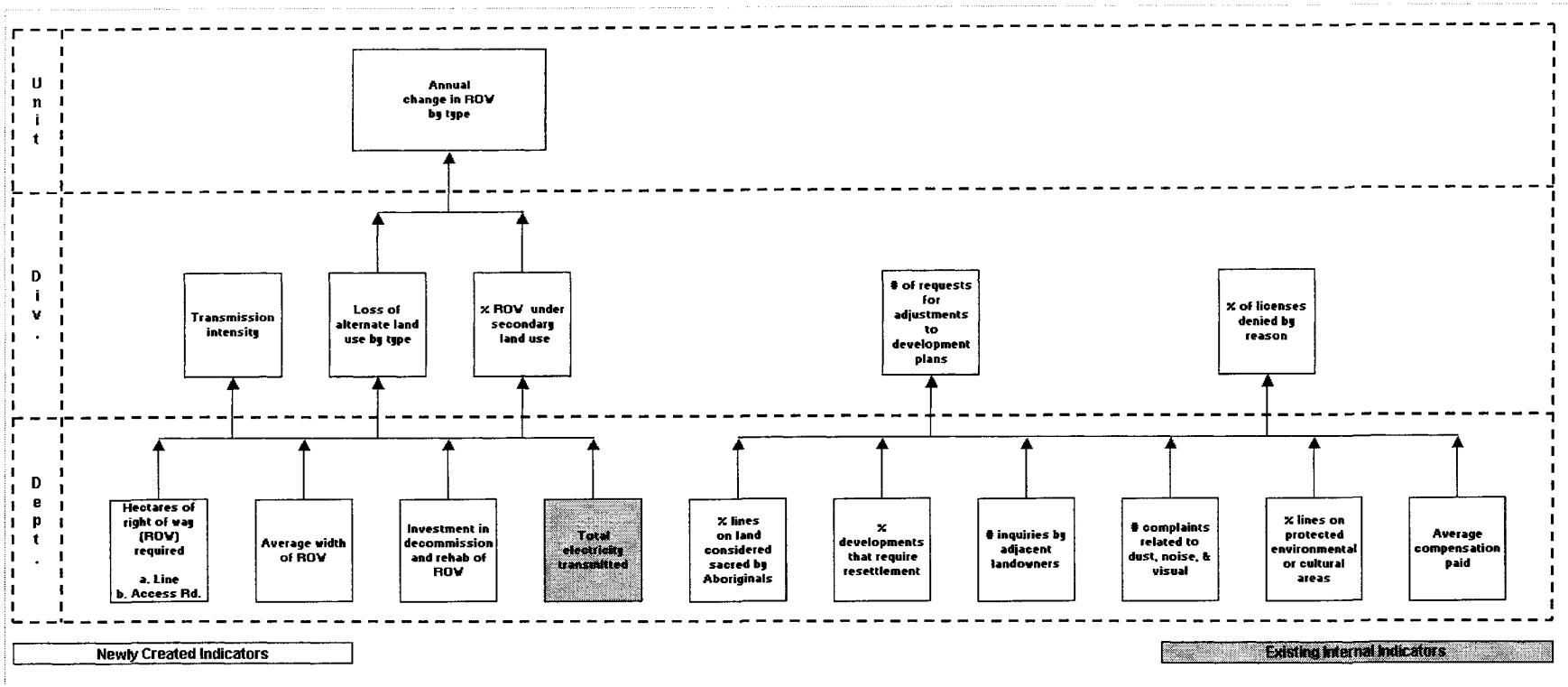

FIGURE E-10
DRAFT SYSTEM OF INDICATORS FOR PRIVATE AND CROWN LAND USAGE

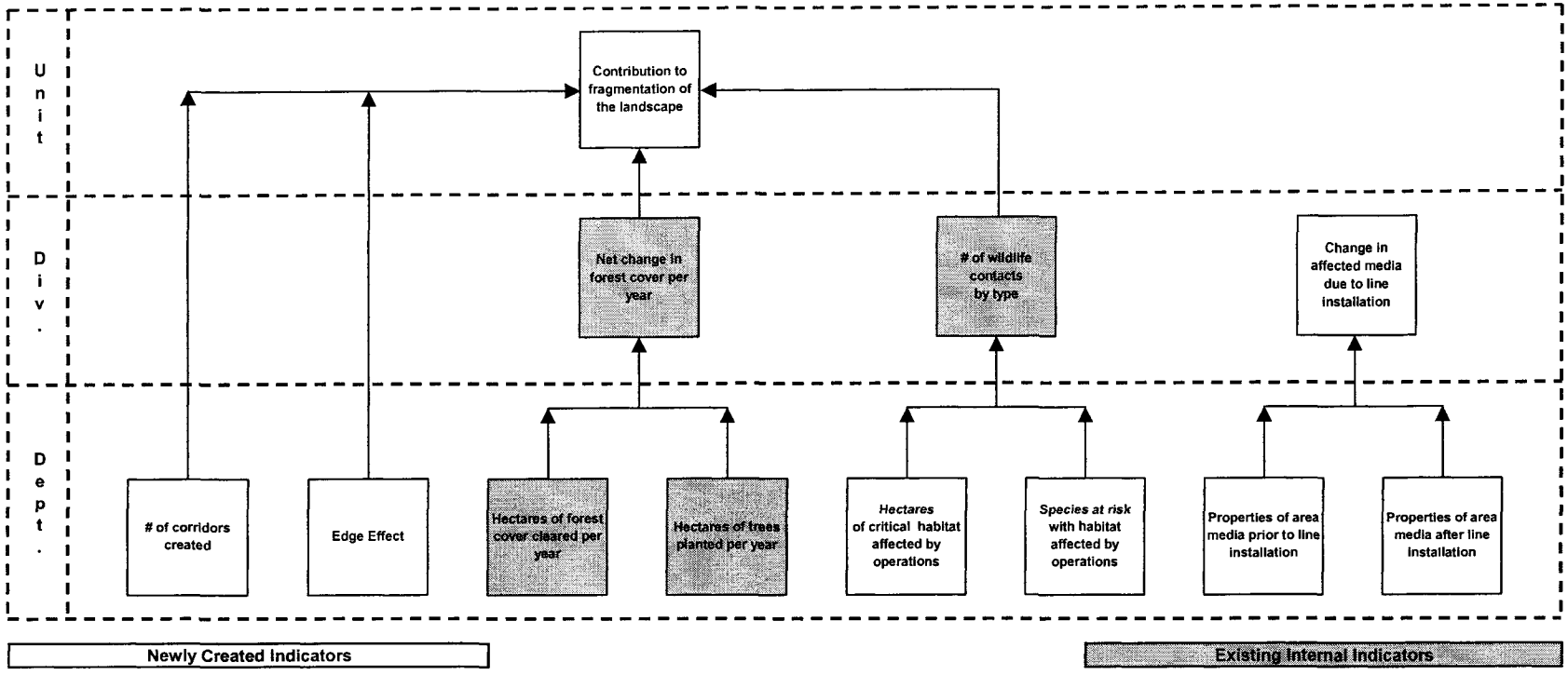

FIGURE E-11
DRAFT SYSTEM OF INDICATORS FOR ALTERATIONS TO THE LANDSCAPE

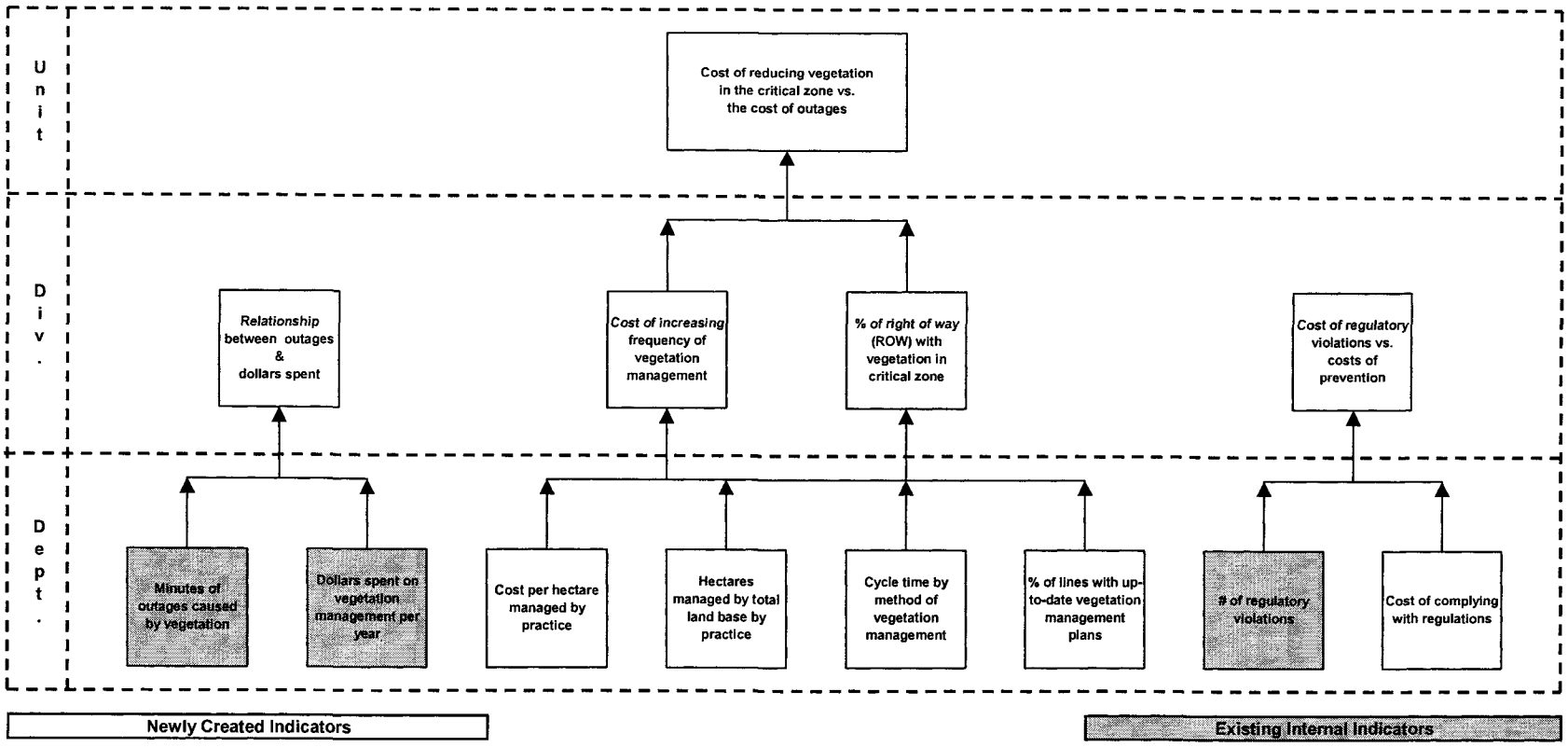

FIGURE E-12
DRAFT SYSTEM OF INDICATORS FOR VEGETATION MANAGEMENT PRACTICES

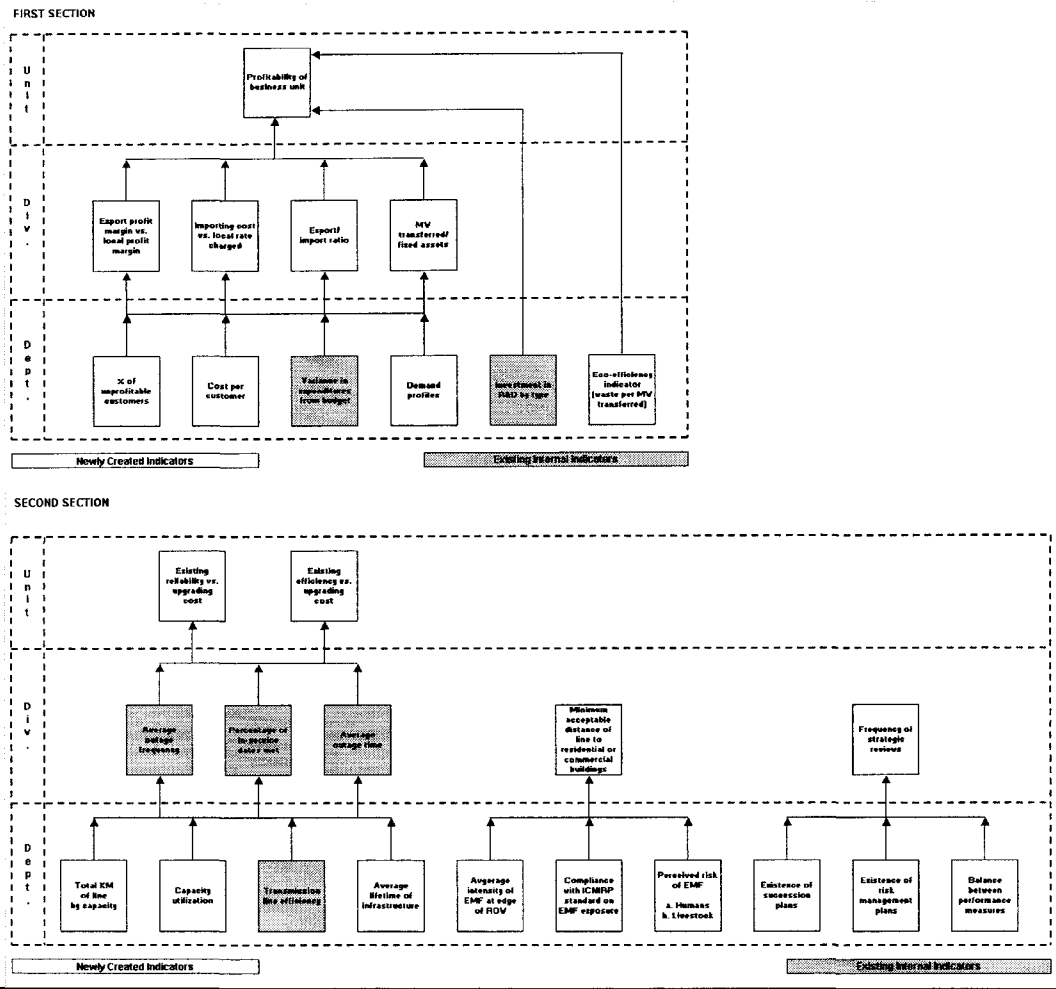

FIGURE E-13
DRAFT SYSTEM OF INDICATORS FOR GOVERNANCE AND MANAGEMENT PRACTICES

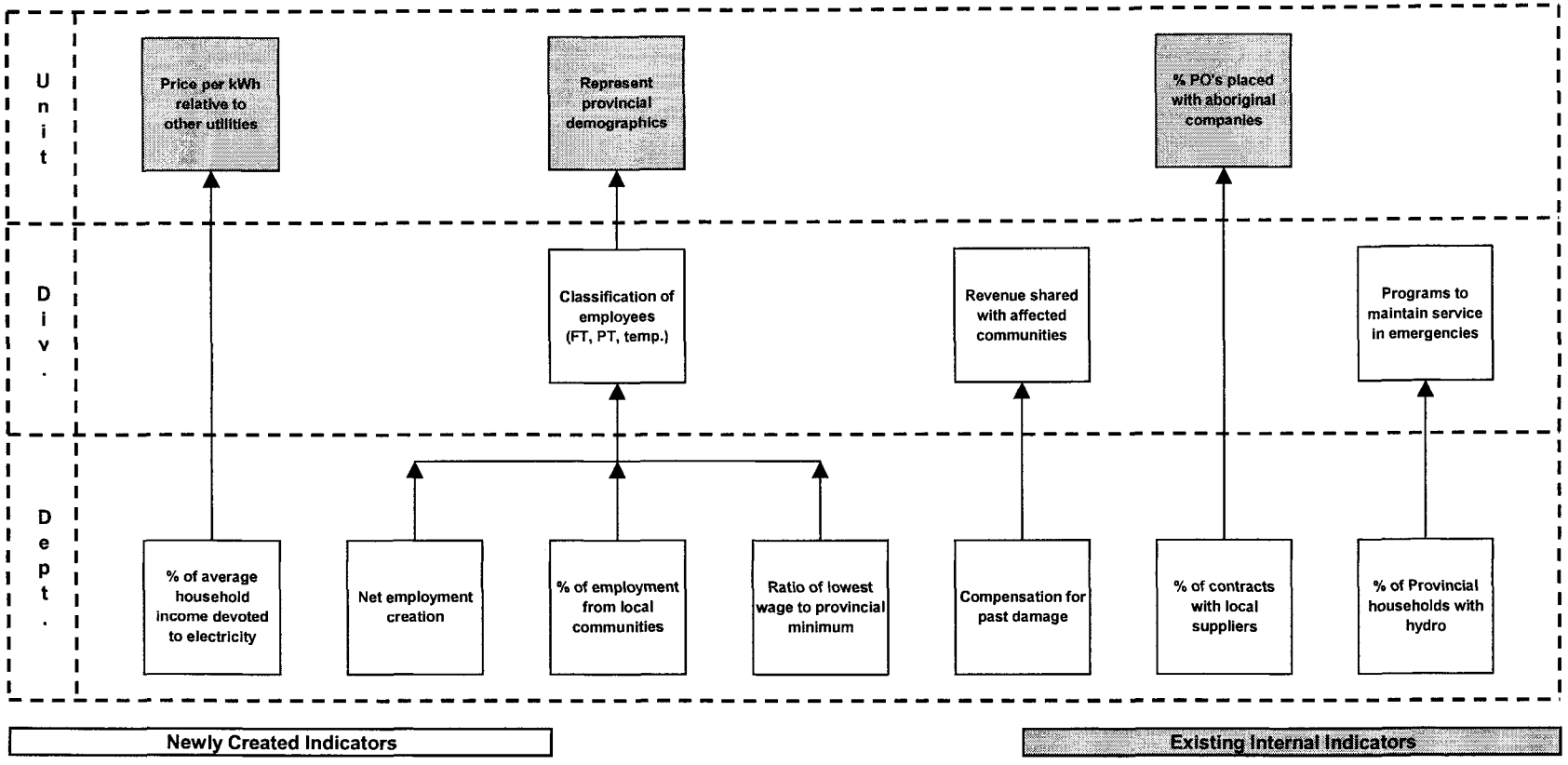

FIGURE E-14
DRAFT SYSTEM OF INDICATORS FOR BENEFITS TO CUSTOMERS AND STAKEHOLDERS

APPENDIX F
SUPPORTING MATERIALS FOR TEST AND ADJUST THE INDICATORS

Step 4 was divided into several stages:

- Conduct critical review of draft indicators.
- Finalize working system of indicators.
- Conduct data assessment.
- Develop method for aggregating the indicators.

The supporting material for those sections is provided in this appendix.

Conduct Critical Review of Draft Indicators

As a part of the critical review, the participants were again invited to comment on the proposed action plan for completing the project. The comments received during discussions of the action plan are summarized in Table F-1.

TABLE F-1
KEY COMMENTS ON THE ACTION PLAN

- Several participants noted that they felt the process was clear and well thought-out.
- One participant suggested the possibility of holding a group meeting with internal experts after a group meeting with external experts. This would provide the internal experts with the opportunity to consider all of the feedback received prior to agreeing to a final set of indicators. However, it was also recognized that meeting with the internal experts first may be necessary to polish the indicators prior to meeting with the external experts. In any case, given the time limitations of the participants, it would be important to limit the consultations to one group meeting for both the internal and external participants.
- It was suggested that two meetings could be held with the external stakeholders. The first meeting could be an introductory meeting of not longer than 30-60 minutes. The purpose of this meeting would be to introduce the project, its scope, and to explain where the external experts fit in the overall project context. This would provide the external experts with the information they need to decide if they wish to participate further. The specific indicators would not be discussed in the first meeting. The second meeting could be a group meeting with the external experts to discuss the draft set of indicators. In any case, it was recognized that the specific approach used would depend on the availability of the selected external stakeholders.
- A key question to consider in the initial meeting with external experts was "how do you convey the case utility's intent?" This may be done either by the principle investigator or by an employee of case utility, but it is important that it does occur.
- It is important to remember that the external stakeholders do not have a common need. For this reason, the purpose of the group meeting with external stakeholders may be to focus on exploring differences of opinion on the indicators, but not necessarily resolving those differences. However, it is also important to note that this meeting should not be too open-ended. Given the diversity of the participant's backgrounds, it will be necessary to have a clear agenda for the meeting in order to stay within the scope of the meeting.
- The questions for the internal and external expert meetings must be tailored to the needs of the group. For example, it would not make sense to have the external experts comment on the appropriateness of the hierarchy given that they may be unfamiliar with the internal workings of the case utility. An important question to ask in preparation for each meeting is therefore "what piece of information do these groups wish to see?"
- Regardless of the exact approach used, it will be critical that the project scope is very clear. This is critical in order to avoid repeating discussions from prior consultations.
- The scope is particularly important in terms of clarifying what key issues are being addressed as a part of the project and which ones are not. It was noted that special care should be taken to explain that although safety and potential contamination, for example, are not addressed in the set of indicators that it doesn't mean those issues are not important. Rather, it indicates that indicators for those issues are already covered with well-established indicators and that considering them again in this project would not add much new value.

TABLE F-1
KEY COMMENTS ON THE ACTION PLAN

- It is also important to consider what the case utility needs out of the indicator project as a whole. For example, possible objectives might include protection from criticism and unwanted public attention, protection from liabilities, and to know more about these topics than its critics.
- One participant suggested that the title for Step 5, which was initially called "Implement Indicators", be changed to "Integrate Indicators" since it would better reflect the plan outlined.

However, while comments were received on the action plan, the primary purpose of the individual meetings in the critical review was to obtain feedback on the draft system of indicators illustrated in Figures E-7 through E-14. Table F-2 provides a complete summary of the key comments received on the draft indicators during the individual meetings with the internal experts and external.

TABLE F-2
KEY COMMENTS ON THE DRAFT SYSTEM OF INDICATORS

General Comments

- Several participants noted that the "pyramid style" of the indicators was a clean way of presenting the information and demonstrated a clear, easy to follow process.
- One participant noted that the structured approach to presenting the indicators limited the need to reduce the number of indicators. It was noted that the case utility had extensive data collection and analysis capability and that an indicator set of this size should not present a problem. One other participant noted that, given the amount of effort in managing the information, it would be important to determine whether the data is worth collecting.
- It is not always clear if indicators at the lower levels of the hierarchy refer to the corporation as a whole or specifically to one department. This should be clarified so that only indicators directly relevant to the transmission system are included in the set. It was acknowledged, however, that some corporate proxy indicators may be provide a close enough representation of issues for transmission.
- One participant noted that while several existing indicators were identified in the current set of indicators, very little is done with that information. It is therefore useful to show how existing information can be used in the overall system of indicators.
- It was noted that it is very important to consider the definition of each indicator. Several examples were cited where the definition may be unclear or where a more narrow interpretation of the indicator may be appropriate. The specific examples are detailed in the sections for each theme.
- One participant noted the importance of an ongoing assessment of the indicators. It was noted that the indicators will evolve over time and that indicators may be added or subtracted. This should be represented as a part of the integration process.
- One participant noted that, although there was a balance amongst the three themes, some of the individual issues had far more indicators than others. It was noted that this may not necessarily be a problem, but that it was something to consider.
- One participant stressed that it would be important to tie each indicator to existing corporate goals. Although the explicit linkages to the business planning process do address this, it is not clear from the pyramid diagrams which specific goal each indicator is linked to.
- The indicators should be presented with more of the overall context. For example, it was suggested that the indicator package distributed to participants also contain a list of the key corporate goals.
- As one participant noted, considering the overall energy marketplace is also important to the project's context. The case utility is just one small piece of a very large, integrated North American energy market. One area that is particularly important, not just for the Province but for the industry as a whole, is energy conservation. This has implications for the transmission system since it will influence how much energy must be transmitted. It is therefore critical that education and marketing programs address the need for energy conservation and that the case utility views itself as a part of a larger movement.
- One participant noted the importance of tying the notion of corporate social responsibility with the sustainable development indicators. It was noted that this is an important concept that should be carefully considered.

TABLE F-2
KEY COMMENTS ON THE DRAFT SYSTEM OF INDICATORS

- One participant noted that the implications of climate change should also be considered for the transmission system. For example, a significant increase in waterfall may have an influence on the utility's vegetation management program. Although this issue may not necessarily appear as an explicit indicator, it should be discussed somewhere.

Theme 1 – Stakeholder Relationships

- For the key issue "Public Involvement", it was noted that several forestry indicator programs might provide some insight into the indicator development. Specifically, the Canadian Standards Association (CSA) and its Sustainable Forest Management (SFM) program was mentioned. The Canadian Electricity Association (CEA) national survey on customer satisfaction was another publication noted.
- For indicators pertaining to meetings or stakeholder input, it is important to consider what was done with the input in addition to focusing on the gathering of that input. Recommendations adopted might be one type of measure to consider. Another participant noted that it may be useful to break the information into categories by stakeholder type. For instance, stakeholders may be asked to identify themselves with a particular group on the survey with the rest of their answers.
- It was noted that the "Number of attendees to public consultations" may not in itself reveal much since the issue really is not one of raw numbers. What was more important was that the key stakeholders affected by the proposal under consideration be present.
- One participant noted that the "Number of attendees to public consultations" might be divided by the local population density to get a better sense of the relative turnout to the consultation.
- It was noted that the indicator "Number of open houses held", however, was useful since it showed that the company was being proactive.
- It was noted that the indicator "Number of meetings with stakeholder advisory panel" may already be obsolete since meetings with the panel have not occurred in well over a year.
- It was suggested that the indicator "Average response time for requests to information" be amended to "Average response time to requests for publicly available information." This would reflect the fact that the company cannot share all of its internal information for a variety of competitive and security reasons.
- It was noted that for the indicators "Number of employees sponsored for education" and "Investment in staff education and training" that appropriate targets be selected. It would not make sense to assume that the number must always go up since not all of the company's resources can be spent exclusively on training.
- One participant noted the importance of succession planning in the "Staff Relations" category. It was acknowledged that this was already captured in the "Governance" category but that it may be more appropriately located in "Staff Relations."
- One participant noted that an indicator such as "Number of meetings with local governments" would demonstrate how the utility has been proactive in meeting with that key stakeholder.
- It was noted by several participants that creating a separate pyramid of indicators within the "Public Involvement" category for Aboriginal issues would be advisable. Although many Aboriginal indicators are embedded in the system, this would clearly demonstrate that the utility recognizes the special importance of this group of stakeholders. It was suggested that the indicators could be very similar to indicators for other stakeholders such as "Number of meetings" or "Number of programs", but that some unique indicators may also be required.
- Definitions of Aboriginal indicators were repeatedly questioned. For example, indicators pertaining to Aboriginal lands were particularly relevant. It is important to consider what is meant by Aboriginal land and whether it refers to reserves, community resource areas, or other areas. The issue may be impact on Aboriginal rights rather than land.
- Definitions are also very important when defining lands considered "sacred" by Aboriginals. It was noted that this could mean many things such as burial areas, trapping areas, gathering places, or potentially the entire Province. A more narrow and crystal clear definition would be required if this indicator remained in the system.
- It was noted that the indicator "Respect for aboriginal decision-making process" would be very difficult to measure. It was suggested that this might be done through assignment of points for meeting certain criteria, but that the criteria may vary for each Aboriginal group.
- It was noted that one important Aboriginal issue to consider is the need for training and job development. Increasingly, the utility is emphasizing the need to employ local people in

Northern development projects. This need goes beyond corporate social responsibility since it is an essential condition of the transmission line licensing process. In any case, it was noted that this issue may be addressed either in the Aboriginal Involvement section of the issue "Public Involvement" or in the issue focusing on "Staff Relations."

Theme 2 – Land Use Practices

- The issue of defining the indicator was raised for several indicators in this theme. For example, in "Vegetation Management Practices", it would be important to be clear on what is meant by vegetation in the "critical zone."
- One participant questioned the inclusion of the indicator "Percent of lines with up-to-date vegetation management plans." The participant noted that while plans are prepared for new lines, many existing lines will not have these plans and they would be extremely time intensive and costly to develop. However, it was acknowledged that future legislation or standards may require that all lines have such plans in the future and the indicator may be helpful in that regard.
- With the above in mind, two participants suggested an alternate indicator for "Percent of lines with up-to-date vegetation management plans." They suggested the indicator might be "Percent of work completed on task frequency sheets," since all lines – both new and old – have those sheets.
- For "Minutes of outages caused by vegetation" it was noted that it is important to be clear on the definition. It was noted that outages could be taken to mean when customers are out of service or when equipment is unavailable. It was also noted that the former is tracked, but does not currently separate transmission caused outages from those caused by distribution.
- It was noted that the existing data collection system does not break out the information required for the indicator "Dollars spent on vegetation management per year." All costs associated with the maintenance of a particular line are currently grouped into one category. Although it was noted that this should not necessarily disqualify the indicator from the system, collecting such information would require changes to the current data collection system. The same issue of separating data was noted for the indicator "Cost per hectare managed by practice."
- One participant noted that the indicator "Cost of complying with regulations" might be better presented as "Cost of non-compliance with regulations." Other participants questioned how it would be possible to obtain a reasonable measurement of this indicator.
- One participant noted that the indicator "Cost of increasing frequency of vegetation management" would be better presented as the "Cost of increasing the intensity of vegetation management." The participant noted that the utility uses a number of different approaches to manage vegetation and that the issue is intensity of the treatment rather than frequency.
- One participant noted that it is important indicators in "Vegetation Management Practices" capture the fact that multiple treatment techniques may be used on the same piece of land. The utility is increasingly applying a more integrated approach to vegetation management and this should be reflected in the indicators. The rationale in this integrated approach is that, although treatment may cost more initially, it will save the company money over the long term.
- It was noted that there are maintenance issues other than vegetation management. The participant noted that rotten poles and cross-arms breaking were two such examples. It was noted that these issues were implicitly captured in the indicator "Average lifetime of infrastructure" but that it should be noted in the report that vegetation management is not the only maintenance issue of significance.
- One participant noted that for the indicator "Cycle time by method of vegetation management" it is important to consider the improvements in the methods themselves as well as their comparison to other methods. Another participant noted that the cycle time will vary depending on the location of the line, with a significant difference noted between Northern and Southern lines. One suggestion to address this was to consider breaking the information into various Provincial zones or regions.
- One participant noted the importance of considering the impact to adjacent residents along the right of way. It was noted that some residents utilize the corridors as recreational areas and it may therefore be useful to consult with them prior to clearing vegetation from the right of way.
- In the key issue "Alterations to the Landscape," one participant noted that the indicator "Number of corridors created" may not really matter. The issue is better framed as one of

TABLE F-2
KEY COMMENTS ON THE DRAFT SYSTEM OF INDICATORS

spatial impact and this may be better covered by something with a more specific measure. Several other participants later mentioned a similar point.

- "Edge effect" is an indicator where definition will be very important since it is possible to interpret very broadly. Some suggestions offered for measuring it included measuring sun penetration, wind penetration, and animal activity. Although it was acknowledged these factors may be difficult to measure, one option might be to compare measurements of these factors before and after the creation of the ROW.
- Another suggested indicator for "Edge effect" was to measure the number of locations where the company is pursuing mitigation of possible effects. One initiative cited was the company's increasing interest in implementing "soft shoulders" on the rights of way (ROW), meaning that the vegetation management on the ROW would be tapered to minimize the difference between the edge of the ROW and the surrounding areas. Although this would require the use of selective chemical spraying, the company is hoping to test this approach in a national park.
- One participant noted that the indicators for the issue "Alterations to the Landscape" may be more applicable to the Northern part of the Province. For example, it was noted that fragmentation in the Southern part of the Province may not be an issue considering the number of existing roads, railways, pipelines, transmission lines, and other "corridor type" projects in the area.
- For the indicator "Hectares of critical habitat affected by operations," it was noted that defining "critical habitat" is difficult since the entire Province could conceivably be considered. For that reason, it was suggested that the Provincial definition of "critical habitat" or some similar concept be used. In any case, it was noted that route selection practices do attempt to mitigate adverse effects on wildlife habitat and this should be considered in the development of the indicator.
- It was also noted that the utility can help create hectares of critical habitat through its rehabilitation efforts and that this should be considered in the formulation of the indicator "Hectares of critical habitat affected by operations."
- One participant noted that the connection between the indicators "Number of wildlife contacts by type" and "Contribution to fragmentation of the landscape" was not clear. The participant also questioned whether the utility actually measured the number of wildlife contacts.
- Another participant noted that the company does monitor the number of wildlife contacts, but this is done on an informal basis as a part of routine patrols. If wildlife is observed in the vicinity of a transmission line it is noted, but this information is not currently used.
- For the indicator "Hectares of forest cover cleared per year" it would be important to have a cumulative as well as a yearly representation of the information. This is important because the utility does not generally clear forest every year, but primarily does so during the construction of a new transmission line.
- For the indicator "Hectares of trees planted per year," it was noted that the company's Forest Enhancement Program provides funding for tree planting all over the Province, not just for the transmission system.
- One participant noted the importance of capturing cumulative effects of alterations to the landscape. It was acknowledged that this may be captured in the indicators comparing the properties of the line before and after installation.
- One participant noted the importance of capturing the effects of increased access. Although this is embedded in some of the indicators, one other possible effect to consider is vegetation migration along the corridor. It was noted that this would be very difficult to measure, but may be captured by the indictors "Properties of area media prior to line installation" and "Properties of area media after line installation."
- It was noted that since existing access roads are used wherever possible, the number of hectares required for access roads may be relatively insignificant. It was noted that access roads are more an issue for generation and that the hectares required for access roads is not currently tracked.
- Several participants noted that the "Average width of the ROW" varies depending on the line location and voltage. Since the width of the ROW is dictated by these factors, it was unclear what benefit this indicator might have. In fact, it was noted that decreasing the width of the ROW could have serious consequences.
- It was noted that "Investment in decommissioning and rehabilitation of ROW" would be close to zero. The company does not generally decommission ROW and, given the difficulty in constructing new ROW, it does not envision doing so in the near future.

TABLE F-2
KEY COMMENTS ON THE DRAFT SYSTEM OF INDICATORS

- It was noted that for the second pyramid of indicators in "Alterations to the Landscape," that most of the indicators pertain to the construction of new lines. The definitions of the indicators should take this observation into account.
- It was noted that the indicator "Percent of developments that require resettlement" is more applicable to generation than transmission. The participant noted that there is no reason for this number not to be zero in this day and age. It was noted that a similar result would be expected for "Percent of lines denied by reason." The participant noted that it was unlikely the case utility would apply for a line they believed would not pass.
- It was noted that the indicator "Number of inquiries by adjacent landowners" would be difficult to track since many of the inquiries are on an informal basis and taken by personnel in the field. It was also noted that measurement of this indicator might not add much value to the decision-making process.
- For the indicator "Percent of lines on protected environmental or cultural areas" it was suggested that the protected areas be defined in accordance with the Provincial Protected Areas Initiative. This would build on a well-established and credible definition and would avoid the case utility having to define these areas itself. It was also noted that this using this definition could avoid the difficulty in defining the indicator "Percent of lines on land considered sacred by Aboriginals."
- It was noted that impacts on Aboriginal trapping have not been explicitly considered. This might fit in as a part of a separate pyramid of indicators in the "Public Involvement" section. In any case, it was noted that the utility already had a compensation program in place for this.
- Several participants noted that effects on aquatic organisms were not captured. Although it was acknowledged this was more of a generation issue and that the effects may be captured indirectly in some of the existing indicators, it should be explicitly considered as a part of the transmission indicators as well. It was noted that possible impacts on fisheries and other aquatic life are due to material being knocked into the river during construction and maintenance operations.
- It was noted by several participants that an improved GIS system would greatly assist in obtaining accurate data for indicators in this theme.

Theme 3 – Governance

- For the "Governance and Management" issue, it is important to consider regulator issues. For example, maintenance of licenses, denial of licenses, compliance with regulations, and adherence to processes should be considered.
- It was suggested by a participant that the indicators "Average intensity of EMF at edge of ROW" and "Compliance with ICNIRP std. on EMF exposure" may measure the same thing.
- One participant questioned the need for the "Eco-efficiency indicator." It was noted that the transmission line does not use any water, energy losses are captured in another indicator, and that waste issues are not very relevant for the major high voltage transmission system.
- The indicator "Total kilometers of line by capacity" might be better represented by "Total kilometers of line by voltage."
- "Existence of succession plans" may not be a useful indicator given that the company generally does not hire someone to assume a position until the previous holder of the title leaves the company. Other participants, however, noted that given the aging demographics of the utility, it is still something to consider. It was noted that it may be more appropriate in "Staff Relations."
- It was noted by another participant that the indicators "Existence of risk management plans," "Balance between performance measures," and "Frequency of strategic reviews" are not particularly useful indicators. They are related more to the existence of internal processes rather than meaningful measurement.
- It was emphasized by some participants that a major customer of the transmission system is the export market and that this should be more explicit. It was noted that exports constitute a significant portion of the company's profits and that loss of export capability for any reason is therefore a serious issue.
- It was noted that due to the spot market pricing currently used in the industry, the prices received for electricity and the ability to sell electricity to external markets varies wildly from day-to-day. Although the company currently uses rough average values, this can make it difficult to determine the costs of an outage from an exporting perspective.

TABLE F-2
KEY COMMENTS ON THE DRAFT SYSTEM OF INDICATORS

- In the "Benefits to Customers and Stakeholders" category, the "Revenue shared with affected communities" may be better represented as "Benefits shared." It was noted that the company does have a transmission development fund that provides funding to communities in areas affected by the transmission line. However, other benefits are offered beyond the sharing of funds.
- In "Benefits to Customers and Stakeholders" it was noted that in addition to a compensation indicator, there should be a mitigation indicator as well. Compensation occurs only after the mitigation efforts have been unable to prevent a problem from occurring. In the case where compensation does occur, it may also be useful to measure "proactive compensation" as well. The current indicator only measures "Compensation for past damage."
- One participant noted that the indicator "Price per kWh relative to other utilities" is more of a generation or corporate indicator. The issue for the transmission system may be better represented as the "Cost per kWh" transmitted.
- It was noted that the definition of what constitutes an Aboriginal company is important for the indicator "Percent of purchase orders placed with aboriginal companies."
- It was noted that measuring for "Representative of Provincial demographics" may be difficult since not everybody in the company will declare if they are a part of a minority group or not.
- It was suggested that the indicator "Percent of Provincial households with hydro" might be better represented as a ratio of households using electric heating vs. gas heating.

To provide a basis for further discussion, the comments summarized in Table F-2 were consolidated into a list of ten key points. The ten key points were previously listed in Section 5 of the report. As noted in the report, the ten points then provided the basis for organizing and explaining updates to the draft system of indicators. A complete summary of the responses to the ten key points is provided in Table F-3.

TABLE F-3
SUMMARY OF RESPONSES TO COMMENTS ON DRAFT INDICATORS

1. **The hierarchical method of presenting the indicators was clear and useful.**

   - All participants agreed that the hierarchical method was useful.

2. **There is no need to limit the number of indicators at the lower levels of the hierarchy.**

   - It was almost universally agreed that there was no need to limit the number of indicators at the lower levels. In fact, some comments focused on not wanting to lose any of the information currently in the system.
   - One explanation for this is may be found in the hierarchical method of presenting the indicators. The provision of a structured approach likely helped increase the utility of the indicators but also provided "built-in rationale" for why each indicator was included. In other words, highlighting relationships between the indicators helped show how each was important in the overall system.

3. **Definitions of each indicator must be carefully considered since several of them could be defined in different ways.**

   - There were many questions regarding the definitions of the indicators.
   - These comments are addressed as a part of the discussion on why indicators were renamed or redefined (comment 9).

4. **It is important to tie the indicators to goals and targets. Note that not all indicators must always increase or decrease, but rather may focus on staying within an appropriate range.**

   - This has been considered throughout the project. Given the all-encompassing nature of the corporate strategic plan goals, it is possible to tie all the indicators to at least one of those goals.

- In addition to that, each of the indicators was considered as to whether it should increase, decrease, or stay within an appropriate range. While those indicators that should always increase or decrease are generally more clear, those staying within a particular range may not be obvious.
- The indicators that should probably stay in a particular range include:
  - Investment indicators in staff training, R&D, community relations, Aboriginal employment training, decommissioning, PO's with Aboriginal companies, etc. – cannot spend all resources on one area.
  - "Number of consultation opportunities" – may have an upper limit.
  - "Non-entry level positions filled with external candidates" and "Avg. employee turnover" – may want some external people?
  - "Cost of hiring vs. cost of retention" and "Cost of outages vs. cost of reducing vegetation in critical zone" – within range of ideal.
- This is something to consider further when the indicators have been finalized.

5. Regulatory issues should be moved to the "Governance and Management Issues" section.

- It was heavily emphasized by one participant that this should be the case.
- The indicators "Percent of licenses denied by reason" and "Number of complaints upheld by regulatory bodies" were incorporated from other sections of the system of indicators. The indicators "Compliance with federal and provincial regulations," "Extent to which Aboriginal treaty rights are respected," and "Annual change in greenhouse gas emissions from transmission operations" were added to address comments raised by participants in the individual consultations. The indicator "Reportable and non-reportable spills including unintended releases" was added from the T&D strategic plan indicators.
- Other indicators were also moved. Among the most prominent were:
  - The three EMF indicators were moved to "Community Relations". This was because they were previously buried in the "Governance" section. The move helps to raise the profile of this important issue.
  - "Existence of succession plans" was moved to "Staff Relations" at the suggestion of a participant. Some had noted the possibility of eliminating this indicator, but it has been kept for now since the demographics of the company are increasing its importance.

6. A separate pyramid within "Public Involvement" should be created for Aboriginal issues.

- One existing indicator, "Respect for Aboriginal decision-making processes," was incorporated into this pyramid along with two new indicators: "Number of Aboriginal consultation opportunities" and "Adequacy of Aboriginal involvement in the decision-making process."
- Explicit Aboriginal indicators were also added to "Community Relations". The new indicators include: "Investment in Aboriginal employment training in Northern communities," "Programs to preserve traditional ways of life in Northern communities," and "Aboriginal attitude factor." These indicators were added in an effort to address comments raised during the consultations and to reinforce the importance of this stakeholder group.
- As noted above, "Extent to which Aboriginal treaty rights are respected" was also added the "Governance" section.

7. Some indicators could be added. There are no indicators directly measuring the effects on aquatic organisms, climate change, or programs on energy conservation. Additionally, while there are indicators pertaining to the export market, the importance of export capability should be more heavily emphasized.

- A total of 24 new indicators were added.
- In the theme "Stakeholder Relationships" the following were added:
  - Aboriginal indicators noted above were all added.
  - "Public awareness of consultation opportunities" was added after a review of the model forest initiatives.
- In the theme "Land Use Practices" the following were added:

- "Programs to rehabilitate rights of way (ROW)" was added to address an explicit principle of sustainable development in the Provincial Sustainable Development Act.
- "Percent of proposed rights of way (ROW) subject of a pre-clearing assessment" was added following a review of the model forest initiatives.
- "Effect on aquatic organisms" was added to address comments raised by several participants.
- "Proportion of identified vulnerable, threatened, or endangered species for which appropriate action have been taken" was added after a review of the model forest initiatives.
- "Changes in population or diversity for selected species" was added after a review of the model forest initiatives. This indicator replaced "Number of wildlife contacts by type".

- In the "Governance" theme, the following indicators were added:
  - The regulatory indicators noted previously were added.
  - "Percent of time that the system has 100% transfer capability" was added from the T&D strategic plan.
  - "Waste poles recycled or reused" was added to focus attention on an important waste issue for the transmission system.
  - "Supplier lead-time for infrastructure by type" was added to emphasize the importance of suppliers.
  - "Percent of connection requests for alternative energy programs completed on time" was added from the T&D strategic plan.
  - "Investment in at-source energy generation options" was added to address comments on linking the system of indicators to the larger system. At-source power generation options would significantly reduce the need for new transmission lines.
  - "Need for new transmission infrastructure eliminated due to energy conservation programs" was added to address comments raised related to energy conservation.
  - "Renewable energy consumed vs. total energy consumed in the Province" was added after a review of the Provincial Sustainability Indicators Report. This was added to partially address comments on linking the system of indicators to the larger system.
  - "Programs to prevent or mitigate damage prior to occurrence" was added to address comments that there should be an indicator on prevention as a complement to the indicator "Compensation for past damage."

8. **Several indicators could be renamed to better reflect an appropriate definition. Among the indicators cited for clarity on definition were those involving the measurement of outages. Given that customer outages are more related to distribution issues, a focus on equipment outages may be more appropriate for this set of indicators.**

- In the "Stakeholder Relationships" theme, the following were updated:
  - "Number of open houses held" was renamed "Number of public consultation opportunities" to reflect the fact that there are a number of methods through which the utility might consult with the public.
  - "Adequacy of reporting" was renamed "Adequacy of reporting and information provided to the public" to reflect the fact that the utility provides the public with information other than reports.
  - "Respect for Aboriginal decision-making processes" was amended to "Respect for Aboriginal decision-making processes and traditional knowledge" after a review of the model forest initiatives. It is suggested that the criteria for this indicator be designed in consultation with each Aboriginal group at the start of any consultation process. Such flexibility would take into account that different groups will have different needs.
  - "Percent of required training modules complete" was renamed "Percent of employee development plans completed" to incorporate the company's existing definition of the measure in the T&D strategic plan.
  - "Number of corporate volunteer hours in community programs" was renamed "In-kind contributions to community and other local programs" to better reflect the fact that the company provides many in-kind contributions to programs throughout the Province. This change was inspired by indicators in the model forest initiatives.

- "Increase in public attitude factor vs. investment in community relations" was renamed "Change in attitude factors vs. investment in community relations" to reflect the fact that the "Aboriginal attitude factor" was added to the system of indicators.

- In the "Land Use Practices" theme, the following were updated:
  - "Percent of lines on land considered sacred by Aboriginals" was combined with "Percent of lines on protected environmental or cultural areas." This was in recognition of the difficulty of defining the first indicator and also the need to build on well-established Provincial definitions. The definition of protected environmental or cultural areas is now based on the Provincial Protected Areas Initiative.
  - "Edge effect" was renamed "Percent of lines where mitigation of edge effect is pursued" to better reflect the definition of the indicator.
  - "Hectares of forest cover cleared" was renamed "Hectares of forest cover cleared by forest type and age class" after a review of the model forest initiatives.
  - "Hectares of critical habitat affected by operations" was amended so that the definition of critical habitat was based on the Provincial Protected Areas Initiative.
  - The definition of "Contribution to fragmentation of the landscape" was amended. It is based on a comparison of the kilometres of total transmission line in the Province to other "corridor-type" projects including roads, pipelines, and railways.
  - "Minutes of outages caused by vegetation" was renamed "Minutes of equipment outages caused by vegetation" to better reflect a definition appropriate to the transmission system.
  - "Cost of increasing frequency of vegetation management" was renamed "Cost of increasing intensity of vegetation management" at the suggestion of a participant.
  - "Percent of lines with up-to-date vegetation management plans" was replaced with "Percent of work completed on task frequency sheets" at the suggestion of a participant.
  - The definitions of "Cost per hectare managed by practice" and "Hectares managed by total land base by practice" were amended to include multiple treatments as a recognized practice.
- In the "Governance" theme, the following were updated:
  - "Demand profiles" was renamed "Percentage of time the utility is capable of meeting demand" in order to clarify the definition.
  - "Total kilometers of line by capacity" was replaced by "Total kilometers of line by voltage" at the suggestion of a participant.
  - "Average outage frequency" and "Average outage time" were renamed "Average equipment outage frequency" and "Average equipment outage time" respectively to better reflect a definition appropriate to the major high-voltage transmission system.
  - "Revenue shared with affected communities" was renamed "Benefits shared with affected communities" at the suggestion of one participant.

9. Several indicators could be subtracted due to lack of relevance, inability to collect meaningful data, or to eliminate redundancy in the system.

- In the "Stakeholder Relationships" theme, the following indicators were deleted:
  - "Number of meetings with stakeholder advisory panel" was deleted since there are currently no plans to hold further sessions with that group.
  - "Percent of complaints directed to MLAs" was deleted due to difficulty in obtaining a reliable measure.
  - "Average number of hours of training by type" and "Number of employees sponsored for education" were deleted since they are implicit components of "Percent of employee development plans completed."
  - "Number of public education opportunities" and "Public communication effectiveness" were deleted since they were already captured by indicators in "Public Involvement."
  - "Awards for Corporate Social Responsibility" was deleted due to its similarity to "Participation in voluntary programs." It is likely any awards received for participation in those programs would be highlighted.
- In the "Land Use Practices" theme, the following indicators were deleted:
  - "Average width of right of way (ROW)" was deleted at the suggestion of a participant. Since the width of ROW is dictated by line location and voltage, it was noted that this

TABLE F-3
SUMMARY OF RESPONSES TO COMMENTS ON DRAFT INDICATORS

indicator would not provide any relevant information.
  - "Percent of lines requiring resettlement" was deleted at the suggestion of a participant. It was noted that this indicator was more applicable to generation and would in any case be zero.
  - "Number of inquires of adjacent landowners" was deleted due to concerns raised by a participant regarding the difficulty of reliable measurement and questions of relevance.
  - "Number of corridors created" was deleted at the suggestion of a participant. This was in recognition of the fact that the issue of spatial impact is better captured by the indicator "Hectares of right of way (ROW) required."
  - "Cost of complying with regulations" was deleted due to the difficulty of measurement. Due to this deletion, "Cost of regulatory violations vs. cost of prevention" was also removed from the system of indicators.
- In the "Governance" theme, the following indicators were deleted:
  - The indicators "Percent of unprofitable customers" and "Cost per customer" were deleted due to their focus on corporate, rather than transmission, issues.
  - "Capacity utilization" was deleted since it is implicit in other indicators.
  - The "Eco-efficiency indicator" was deleted at the suggestion of one participant. It was replaced by the indicator "Waste poles recycled or reused."
  - The indicators "Existence of risk management plans," "Balance between performance measures," and "Frequency of strategic reviews" were deleted based on the comments of multiple participants.
  - "Percent of Provincial households with access to hydro" was deleted since the number is nearly 100% already. This indicator may also inadvertently encourage building transmission lines to very remote communities where at-source power generation is a more reasonable option.
  - "Programs to maintain service in emergencies" was deleted since it may reveal proprietary information.

10. Although the overall focus is on the transmission system, it is also important to consider linkages to the larger system.

- It was emphasized by many participants that the indicators must be directly relevant to the transmission system.
- However, it was highlighted by others (particularly the external experts) that there must also be linkages to the overall system.
- This point was reflected in a number of updates to the indicators in the "Governance" theme.
- In the "Governance and Management Issues" issue, this is reflected in:
  - "Profitability of business unit" – although the company does not measure profitability at the business unit level, it may be useful to consider how each business unit contributes to the profitability of the overall company.
- In the "Benefits to Customers and Stakeholders" issue, this is reflected in:
  - "Percent of avg. household income devoted to electricity" – although not explicitly a transmission indicator, it links the price of energy to the income levels in the province.
  - "Price per kWh relative to other utilities" – an important overall indicator that transmission contributes to.
  - "Investment in at-source options" – advances in this area would largely reduce or eliminate the need for much of the required transmission infrastructure.
  - "Renewable energy consumed vs. total energy consumed" – again, an overall corporate indicator, but very important.
  - In "Community Relations" the indicator "Public attitude factor" also fits into this.

The responses to the comments received in Table F-3 provided the starting point for a group meeting. Each of the points in Table F-3 was reviewed with the group of experts. Throughout the review, the participants provided a wide variety of additional feedback. Some of the key comments included:

- Consider phasing the indicators in over time. This would recognize the need to focus on a manageable set of indicators initially, but would also emphasize that the remaining indicators are not to be forgotten and should be considered as a part of the recommendations for future work.
- The indicators should be tied to goals and targets. It must be clear if the value of the indicator should increase, decrease, or maintain an appropriate range. Other indicators may be based on a binary evaluation, such as a yes/no response. This form of measurement may be most appropriate for issues where the problem is still difficult to define.
- Several indicators could be deleted from the current set since they are not directly related to the major high-voltage transmission system.
- Compliance with regulatory issues should not be presented as optional. The focus of indicators on these issues should be on instances of non-compliance.
- The participants agreed that EMF is not a governance issue. However, it was emphasized that any EMF indicators should focus on the company's response to concerns raised on the issue, rather than setting arbitrary standards.
- All participants agreed that it is important to explicitly highlight Aboriginal issues. However, the issue should not be micromanaged by indicators that are overly specific. It is also important for the company to look internally regarding Aboriginal issues. For example, cultural awareness training provided to employees and Aboriginal employment goals are particular topics to consider.
- Supplier issues should be captured in the system of indicators. However, any indicator(s) should focus on the broad issue of supplier relationships rather than specific lead-times for each piece of equipment.
- The experts emphasized that no set of indicators will ever be comprehensive since it is not possible to measure everything. Although there are many indicators in the draft system, it must be acknowledged that something will always be missed. Recognizing that the indicators will evolve over time, it was therefore acknowledged that the project must move beyond the identification of a working set of indicators and focus on the remaining steps.

A complete summary of the comments received on the updates to the system of indicators is presented in Table F-4. The comments are again organized around the ten key points discussed in the meeting.

TABLE F-4
SUMMARY OF DISCUSSION ON THE RESPONSES TO THE COMMENTS RECEIVED

1. The hierarchical method of presenting the indicators was clear and useful.

- All participants agreed that the hierarchical method was useful. No additional comments on this point were received.

2. There is no need to limit the number of indicators at the lower levels of the hierarchy.

- The participants acknowledged that the hierarchical structuring of the indicators helped increase the utility of the indicators and provided rationale for why each indicator was included.
- However, the participants noted that it might still be useful to consider limiting the indicators. It was emphasized that the project must be sensitive to the conditions that make a smaller set of indicators desirable. In particular, it was noted that those who actually have to collect the data might prefer a smaller, more manageable set.
- One suggestion was to consider the possibility of phasing the indicators in over time rather than implementing the complete set at once. Given the number of indicators in the working set, a phased approach could help make implementation more manageable. Once an initial

set of indicators was implemented, the company could then consider adding the remaining indicators to it over time.

- This last suggestion built on comments received in the individual consultations. However, if such an approach was adopted, the participants emphasized that the criteria for selecting the core set of indicators must be clear.

3. Definitions of each indicator must be carefully considered.

- The participants agreed that it is important to consider the definitions of each indicator.
- Specific comments received regarding the definition of specific indicators are presented as a part of comment 8.

4. It is important to tie the indicators to goals and targets.

- All participants agreed that goals and targets are necessary to know if the measure is improving or not. It must be clear whether the value of the indicator should increase, decrease, or maintain an appropriate range.
- It was noted that participants would have an opportunity to comment on goals and targets for each indicator as a part of the data assessment and aggregation process.

5. Regulatory issues should be moved to the "Governance and Management Issues" section.

- All participants agreed that regulatory issues are most appropriately presented in the "Governance and Management Issues" section. However, there were questions regarding the specific indicators to be included.
- Discussions centered on the indicators "Compliance with federal and provincial regulations" and "Extent to which Aboriginal treaty rights are respected." One participant questioned whether these indicators were appropriate since they may imply that compliance with regulations is an option, when it is not. It was noted that perhaps it would be more appropriate to frame the issue focusing on instances of non-compliance. The participants also discussed whether the second indicator is actually implicit in the first. However, it was also noted that although Aboriginal treaty rights are protected in federal legislation, keeping it as a separate indicator could potentially be important in demonstrating that it is explicitly considered. In any case, another participant noted that the case utility is not directly responsible for consultations on Aboriginal treaty rights. The provincial and federal governments handle consultation on those matters.
- Two other cases where indicators were moved were also discussed.
    - First, it was agreed that EMF was not a "Governance" issue and that its move to the "Community Relations" section was appropriate. However, it was stressed that indicators regarding EMF should focus on the utility's response to concerns raised regarding EMF rather than on setting additional standards. Possible indicators for EMF will be confirmed in a future consultation with a participating expert.
    - Second, it was agreed by all participants that the indicator "Existence of succession plans" should remain in the system of indicators and that it is most appropriately presented in the "Staff Relations" section.

6. A separate pyramid within "Public Involvement" should be created for Aboriginal issues.

- All participants agreed that explicitly recognizing Aboriginal issues is very important. However, there were some comments and suggestions regarding the specific indicators used.
- It was noted that indicators such as "Number of Aboriginal consultation opportunities," "Adequacy of Aboriginal involvement in the decision-making process," "Investment in Aboriginal employment training in Northern communities," "Programs to preserve traditional ways of life in Northern communities," and "Aboriginal attitude factor" may be getting too specific. In other words, the indicators might inadvertently lead to a micromanaging of the issue. It was suggested that those indicators might be consolidated into a few indicators with a broader focus. One suggested indicator was "Satisfaction with the consultation process." Another suggestion was to consider structuring the indicators around the major phases of transmission development. For instance, one indicator could be created for planning and

design, one for construction, and one for operation of the transmission line. Finally, the participants noted that several Aboriginal issues would be implicit in indicators in the "Benefits to Customers and Stakeholders" section.

- The participants discussed whether the indicators should consider Aboriginal issues in only those communities where the transmission system has an impact or in the entire province. Although this would go beyond the scope of this particular project, it was discussed that there is a need for an overall corporate policy on Aboriginal issues to help clarify such points.
- It was also noted that it is important for the utility to look internally on Aboriginal issues as well. In particular, it would be useful to consider an indicator that measures cultural awareness training provided to employees. It would also be useful to consider what the utility wants to accomplish from an Aboriginal employment perspective.

7. Some indicators could be added.

- There were many comments received on the indicators added to the working set. Unless otherwise noted below, the participants agreed with the addition of the indicator as noted in Table F-3.
- The participants felt that "Programs to rehabilitate rights of way (ROW)" should be deleted. The company already has a program in place, but the reality is that it is rarely needed. The company does not often decommission a right of way and there are therefore better things for the indicators to focus on.
- It was noted that the indicator "Percent of proposed rights of way subject to a pre-clearing assessment" would not add any value since this is required as a part of the licensing process.
- It was suggested that "Effects on aquatic organisms" could be measured by tracking how often a letter of advice for overhead powerlines is required from the Department of Oceans and Fisheries. The definition of this indicator will be determined following a discussion with one expert.
- It was noted that the indicator "Proportion of VTE species for which appropriate action have been taken" is an important issue and is already considered as a part of the assessment process for new transmission lines. It was determined that the indicator should remain in the system but that it may be clearer if it is reworded to focus on the percent of areas where appropriate action has been taken. In any case, it was noted that this indicator should be viewed as a starting point and will likely evolve over time.
- "Changes in population or diversity for selected species" is related to an important concept, biodiversity, but it is better represented as a forward-looking indicator that will be considered in the future rather than as a part of this system of indicators. Questions such as what species to select go beyond the scope of this project. However, the indicator does draw attention to the need to emphasize in future thinking whether the utility is asking the right questions regarding biodiversity. A descriptive indicator focusing on the existence or lack of a policy may therefore be appropriate for this stage of the project. In any case, this concept should be captured in a discussion of further work required.
- Several comments were raised during the discussion of the indicator "Waste poles recycled or reused." One participant noted that there are many more components of the transmission system that can be recycled or reused, including the line and other hardware. It was also noted that a separate indicator for treated wood, including but not limited to the poles, might be useful. This indicator will be developed in further consultation with a participating expert.
- It was noted that supplier issues are important, however the indicator "Supplier lead-time for infrastructure by type" is too specific and does not add much value. For example, lead times for infrastructure will already be captured as a part of the indicator on duration of outages. There were also questions regarding the relevance to sustainable development such an indicator has. However, it was noted that a broad indicator on supplier relations might be useful.
- The participants felt that the indicators "Percent of connection requests for alternative energy programs completed on time", "Investment in at-source energy generation options", "Need for new transmission infrastructure eliminated due to energy conservation", and "Renewable energy consumed vs. Total energy consumed in the Province" were more appropriate as generation or corporate level indicators and should be deleted from this system of indicators. However, it was stressed that these are important issues that should be noted somewhere, potentially in the recommendations for further work.

TABLE F-4
SUMMARY OF DISCUSSION ON THE RESPONSES TO THE COMMENTS RECEIVED

- It was noted that the indicators "Programs to prevent or mitigate damage prior to occurrence" and "Compensation for past damage" should be reworded to ensure that the issue of fair treatment of landowners is addressed. For example, the indicator might focus on the question of whether there is a policy to address this issue and whether it has been updated in the last five years or not (i.e. a yes/no-style of indicator). It was also noted that there are already many programs in place to deal with compensation and mitigation issues at the corporate and transmission business unit levels.

8. Several indicators could be renamed to better reflect an appropriate definition.

- There were many comments received on the renamed indicators. Unless otherwise noted below, the participants agreed with the changes.
- Although there was some debate, it was suggested that the indicator "Percent of lines on protected environmental or cultural areas" may not add value. Some of the participants felt the more important issue was what the utility was doing to minimize such occurrences in the future. It was noted that this would be a consideration during the siting of the line. It was also noted during the discussion of this indicator that it may be useful for the company to have an inventory of the species at risk, the protected environmental areas, and protected cultural areas where the transmission line has an impact. Although it is beyond the scope of the current work, this is another indicator to consider in the future.
- It was noted that the indicator "Hectares of forest cover cleared by forest type and age class" was too specific and would require an enormous amount of work to measure. Therefore, it was suggested that it should revert to the original indicator of "Hectares of forest cover cleared." The participants discussed that the goal of the indicator was to better understand what effect the company was having in land management.
- The participants agreed that the indicator "Percent of work completed on task frequency sheets" would be better represented by the original indicator "Percent of lines with up-to-date management plans" or some similar measure. The definition of this indicator was clarified in consultation with a participating expert.
- It was noted that the indicator "Hectares managed by total land base by practice" was confusing and that it should be renamed to focus on the respective percentages of the land management options.
- It was clarified that the definition of "critical zone" was related to the height of the vegetation and, specifically, the vegetation that put the line at risk. It was noted that measuring the "Percent of line with vegetation in the critical zone" may be very costly to measure in the absence of a GIS system.

9. Several indicators could be subtracted.

- The participants agreed that all of the indicators suggested in Table E-3 should remain out of the system with the possible lone exception of "Number of inquires of adjacent landowners." One participant noted that it might be possible to extract this information from the customer service database.

10. Although the overall focus is on the transmission system, it is also important to consider linkages to the larger system.

- The participants agreed that linkages to the larger system should be considered but all stressed that the indicators themselves should be focused specifically on the transmission system.
- It was noted that all of the indicators suggested would therefore be more appropriate as considerations for further work at the corporate level, rather than being addressed as a part of this project.
- For the indicator "Profitability of the business unit", it was noted that the transmission system is not profitable per se and the issue should really be focused on minimizing costs. With that in mind, it was suggested that an indicator such as "Cost per kilometer of maintenance" might be an indicator to consider.

Finalize Working System of Indicators

The working system of indicators was presented in Section 5. As is evident from the figures, several updates to the indicators were made based on the critical review. A brief summary of the final updates to the indicators is presented in Table F-5.

TABLE F-5
SUMMARY OF FINAL UPDATES TO THE INDICATORS

Indicators that were renamed:

- Adequacy of Aboriginal involvement in the decision-making process
- Hectares of forest cleared per year by type and age class
- Proportion of identified vulnerable, threatened, or endangered species for which appropriate action has been taken
- Hectares managed by total land base by practice
- Number of complaints upheld by regulatory bodies
- Waste poles recycled or reused
- Average equipment outage time
- Average equipment outage frequency

Indicators that were added:

- Aboriginal satisfaction with the decision-making process
- Resources devoted to Aboriginal participation in the consultation process
- Percent of EMF information requests followed up on
- Number of staff hours directed towards EMF education programs
- Existence of an up-to-date biodiversity policy
- Percent of lines with up-to-date vegetation management plans
- Stakeholder satisfaction with programs to mitigate effects of transmission line installation
- Percent of suppliers with an up-to-date sustainable development policy
- Percent of wood used that is treated
- Cost per kilometer of line

Indicators that were deleted:

- Respect for Aboriginal decision-making processes and traditional knowledge
- Number of Aboriginal consultation opportunities
- Minimum acceptable distance of line to residential or commercial buildings
- Benefits beyond those legally mandated
- Cost of hiring vs. cost of retention
- Aboriginal attitude factor
- Investment in Aboriginal employment training in Northern communities
- Programs to preserve traditional ways of life in Northern communities
- Average intensity of EMF at edge of right of way (ROW)
- Investment in decommissioning and rehabilitation of ROW
- Programs to rehabilitate ROW
- Change in public attitude factor vs. investment in community relations
- Percent of proposed ROW subject to pre-clearing assessment
- Species at risk with habitat affected by operations
- Changes in population or diversity for selected species
- Percent of work completed on task frequency sheets
- Export profit margin vs. local profit margin
- Profitability of business unit
- Supplier lead-time for infrastructure by type
- Compliance with federal and provincial regulations
- Extent to which Aboriginal treaty rights are protected
- Percent of licenses denied by reason

TABLE F-5
SUMMARY OF FINAL UPDATES TO THE INDICATORS

- Percent of household income devoted to electricity
- Importing cost vs. local rate charged
- Percent of connection requests for alternative energy programs completed on time
- Need for new transmission infrastructure eliminated due to energy conservation programs
- Investment in at-source energy generation options
- Renewable energy consumed vs. total energy consumed in the province
- Price per kwh relative to other utilities
- Compensation for past damage
- Programs to prevent or mitigate damage prior to occurrence

Conduct Data Assessment

The data assessment was based on consultations with key internal experts. A reference number (as indicated by [#]), the significance of the indicator, the form of measurement, the overall goal, and the hierarchical level of the indicator were all considered as a part of the assessment. In cases where an indicator was based on examples in the published literature, the following reference scheme (as indicated in the superscripts) was used in all tables:

1. Case Utility, 2005.
2. Canadian Electricity Association (CEA), 2004. ECR 2003 – the annual report of the environmental commitment and responsibility program. Canadian Electricity Association. Ottawa, Canada.
3. Global Reporting Initiative, 2002. GRI Sustainability Reporting Guidelines. Global Reporting Initiative. Amsterdam, Netherlands.
4. Natural Resources Canada (NRC), 2000. A user's guide to local level indicators of sustainable forest management: experiences from the Canadian Model Forest Network. Ottawa, Canada.
5. Velva, V. and Ellenbecker, M., 2001. Indicators of sustainable production: framework and methodology. Journal of Cleaner Production. Vol. 9, pp. 519-549.
6. Azapagic, A. 2004. Developing a framework for sustainable development indicators for the mining and minerals industry. Journal of Cleaner Production, Vol. 12, No. 6, pp. 639-662.
7. Meadows, D., 1998. Indicators and information systems for sustainable development. The Sustainability Institute, Hartland Four Corners, Vermont, USA.
8. Belnap, J., 1998. Environmental auditing - choosing indicators of natural resource condition: a case study in Arches National Park, Utah, USA. Environmental Management, Vol. 22, No. 4, pp. 635-642.

The indicators are organized by the eight identified key issues. The complete results of the data assessment are available in Tables F-5 – F-12 respectively.

Table F-5 – Indicators for Public Involvement					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[1] Number of public consultation opportunities	Stakeholder demands and legislative requirements have increased the need to consult regularly with key stakeholders.	Opportunities/Year	Increase	Department (Licensing and Environmental Assessment)	Yes, but not currently compiled
[2] Number of attendees to public consultations	In order to be productive, it is essential that the consultations are well attended by the right people.	Number/Year	Increase	Department (Licensing and Environmental Assessment)	No
[3] Public awareness of consultation opportunities[4]	In order to enhance transparency of the public consultation process, the utility should ensure that those affected by the decision are aware of the available consultation opportunities.	Scale (1-5) from public survey	Increase	Department (Licensing and Environmental Assessment)	No
[4] Percent of past commitments fully met	Meeting past commitments is an essential component of building trust and strong relationships with stakeholders.	Percent	Increase	Department (Licensing and Environmental Assessment)	No
[5] Average response time to requests for publicly available information[2]	Prompt response to requests for publicly available information are desired wherever possible.	Days/Request	Decrease	Department (Licensing and Environmental Assessment)	No
[6] Adequacy of reporting and information provided to the public	External reports and other communication tools provide an opportunity to share information of value to both the company and its key stakeholders.	Scale (1-5) from public survey	Increase	Department (Licensing and Environmental Assessment)	No
[7] Resources devoted to Aboriginal participation in the consultation process	Explicit recognition of Aboriginal issues is critical from a regulatory, future liability, and public image perspective. It is critical that resources are made available for their participation in planning and development.	Dollars/Year as a percentage of total spending	Range	Department (Licensing and Environmental Assessment)	No
[8] Openness to stakeholder participation[5]	Involving stakeholders in the decision-making process helps to enhance credibility, public image, and transparency.	Scale (1-5) from public survey	Increase	Division (Planning and Design)	No
[9] Effectiveness of engagement process	The company conducts a number of stakeholder consultation activities. Measuring the effectiveness of these activities is critical in identifying improvements.	Scale (1-5) from survey of those consulted	Increase	Division (Transmission Planning and Design)	No

Table F-5 – Indicators for Public Involvement					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[10] Meeting expectations	Meeting or exceeding stakeholder expectations is an essential component of overall business sustainability.	Scale (1-5) from public survey	Increase	Division (Transmission Planning and Design)	No
[11] Aboriginal satisfaction with the decision-making process	It is important that Aboriginal individuals and groups feel that the company takes their input seriously. Satisfaction with the decision-making process is a key component of building stronger relationships over time.	Scale (1-5) from survey of Aboriginal groups affected by decisions	Increase	Division (Transmission Planning and Design and Community Relations)	No
[12] Level of stakeholder trust by category[2]	Trust is the most important factor in relationships with interested stakeholders.	Scale (1-5) from CEA public survey or from a survey of previously consulted groups	Increase	Business Unit	Yes

Table F-6 – Indicators for Staff Relations					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[13] Perceived clarity of expectations[1]	Clear roles and responsibilities are necessary to ensure all employees understand what is expected of them.	Scale (1-5) from staff survey	Increase	Department (All)	Yes
[14] Perceived opportunity for advancement[1]	Most employees want to see that their company offers an opportunity for professional advancement.	Scale (1-5) from staff survey	Increase	Department (All)	Yes
[15] Perceived ability to influence decisions[1, 5]	Employees increasingly want a say in how the company is run, particularly in decisions that affect them.	Scale (1-5) from staff survey	Increase	Department (All)	Yes
[16] Perceived access to necessary resources[1]	In order to effectively do their jobs, employees require access to the necessary information and other resources.	Scale (1-5) from staff survey	Increase	Department (All)	Yes
[17] Staff sense of team[1]	A strong sense of team may help lead to several benefits including enhanced morale, increased productivity, reduced absenteeism, and reduced turnover.	Scale (1-5) from staff survey	Increase	Department (All)	Yes
[18] Internal and external salary ratios	In order to attract quality employees, the company must offer competitive salaries.	Average internal salary/Average salary in CEA	Range	Department (All)	No
[19] Percent of employee development plans completed[1]	As a part of the orientation and ongoing education program, the company offers a number of training modules. Completion of the modules will prepare the employee to effectively and safely do their job.	Percent	Increase	Department (All)	Yes, but not currently compiled
[20] Non-entry level positions filled with external candidates[1]	In most cases, the company would like to fill openings with internal candidates. In addition to providing opportunities for internal advancement, this provides an indication of how well the company is doing in preparing for the future. However, the company recognizes it must also occasionally hire external experts in order to bring a different perspective.	Percent	Range	Department (All)	Yes
[21] Investment in staff education and training[3]	Promoting education and training requires a significant investment in employees. However, this is critical to the survival and growth of an organization. Education can be a source of competitive advantage, help promote employee	Dollars/Year as a percentage of total spending	Range	Department (All)	Yes

Table F-6 – Indicators for Staff Relations					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
	personal growth, raise job satisfaction, and contribute to improved safety.				
[22] Percent of worker's who report complete job satisfaction[1, 5]	Employees who are satisfied with their position are more likely to be productive and less likely to leave the company.	Percent	Increase	Division (All)	Yes
[23] Effectiveness of capturing staff feedback	In order to address the issues staff consider important, it is essential that feedback is effectively captured.	Scale (1-5) from staff survey	Increase	Division (All)	No
[24] Average employee turnover by classification[3, 5]	The employee turnover rate is directly related to recruitment costs, training costs, and productivity. However, the company recognizes that some turnover is desirable in order to bring new perspectives.	Percent	Range	Division (All)	Yes
[25] Effectiveness of staff training programs	It is useful to consider what return the company is receiving for its investment in staff training and education programs.	Scale (1-5) from staff survey	Increase	Division (All)	Yes
[26] Existence of succession plans	Succession planning is becoming increasingly important as the average employee age continues to rise.	Yes/No	Yes	Division (All)	Yes
[27] Status as an employer of choice[1]	Being an employer of choice offers many potential benefits, including the retention and attraction of top people.	Scale (1-5) from staff survey	Increase	Business Unit	Yes
[28] Staff preparedness to represent the company in public	Contact with the public is a significant component of many jobs at the case utility. In order to effectively address both company and public needs, staff must be prepared to deal with this critical component of their job.	Scale (1-5) from staff, public, and management surveys	Increase	Business Unit	No

Table F-7 – Indicators for Community Relations					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[29] In-kind contributions to community and other local programs[1]	The company provides a number of in-kind contributions on a variety of projects. Volunteerism is a significant contributor to the social fabric of the community.	Hours/Year as a percentage of total staff time	Range	Department (All)	Yes in some cases, but not currently compiled
[30] Participation in voluntary programs	Among other benefits, participation in voluntary programs can help reduce risk, enhance reputation, and promote best practice influence on regulation.	Description	Range	Department (All)	No
[31] Existence of cultural awareness training for employees	In an increasingly diversified workforce and community, the need for increased cultural awareness is growing. Of particular relevance is that employees are sensitivity to Aboriginal issues and recognize the validity of traditional knowledge.	Yes/No	Yes	Department (All)	Yes
[32] Perceived risk of EMF to humans and livestock	EMF is a high profile issue in the transmission system for some stakeholders. In many cases, the perceived risk of exposure to EMF is substantially greater than the actual risk.	Scale (1-5) from survey of public and livestock owners	Decrease	Department (Licensing and Environmental Assessment)	No
[33] Number of staff hours directed to EMF education and awareness initiatives	There is debate regarding the health effects of EMFs. After more than 25 years of research, there is still no definitive answer. The company should continue to monitor ongoing developments and to share information with the public as it becomes available.	Hours/Year as a percentage of total staff time	Range	Department (Licensing and Environmental Assessment)	Yes, but not currently compiled
[34] Investment in community outreach, charity, and education programs[3, 5, 6]	Investments in such programs can help promote a positive corporate image.	Dollars/Year as a percentage of total spending	Range	Division (All)	Yes
[35] Percent of EMF information requests promptly followed up on	The utility strives to provide interested stakeholders with up-to-date information on EMF.	Percent followed up within one week	Increase	Division (Planning and Design)	Yes, but not currently compiled
[36] Public attitude factor[1, 2]	The CEA public attitude index provides a point of comparison with other utilities regarding the public's opinion of the company's status as an outstanding corporate citizen.	Scale (1-5) from CEA public survey or groups affected by transmission	Increase	Business Unit	Yes

Table F-8 – Indicators for Private and Crown Land Usage					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[37] Hectares of right of way required	The installation of transmission lines requires a significant amount of land.	Hectares	Decrease	Department (Property)	Yes
[38] Loss of alternate land use by type	Devoting land to transmission lines alters existing and future land uses. Where practical, the loss of alternate uses of the land should be minimized.	Hectares/Year by forest, agriculture, recreation, and other	Decrease	Department (Property)	No
[39] Total electricity transmitted[1]	The purpose of the transmission line is to efficiently transmit electricity from generation facilities to the distribution system.	MW/Year	Increase	Department (System Performance)	Yes
[40] Percent of lines on protected environmental or cultural areas	The company seeks to avoid building lines on areas protected as a part of the Province's Protected Areas Initiative where practical.	Percent	Decrease	Department (Property)	No
[41] Number of complaints related to dust, noise, and visual issues[6]	Aesthetics is an important issue among key stakeholders, particularly the general public and adjacent landowners.	Number/Year by dust, noise, visual, and other	Decrease	Department (Property and Community Relations)	No
[42] Average compensation paid	The company first seeks to negotiate a fair settlement. If necessary, provincial legislation sets the price for expropriation at 75% of the current market value.	Percent of fair market value	Range	Department (Property)	Yes
[43] Transmission intensity	Ideally, the company would like to transmit as much power as possible using as little land as necessary.	MW transmitted/ Hectares right of way	Increase	Division (Planning and Design)	Yes, but not currently compiled
[44] Percent of right of way under secondary land use	In spite of the presence of transmission lines, there are opportunities to simultaneously use the ROW for other purposes, particularly agriculture.	Percent by agriculture, recreation, and other	Increase	Division (Property)	No
[45] Number of requests for adjustments to development plans	The company strives to develop plans that are as close to the final design as possible. However, the company seeks to accommodate reasonable requests for adjustments to plans where practical.	Number/Year	Decrease	Division (Transmission Construction and Maintenance)	No
[46] Annual change in right of way by type	The number of hectares of right of way required by the transmission system is subject to continuous change. Each year, additional right of way may be added through the creation of new corridors while existing ROW may by either improved or rehabilitated.	Hectares/Year by agriculture, forest, recreation, and other	Range	Business Unit	No

Table F-9 – Alterations to the Landscape					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[47] Hectares of forest cover cleared per year[1, 4]	Among other benefits, forests help conserve and promote biological diversity, provide a "sink" for carbon dioxide emissions, support employment, and provide recreational opportunities.	Hectares/Year	Decrease	Department (All)	Yes, but not currently compiled
[48] Hectares of trees planted per year[1]	Although tree planting cannot replace natural forest cover, it does promote more sustainable management of the land.	Hectares/Year	Increase	Department (Forestry)	Yes
[49] Hectares of critical habitat affected by operations	One of the greatest threats to wildlife species and biodiversity is habitat loss. Critical habitat is identified in the Provincial Protected Areas Initiative.	Hectares	Decrease	Department (Licensing and Environmental Assessment)	No
[50] Effect on aquatic organisms	Transmission lines cross over bodies of water and this could have potential impacts on aquatic life. Although this indicator will be developed further over time, a preliminary measure has been introduced to highlight its importance.	Percent of requests for letters of advice rejected by the Department of Oceans and Fisheries per year	Decrease	Department (Construction and Maintenance, Licensing and Environmental Assessment)	Yes
[51] Percent of lines where mitigation of edge effect is pursued	The creation of rights of way can have several effects such as creating a boundary, permitting greater penetration of sun and wind, and encouraging growth of opportunisitic species at the edge. The utility seeks to minimize these effects by instituting "soft shoulders" where the management of vegetation is tapered to minimize the difference between the edge of the ROW and the surrounding areas.	Percent	Increase	Department (Line Maintenance Services)	No
[52] Properties of area media prior to line installation[8]	The utility seeks to better understand the effect of the installation of a line both within the project impact area (i.e. the right of way) and within the zone of influence (i.e. within 150 metres of the edge of the right of way). This requires that the properties of the area are measured prior to the line installation to establish baseline values.	Average soil temperature, soil compaction, and groundwater levels	Range	Department (Construction)	No
[53] Properties of area media after line installation[8]	The utility seeks to better understand the effect of the installation of a line both within the project impact area (i.e. the right of way) and within the zone of influence (i.e. within 150 metres of the	Average soil temperature, soil compaction, and groundwater levels	Range	Department (Line Maintenance Services)	No

Table F-9 – Alterations to the Landscape					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
	edge of the right of way). This requires that the properties of the area media (soil, air, water) after the line installation are measured so that they may be compared to the baseline values.				
[54] Net change in forest cover per year[1]	The company seeks to minimize the overall loss of forest cover.	Hectares/Year	Range	Division (Transmission Construction and Line Maintenance)	Yes, but not currently compiled
[55] Percent of lines for which vulnerable, threatened, or endangered species have been identified and appropriate action has been taken[4]	It is important to consider the effects of the transmission system on both plant and animal species. Where possible, efforts should be taken to mitigate the negative effects of the system on these species.	Percent	Increase	Division (Licensing and Environmental Assessment)	No
[56] Existence of an up-to-date biodiversity policy[3]	Biodiversity loss is a significant side-effect of the clearing of a ROW. Although indicators for this type issue are still in the early stages of development, a preliminary measure has been included here to highlight the issue.	Yes/No	Yes	Division (Transmission Construction and Line Maintenance)	Yes
[57] Change in affected media due to line installation	The utility seeks to better understand the effect of the installation of a line both within the project impact area (i.e. the right of way) and within the zone of influence (i.e. within 150 metres of the edge of the right of way).	Change in average soil temperature, soil compaction, and groundwater levels	Range	Division (Transmission Construction and Line Maintenance)	No
[58] Contribution to fragmentation of the landscape	One of the most significant issues associated with the construction of transmission lines is fragmentation of the landscape. Among other effects, it may impede the movement of some species and may introduce new competitors for the use of land. Clearing for roads, pipelines, railways, agricultural uses, and urban development also causes significant fragmentation.	Kilometers of transmission lines / Total kilometers of corridors created in the Province (railway, pipeline, roads, and transmission)	Decrease	Business Unit	No

Table F-10 – Vegetation Management Practices					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[59] Minutes of system outages caused by vegetation per year[1]	The purpose of vegetation management is to prevent outages caused by vegetation.	Minutes/Year	Decrease	Department (Line Maintenance Services)	Yes
[60] Dollar spent on vegetation management per year[1]	Vegetation management is a significant, non-value added expense.	Dollars/Year	Decrease	Department (Line Maintenance Services)	Yes
[61] Cost per hectare managed by practice	The cost of managing the vegetation varies substantially by practice. Practices include hand cutting, mechanical, chemical, biological, and multiple treatments.	Dollars/Hectare for hand cutting, mechanical, chemical, biological, and multiple treatments	Decrease	Department (Line Maintenance Services)	Yes
[62] Percent of hectares of right of way managed by practice	A number of vegetation management practices are utilized depending on terrain, cost, and other factors.	Percent of hectares managed by practice	Range	Department (Line Maintenance Services)	Yes, but not currently compiled
[63] Cycle time by method of vegetation management	The interval between treatments varies substantially by practice. This is also useful as a measure of how fast the vegetation is growing.	Years	Increase	Department (Line Maintenance Services)	Yes
[64] Percent of lines with up-to-date vegetation management plans	While all newer lines have up-to-date vegetation management plans due to licensing requirements, many of the older lines do not.	Percent	Increase	Department (Line Maintenance Services)	No
[65] Relationship between outages and dollars spent	The company seeks to obtain maximum value for dollars invested in vegetation management.	Ratio	Increase	Division (Construction and Maintenance)	No
[66] Cost of increasing intensity of vegetation management	Cost is the most significant factor in determining whether or not the intensity of right of way treatment should be increased. Increased intensity of treatment should increase the cycle time.	Dollars/Year	Decrease	Division (Construction and Maintenance)	No
[67] Percent of right of way with vegetation in the critical zone	Vegetation in the critical zone (i.e. at a height where it might interfere with the line if not treated within one year) is a significant risk to cause outages.	Percent	Decrease	Division (Transmission Construction and Maintenance)	No
[68] Cost of reducing vegetation in the critical zone vs. cost of outages	With demands on limited resources ever increasing, the costs of any treatment must be weighed against the benefits.	Ratio	Range	Business Unit	No

Table F-11 – Governance and Management Issues					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[69] Total kilometers of line by voltage	The case utility has over 20,000 km of high voltage transmission lines in the Province. The major high voltage lines operate at 115 kV, 138 kV, 230 kV, and 500 kV.	Total kilometers of line by voltage (115 kV, 138 kV, 230 kV, and 500 kV)	Range	Department (Planning and Design)	Yes
[70] Export/import ratio and capability	Significant profits are generated through the export of electricity to more lucrative markets. Conversely, the cost of imported electricity exceeds the rate charged to local customers.	Ratio as a percentage of total export and import capability	Increase	Department (System Performance)	Yes
[71] Percent of time that the system has 100% transfer capability[1]	Much of the company's profit is derived from export sales. It is essential that the transmission system is able to transfer any excess electricity to external customers whenever possible.	Percent	Increase	Department (System Performance)	Yes
[72] Percent of time capable of meeting demand	The demand for electricity varies greatly throughout the day and throughout different periods of the year. To avoid outages, the company must be capable of meeting peak demand.	Percent	Increase	Department (System Performance)	Yes
[73] Percent of in-service dates met[1]	The company strives to meet in-service dates since this can have important implications for the reliability of the system.	Percent	Increase	Department (Transmission Projects)	Yes
[74] Average lifetime of infrastructure	The average lifetime of the infrastructure is a significant consideration in the overall life cycle impacts.	Years	Increase	Department (Line Maintenance Services)	No
[75] Variance in expenditures from budget[1]	A measure of how effective the divisions are in both predicting and staying within budget.	Percent	Decrease	Department (All)	Yes
[76] Investment in research and development by type[1, 3, 5]	Research and development is a critical component of continuous improvement. It is necessary to ensure the long-term viability of the company.	Dollars/Year as a percentage of total spending	Range	Department (All)	Yes
[77] Reportable and non-reportable spills and unintended releases[1, 5]	The company seeks to minimize spills and other unintended releases wherever possible. However, when they do occur, it is important that they are documented for both regulatory purposes and for developing future mitigation mechanisms.	Number/Year	Decrease	Department (Occupational Health and Safety)	Yes
[78] Percent of wood used that is treated	Much of the wood used in the operations of the transmission system is treated.	Percent	Range	Department (Line Maintenance)	Yes

Table F-11 – Governance and Management Issues					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[79] Annual change in greenhouse gas emissions from transmission operations[3]	Although there are few GHG emissions from the transmission system, this is an important company goal that all divisions will monitor. The company seeks to minimize GHG emissions.	Percent reduction and total emissions in Tones/Year	Decrease	Department (All)	No
[80] Transmission line efficiency[2]	The company seeks to minimize the amount of electricity lost during transmission from the generation to the distribution system.	Percent	Increase	Division (System Operations)	Yes
[81] Average system outage frequency[1]	Outage frequency is a significant indicator of system reliability. Since the indicators are focused on the major high voltage transmission system, the indicator measures system outages rather than customer outages (distribution issue).	Outages/Year	Decrease	Division (System Operations)	Yes
[82] Average system outage time[1]	Outage time is another significant indicator of system reliability. Long outage times can damage the company's ability to meet demand.	Minutes	Decrease	Division (System Operations)	Yes
[83] Waste poles, line, and other hardware recycled or reused[3]	Several components of the transmission system are recyclable, including the poles, line, and other equipment. The company seeks to recycle or reuse as much of its infrastructure as possible.	Percent	Increase	Division (Design, Maintenance, and Construction)	Yes
[84] Cost per kilometer of line	The cost per kilometer of line varies substantially depending on the installed capacity.	Dollars/Kilometer for both construction and maintenance	Decrease	Division (Design, Maintenance, and Construction)	Yes
[85] Number of regulatory violations by type[3, 5]	The company seeks to meet or exceed all regulatory requirements, including compliance with all federal and provincial regulations. Identifying past violations is an important part of preventing them in the future.	Number/Year	Decrease	Division (All)	Yes, not currently compiled
[86] Existing reliability vs. cost of upgrading	The costs of improving the system reliability must be carefully considered. This measure is likely to evolve over time.	Ratio	Range	Business Unit	No
[87] Existing efficiency vs. cost of upgrading	The costs of improving the transmission line efficiency must be carefully considered. This measure is likely to evolve over time.	Ratio	Range	Business Unit	No
[88] Megawatts transferred per value of fixed assets	Measures the extent to which management is using fixed assets.	MW/Value of Fixed Assets	Increase	Business Unit	No

Table F-12 – Benefits to Customers and Stakeholders					
Indicator	**Significance**	**Metric**	**Goal**	**Level**	**Data (Y/N)**
[89] Net employment creation[3]	The case utility is one of the most significant employers in the Province.	Change in job force per year	Range	Department (All)	Yes
[90] Percent of employment sourced from local communities[6]	The case utility aims to hire employees from local communities wherever practical.	Percent	Increase	Department (All)	Yes
[91] Ratio of lowest wage to provincial minimum[5]	The company seeks to provide quality employment.	Ratio	Range	Department (Human Resource)	Yes
[92] Stakeholder satisfaction with programs to mitigate effects of transmission line installation	The utility has a number of policies and programs to mitigate the adverse effects of line installation, including a trapper's compensation policy. The utility is interested in learning if these policies are working and are acceptable to those being impacted.	Scale (1-5) from survey of impacted stakeholders	Range	Department (Licensing and Environmental Assessment)	No
[93] Percent of contracts with Provincially-based suppliers[5]	The company seeks to utilize local suppliers wherever practical.	Percent	Increase	Department (Purchasing)	Yes
[94] Percent of purchase orders placed with Aboriginal companies[1]	The company seeks to strengthen relationships with aboriginal peoples and to support their businesses where practical.	Percent	Range	Department (Purchasing)	Yes
[95] Classification of employees (full-time, part-time, temporary)[3]	Full-time employment provides a full benefits packages in addition to a higher annual wage and increased stability.	Percent by type of employment (FT, PT, and temporary)	Range	Division (Human Resources)	Yes
[96] Benefits shared with affected communities[6]	The company is increasingly recognizing the need to share the benefits received with those affected by the line. Since these initiatives are in the earliest stages, this indicator represents only a start in the development of the measure.	Description	Increase	Division (All)	No
[97] Percent of suppliers with an up-to-date *sustainable development* policy	Although the existence of a policy does not necessarily indicate more sustainable development, it does indicate that the company has given some thought to the issue. This indicator is a starting point in developing a more robust measure.	Percent	Increase	Division (Purchasing)	No
[98] Workforce representative of Provincial demographics[1, 3]	It is important that the company's workforce reflects the demographics of the larger society. This indicator measures progress towards corporate equity goals.	Percent by target group	Range	Business Unit (Human Resources)	Yes

The indicators clearly illustrate how the utility can begin to measure progress towards many of the existing policies, principles, and goals identified in Appendix B. For instance, on the policy level, there are indicators that address efficiency (e.g. "Transmission line efficiency"), stewardship (e.g. "Change in properties of affected media due to line installation"), minimizing adverse environmental impacts (e.g. "Reportable and non-reportable spills"), and considering the interests of key stakeholders (e.g. many indicators, including all of the "Public Involvement" indicators). Through the integration and assessment models, the indicators also stress the need for continuous improvement, including a regular assessment of progress towards the identified goals for each indicator.

At the principle level, the indicators illustrate how the company could measure progress towards the Sustainable Development Guiding Principles. As noted in Appendix B, the utility has made a commitment to "apply the principles of sustainable development in all aspects of its operations to achieve environmentally sound and sustainable economic development". The indicators clearly represent a tangible demonstration of that commitment. Many of the thirteen guiding principles are also explicitly addressed. The indicators are particularly strong in the areas of public participation, understanding and respect, access to adequate information, stewardship, shared responsibility, and efficient use of resources. Integration of environmental and economic decisions, economic enhancement, prevention, conservation, waste minimization, innovation, and global responsibility are all addressed by at least one indicator as well.

To demonstrate how they contribute to existing goals within the case utility, each of the indicators in Tables F-5 to F-12 was also explicitly tied to one of the goals in the Transmission and Distribution Strategic Plan (TDSP). Although it may be possible to tie many of the indicators to multiple goals, the TDSP goal to which each indicator is most relevant is illustrated in Table F-13.

Note that not all of the TDSP goals were explicitly considered. For example, as previously explained in the dissertation, indicators related to safety were not considered as a part of the process. This was because there were already many existing safety indicators, safety is governed by specific regulations, and the participants did not feel considering issues related to safety would add much value to the process. The participants felt that the time would be better invested in addressing other priorities.

It should also be noted that each of the TDSP goals are not equally represented in the system of indicators. Again, this was because the participants decided to focus on the key priority areas for sustainable development that would add the most value to existing systems. Since the participants felt that greater attention was especially required on environmental and social issues, goals 6, 7, and 8 in the TDSP were particularly well represented in the system.

TABLE F-13
T&D STRATEGIC PLAN GOALS AND THE SUSTAINABLE DEVELOPMENT INDICATORS

Goal	Indicators
1. Continually improve safety and wellness in the work environment.	• No new indicators were developed for this goal.
2. Provide T&D customers with exceptional value.	• Percent of time capable of meeting demand • Percent of in-service dates met • Average lifetime of infrastructure • Average system outage frequency • Average system outage time • Existing reliability vs. cost of upgrading • Existing efficiency vs. cost of upgrading • Transmission line efficiency • Percent of rights of way with vegetation in the critical zone

TABLE F-13
T&D STRATEGIC PLAN GOALS AND THE SUSTAINABLE DEVELOPMENT INDICATORS

Goal	Indicators
3. Be a leader in strengthening working relationships with Aboriginal peoples.	• Resources devoted to Aboriginal participation in the consultation process • Aboriginal satisfaction with the decision-making process • Value of purchase orders placed with Aboriginal companies
4. Improve T&D financial strength by focusing on core business.	• Dollars spent on vegetation management per year • Relationship between outages and dollars spent per year • Cost per hectare managed by practice • Cycle time by method of vegetation management • Cost of increasing intensity of vegetation management • Cost of reducing vegetation in the critical zone vs. cost of outages • Variance in expenditures from budget • Waste poles, line, and other hardware recycled or reused • Cost per kilometer of line • Megawatts transferred per value of fixed assets
5. Maximize transmission system transfer capability to the United States.	• Total electricity transmitted • Transmission intensity • Minutes of system outages caused by vegetation • Total kilometers of line by voltage • Export/import ratio and capability • Percent of time system has 100% transfer capability
6. Have highly skilled, effective, and innovative employees.	• Perceived clarity of expectations • Perceived opportunity for advancement • Perceived ability to influence decision-making • Perceived access to necessary resources • Staff sense of team • Internal and external salary ratios • Percent of employee development plans completed • Non-entry level positions filled with external candidates • Investment in staff education and training • Percent of workers who report complete job satisfaction • Effectiveness of capturing staff feedback • Average employee turnover by classification • Effectiveness of staff training programs • Existence of succession plans • Status as an employer of choice • Staff preparedness to represent the company in public
7. Be a leader in protecting the environment.	• Hectares of right of way (ROW) required • Loss of alternate land use by type • Percent of lines on protected environmental or cultural areas • Percent of right of way under secondary land use • Annual change in right of way by type • Hectares of forest cover cleared per year • Hectares of trees planted per year • Hectares of critical habitat affected by operations • Effect on aquatic organisms • Percent of lines where mitigation of edge effect is pursued • Properties of area media prior to line installation • Properties of area media after line installation

TABLE F-13
T&D STRATEGIC PLAN GOALS AND THE SUSTAINABLE DEVELOPMENT INDICATORS

Goal	Indicators
	• Net change in forest cover per year • Percent of lines for which vulnerable, threatened, or endangered species have been identified and action has been taken • Existence of an up-to-date biodiversity policy • Change in affected media due to line installation • Contribution to fragmentation of the landscape • Percent of hectares managed by practice • Percent of lines with up-to-date vegetation management plans • Reportable and non-reportable spills including unintended releases • Percent of wood used that is treated • Annual change in greenhouse gas emissions from transmission operations • Number of regulatory violations by type
8. Be an outstanding corporate citizen and an outstanding member of the community.	• Number of public consultation opportunities • Number of attendees to public consultations • Public awareness of consultation opportunities • Percent of commitments fully met • Average response time to requests for publicly available information • Adequacy of reporting and information provided to the public • Openness to stakeholder participation • Effectiveness of engagement process • Meeting expectations • Level of trust by stakeholder category • In-kind contributions to community and other local programs • Participation in voluntary programs • Existence of cultural awareness training for employees • Investment in community outreach, charity, and education • Perceived risk of electromagnetic field (EMF) • Number of staff hours directed to EMF education and awareness initiatives • Public attitude factor • Number of complaints related to dust, noise, and visual • Average compensation paid for expropriated land • Number of requests for adjustments to development plans • Ratio of lowest wage to provincial minimum • Stakeholder satisfaction with programs to mitigate effects of transmission line installation • Classification of employees (full-time, part-time, temporary) • Benefits shared with affected communities • Workforce representative of provincial demographics
9. Proactively support agencies responsible for business development in the Province.	• Net employment creation • Percent of employment sourced from local businesses • Percent of contracts with provincial suppliers • Percent of suppliers with an up-to-date sustainable development policy

TABLE F-13
T&D STRATEGIC PLAN GOALS AND THE SUSTAINABLE DEVELOPMENT INDICATORS

Goal	Indicators
10. Be a leader in implementing cost-effective energy conservation and alternative energy programs.	• Investment in research and development by type • Several indicators were suggested that participants ultimately decided should not be included. They are listed in Table 8.2.

Finally, each the indicators were also evaluated against the indicator selection criteria specified in Section 4.4.3. As explained in the report, it was recognized that each indicator would not necessarily meet every criteria. The criteria were used as a screening technique to identify if any indicators may need to be removed from the system. The results of the evaluation are displayed in Table F-14.

As noted in Table F-14, the criteria, namely that the indicators should be understandable, actionable, relevant, credible, illustrative and provide linkages, are met by nearly all of the indicators. The primary exception is that binary indicators are not particularly illustrative since they have only two possible answers. The other exception is the indicator "Properties of area media prior to line installation". It is not illustrative since the number will remain the same over time. However, it is used to develop an illustrative indicator, "Change in affected media due to line installation". Finally, it should be noted that although each individual indicator does not necessarily provide linkages between all three pillars of sustainable development, all of them were considered to provide linkages since each indicator is linked to another through hierarchical structuring and all may be incorporated into the aggregated indices once data is available.

TABLE F-14
INDICATOR SELECTION CRITERIA EVALUATION

	Criteria					
Indicator	**Understandable**	**Actionable**	**Relevant**	**Credible**	**Illustrative**	**Linkages**
Number of public consultation opportunities	•	•	•	•	•	•
Number of attendees to public consultations	•	•	•	•	•	•
Public awareness of consultation opportunities	•	•	•	•	•	•
Percent of past commitments fully met	•	•	•	•	•	•
Average response time to requests for information	•	•	•	•	•	•
Adequacy of reporting and information provided to public	•	•	•	•	•	•
Resources devoted to Aboriginal participation in consultation	•	•	•	•	•	•
Openness to stakeholder participation	•	•	•	•	•	•
Effectiveness of engagement process	•	•	•	•	•	•
Meeting expectations	•	•	•	•	•	•
Aboriginal satisfaction with the decision-making process	•	•	•	•	•	•
Level of trust by stakeholder category	•	•	•	•	•	•
Perceived clarity of expectations	•	•	•	•	•	•
Perceived opportunity for advancement	•	•	•	•	•	•
Perceived ability to influence decisions	•	•	•	•	•	•
Perceived access to necessary resources	•	•	•	•	•	•

TABLE F-14
INDICATOR SELECTION CRITERIA EVALUATION

	Criteria					
Indicator	**Understandable**	**Actionable**	**Relevant**	**Credible**	**Illustrative**	**Linkages**
Staff sense of team	•	•	•	•	•	•
Internal and external salary ratios	•	•	•	•	•	•
Percent of employee development plans completed	•	•	•	•	•	•
Non-entry level positions filled with external candidates	•	•	•	•	•	•
Investment in staff education and training	•	•	•	•	•	•
Percent of workers who report complete job satisfaction	•	•	•	•	•	•
Effectiveness of process for capturing staff feedback	•	•	•	•	•	•
Average employee turnover by classification	•	•	•	•	•	•
Effectiveness of staff training programs	•	•	•	•	•	•
Existence of succession plans	•	•	•	•		•
Status as an employer of choice	•	•	•	•	•	•
Staff preparedness to represent the company in public	•	•	•	•	•	•
In-kind contributions to community and other local programs	•	•	•	•	•	•
Participation in voluntary programs	•	•	•	•	•	•
Existence of cultural awareness training for employees	•	•	•	•		•
Perceived risk of electromagnetic field (EMF)	•	•	•	•	•	•
Number of staff hours directed towards EMF education	•	•	•	•	•	•
Investment in community outreach, charity, and education	•	•	•	•	•	•
Percent of EMF info requests promptly followed up on	•	•	•	•	•	•
Public attitude factor	•	•	•	•	•	•
Hectares of right of way required	•	•	•	•	•	•
Loss of alternate land use by type	•	•	•	•	•	•
Total electricity transmitted	•	•	•	•	•	•
Percent of lines on protected areas	•	•	•	•	•	•
Number of complaints related to dust, noise, and visual	•	•	•	•	•	•
Average compensation paid	•	•	•	•	•	•
Transmission intensity	•	•	•	•	•	•
Percent of right of way under secondary land use	•	•	•	•	•	•
Number of requests for adjustments to development plans	•	•	•	•	•	•
Annual change in right of way by type	•	•	•	•	•	•
Hectares of forest cover cleared per year	•	•	•	•	•	•
Hectares of trees planted per year	•	•	•	•	•	•
Hectares of critical habitat affected by operations	•	•	•	•	•	•
Effect on aquatic organisms	•	•	•	•	•	•
Percent of lines where mitigation of edge effect is pursued	•	•	•	•	•	•
Properties of area media prior to line installation	•	•	•	•		•
Properties of area media after line installation	•	•	•	•	•	•
Net change in forest cover per year	•	•	•	•	•	•
Percent lines for which of VTE species have been identified	•	•	•	•	•	•
Existence of an up-to-date biodiversity policy	•	•	•	•		•
Change in affected media due to line installation	•	•	•	•	•	•
Contribution to fragmentation of the landscape	•	•	•	•	•	•
Minutes of system outages caused by vegetation	•	•	•	•	•	•

TABLE F-14
INDICATOR SELECTION CRITERIA EVALUATION

Indicator	Criteria					
	Understandable	Actionable	Relevant	Credible	Illustrative	Linkages
Dollars spent on vegetation management per year	•	•	•	•	•	•
Cost per hectare managed by practice	•	•	•	•	•	•
Percent of hectares managed by practice	•	•	•	•	•	•
Cycle time by method of vegetation management	•	•	•	•	•	•
Percent of lines with up-to-date vegetation management plans	•	•	•	•	•	•
Relationship between outages and dollars spent	•	•	•	•	•	•
Cost of increasing intensity of vegetation management	•	•	•	•	•	•
Percent of right of way with vegetation in the critical zone	•	•	•	•	•	•
Cost of reducing vegetation in critical zone vs. outage cost	•	•	•	•	•	•
Total kilometers of line by voltage	•	•	•	•	•	•
Export/import ratio and capability	•	•	•	•	•	•
Percent of time system has 100% transfer capability	•	•	•	•	•	•
Percent of time capable of meeting demand	•	•	•	•	•	•
Percent of in-service dates met	•	•	•	•	•	•
Average lifetime of infrastructure	•	•	•	•	•	•
Variance in expenditures from budget	•	•	•	•	•	•
Investment in research and development by type	•	•	•	•	•	•
Reportable and non-reportable spills	•	•	•	•	•	•
Percent of wood used that is treated	•	•	•	•	•	•
Annual change in GHG emissions from transmission	•	•	•	•	•	•
Transmission line efficiency	•	•	•	•	•	•
Average outage system frequency	•	•	•	•	•	•
Average system outage time	•	•	•	•	•	•
Waste poles, line, and other hardware recycled or reused	•	•	•	•	•	•
Cost per kilometer of line	•	•	•	•	•	•
Number of regulatory violations by type	•	•	•	•	•	•
Existing reliability vs. cost of upgrading	•	•	•	•	•	•
Existing efficiency vs. cost of upgrading	•	•	•	•	•	•
Megawatts transferred per value of fixed assets	•	•	•	•	•	•
Net employment creation	•	•	•	•	•	•
Percent of employment sourced from local communities	•	•	•	•	•	•
Ratio of lowest wage to provincial minimum	•	•	•	•	•	•
Stakeholder satisfaction with programs to mitigate effects	•	•	•	•	•	•
Percent of contracts with local suppliers	•	•	•	•	•	•
Percent of purchase orders placed with Aboriginal companies	•	•	•	•	•	•
Classification of employees (full-time, part-time, temporary)	•	•	•	•	•	•
Benefits shared with affected communities	•	•	•	•	•	•
Percent of suppliers with up-to-date sustainable development policy	•	•	•	•	•	•
Workforce representative of provincial demographics	•	•	•	•	•	•

Legend: *• = criteria met, blank cell = criteria not met*

In addition to the criteria specified in Table F-14, Section 4.4.3 identified five principles to help guide the selection of the indicators. The first guiding principle noted that

although data does not necessarily need to be available, the company should have the ability to measure the indicator. This was explicitly considered by conducting a data assessment. The second principle noted that the indicator should be used as a part of a decision-making process. For this reason, each indicator was tied to the business planning process through the hierarchical approach, each indicator was assigned a goal, and an indicator integration model was developed to link the indicators to other internal initiatives. The third criteria dealt with the acceptability of the indicator to those in the company. This was addressed through extensive consultations with internal experts as well as an emphasis on showing how each indicator contributed to the overall system through both the hierarchical approach and the development of the indices. The fourth criteria dealt with comparability to other utilities. Since there are relatively few utilities that have developed sustainable development indicators for their transmission systems, it was recognized this might be a greater consideration in the future. However, several indicators used by other utilities, including limited selections from the CEA ECR program and the Global Reporting Initiative may permit some initial comparisons, provided the other utilities define their measures in a similar manner. Finally, the fifth principle suggested that the utility consider whether the indicator is meant to drive or support policy. Whether any individual indicator will drive or support policy ultimately depends on the utility's priorities at any given time and how the organizational policies change over time. Therefore, while each of the indicators were designed to support existing policy, rather than create new policy, that does not mean they could not conceivably be used to drive policy improvements in the future.

Develop Method for Aggregating the Indicators

The method for developing the indices was illustrated in Section 5. Further details on each step in the figure are provided below and in the CD attached at the back of the dissertation.

Step 1 – Definition of Scope

It was determined that all indicators that currently have data available should be a part of the initial integration phase. For indicators that do not currently have data available, it was agreed that the case utility would determine whether data is collected in the future.

Step 2 – Key Issues Identification

The identification of key issues comprised a significant portion of the project. The three key themes and eight key issues identified during the development of the indicators formed the basis for the organization of the aggregate.

Step 3 – Development of Sustainable Development Indicators

The system of indicators developed in consultation with internal and experts throughout the project formed the basis for the aggregation of the indicators.

Step 4 – Trend Determination

For the purposes of normalization (Step 6 in the aggregation process), it was necessary to determine for each indicator whether its value should increase, decrease, or maintain a range. There are also a limited number of indicators where the measure is of a

binary (yes/no) nature. A summary of the identified goals for each indicator was provided in Table F-5 – F-12.

Step 5 – Assignment of Weights

The weighting process was based on the assignment of a predetermined number of points to the indicators and issues. 100 points were available to be assigned to the indicators in each of the key issues. This method was selected because it is clear and easy to apply.

As discussed in the dissertation, the weights were set to be equal for all indicators and issues. This was in recognition of the fact that the company will require the time and experience of several business cycles following actual implementation of the indicators to determine the relative importance of each. There is precedent for this approach in the published literature.

Step 6 – Normalization of the Indicators

Since the various economic, environmental, and social indicators use a variety of different units, aggregation was not possible without some form of data normalization. As noted in Step 4, normalization equations were required for the four different types of indicators in the system.

Indicators with Increasing or Decreasing Trends

These indicators were calculated according to the following equations:

$$\text{Indicators with Increasing Trends} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

$$\text{Indicators with Decreasing Trends} = 1 - \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

The formulas were based on a normalization procedure published by Krajnc and Glavic (2005a and 2005b) which was in turn very similar to the method used in the calculation of the Human Development Index (UNDP, 2004). The maximum and minimum values were calculated based on internal data collected over a period of five years (as done by Krajnc and Glavic).

Binary Assessment Indicators

Indicators of a binary nature had the values set at 0 for a "no" and 1 for a "yes". This was determined in consultation with the participating experts.

Range Indicators

For indicators seeking to maintain an appropriate range, three options were discussed. In the first option, values were set based on the closeness to the target threshold. For each percentage point that the range was missed, 0.1 of a point was subtracted from the ideal score of 1. A second alternative was to assign a value of 1 for indicators within a specified range and a value of 0 to indicators falling outside of the range. The third alternative was similar to the first, but instead of a 0.1 of a point being subtracted, the penalty would be exponential. In this case, the normalized value of the indicator would be set according to the formula:

Normalized value = exponential (minimum (target, actual score) – maximum(target, actual score))

The normalization methods offer the advantage of incorporating different kinds of units by normalizing them to a value between 0 and 1.

Step 7 – Calculation of Sub-Indices

Given that the three key issue themes (i.e. Stakeholder Relationships, Land Use Practices, and Governance) are further divided into eight individual key issues, there were two levels of sub-indices:

1. One for each of the eight individual key issues.
2. Another for each of the three themes.

The sub-indices for each of the individual key issues were calculated by multiplying the normalized scores by the assigned weight. The sum of the multiples for all of the indicators gave the value for the issue's sub-index. For the calculation of the sub-indices for the three themes, the normalized score for the key issues in that theme were multiplied by the weight assigned to those issues. The sum of the multiples for each issue gave the value for the theme's sub-index. In all cases, the high and low scores within each sub-index group were also highlighted to give a sense of the variation within the sub-index. Examples for each sub-index are provided in the CD attached to the back of the dissertation.

Step 8 – Calculation of the Composite Sustainable Development Index

The composite index was calculated by multiplying the normalized scores for each of the three themes by the weight assigned to each theme. The sum of the multiples for each theme gave the value for the composite index. As above, the low and high scores would also be shown.

* * *

In the group consultation on aggregation, an aggregation example for the key issue "Staff Relations" was presented on an overhead projector. Following the review of the aggregation example, the participants discussed the format for presenting the information and the key assumptions used to develop the example. This resulted in a wide variety of feedback. The key comments included:

- The participants all agreed that the method of presenting the information in Excel was appropriate and would likely be well received within the company.
- One of the key advantages in presenting the information in this manner is that it clearly illustrates how the data will be used to develop useful information. This would be absolutely critical in selling the indicators to those who have to collect the data.
- The radar plot showing the normalized values of the indicators on one figure is a very powerful way of presenting the information in a clear, concise manner.
- Most of the assumptions made in the development of the aggregate were appropriate. The method of weighting the indicators and the normalization method for increasing, decreasing, and binary types of indicators were all acceptable. Where updates were necessary, they are reflected in the previous descriptions of each step in the aggregation process.

- The participants requested that one example be prepared for each of the other two themes. This would help demonstrate that the same process applies to all forms of aggregation and would be helpful in selling the indicators throughout the company.

A complete summary of the comments received during the discussion of the aggregation example is available in Table F-15.

TABLE F-15
SUMMARY OF DISCUSSION ON AGGREGATION EXAMPLE FOR STAFF RELATIONS

- The participants all agreed that the method of presenting the information in Excel was appropriate and would likely be well received within the company.
- Presenting the information in this format helps make sense of the data. It has a very clear and direct linkage between the information and results. This clearly illustrates how the data will be used to develop useful information.
- Illustrating how the data would be used is absolutely critical in selling the indicators to those who have to collect the data. It was noted that employees will inevitably ask why they are required to collect the data and answering this question is something that the company currently struggles with on a regular basis. The aggregation example therefore provides insight into how the necessary linkage between data collection and decision-making may be accomplished.
- The radar plot showing the normalized values of the indicators on one figure is a very powerful way of presenting the information in a clear, concise manner. Such a figure will be very useful in helping sell the indicators at all levels of the organization, particularly with senior management.
- Most of the assumptions made in the development of the aggregate were appropriate and the participants liked the fact that they were largely based on published methods.
- For the weighting of the indicators, the 100 point assignment method was appropriate. It was agreed that using another method, such as the Analytic Hierarchy Process (AHP), would be too time intensive and may not be as clear. The participants also agreed that equally weighting the issues at this stage was appropriate. It was agreed that time and experience would be necessary to determine the weights or even if they should be changed at all.
- The normalization methods were also appropriate in most cases. Although it is always difficult to normalize data with different units, this method does allow the company to see if it is getting better or worse over time. Recognizing that the formula must vary depending on the type of the indicator, the participants agreed that the method for increasing, decreasing, and binary types of indicators were all appropriate.
- However, the participants suggested that the method of normalizing indicators seeking to maintain an appropriate range might be modified. Rather than penalties being assigned for missing a specific target, the method should take into account that any value falling within the desired range is appropriate. Only values falling outside the range should be penalized. It was also suggested that the penalty might grow exponentially as it gets further away from the desired range.
- The participants requested that one example be prepared for each of the other two themes (i.e. one example for "Land Use Practices" and one example for "Governance"). This would help demonstrate that the same process applies to all forms of aggregation and would be helpful in selling the indicators throughout the company. The participants also noted that a CD with all of the electronic examples on it would be very helpful.

Electronic Aggregation Examples in Excel Spreadsheets

As noted above, automated Excel spreadsheets were prepared to provide examples of how the sustainable development indicator indices could be calculated at the case utility. The CD attached to the back of the dissertation contains a copy of those examples.

It is important to note that the spreadsheets were intended to be viewed as illustrative examples. Data was not provided by the case utility for any of the indicators and it was recognized that the case utility's information systems personnel might develop the spreadsheets further if the utility decided to implement the aggregation method. Furthermore, it is important to note that only the spreadsheet for the key issue "Staff Relations" was

directly tested in the expert consultations. The case utility did not request that examples be prepared for the other key issues. However, sample spreadsheets were prepared for each key issue, for each theme, and for the composite sustainable development index to provide illustrations of how the aggregates might be prepared.

With the above in mind, the CD contains folders for each of the key issues, themes, and the composite sustainable development index. To view the examples, begin by opening the folder for the index you wish to view. Then, open the file "*issue name*_data.xls". All of the files are linked to the "*issue name*_data.xls" file. Clicking on the links in the file or changing any of the numbers in the orange cells will allow you to see how everything is linked together and how the graphs and calculations are automatically generated depending on information entered by the user.

APPENDIX G
SUPPORTING MATERIALS FOR INTEGRATE INDICATORS

This section begins by summarizing the most relevant internal initiatives at the case utility for the integration of the indicators. Following that review, it also contains a summary of the key comments received during the consultations with experts on the proposed integration models. An alternate indicator integration model and a summary of the key material related to the development of the indicator trade-off criteria are also provided.

Relevant Existing Initiatives

There are a number of existing initiatives that have relevance to the system of sustainable development indicators. Consultations with the internal and external participants identified the case utility's business planning systems, the ISO 14001 Environmental Management System (EMS), the Canadian Electricity Association (CEA) Environmental Commitment and Responsibility (ECR) Program, the sustainable development reporting system, and the corporate intranet as the most relevant internal initiatives.

Business Planning Systems

The case company had an extensive business planning process in place. The process was widely used, contained a limited set of performance measures, provided inputs to key external reports, and was regularly evaluated as a part of a senior management review. For these reasons, internal experts at the company continually stressed that it would be the primary vehicle for integration of the indicators. The business planning system is a core element in the overall performance improvement system at the utility. Figure G-1 illustrates the performance improvement system at the case utility.

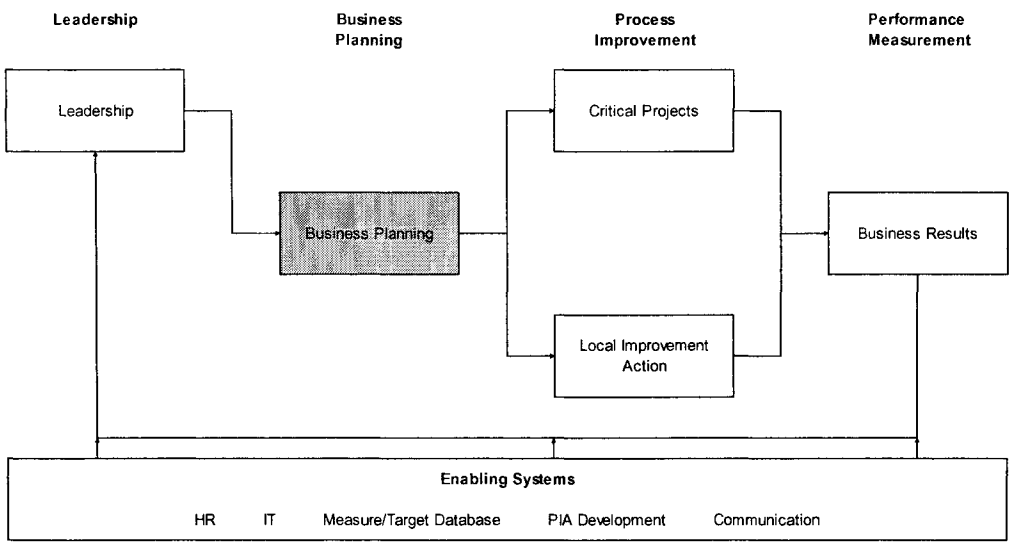

FIGURE G-1
THE CASE UTILITY'S PERFORMANCE IMPROVEMENT SYSTEM

The core document in the business planning system is the Corporate Strategic Plan (CSP), which is produced annually. The CSP includes the corporate vision, mission,

operating principles, and goals outlined in previous sections. Associated with each goal are a number of related measures, targets, and strategies. These measures partially address all three pillars of sustainable development. The CSP provides the foundation for the development of strategic plans at the business unit, division, and department levels. In the case of the T&D business unit, there are some minor differences in language as it relates to the goals in the CSP, but the spirit of the goals are consistent. The complete set of T&D strategic planning indicators were presented in Appendix B (Table B-1).

Business reviews at all levels of the organization are conducted quarterly. At the corporate level, the review is conducted by the Executive Management Committee. At the business unit level, it is conducted by the Business Unit Vice President and the managers of the various divisions within the unit. At the Division and Departmental levels, the managers in charge of the respective area conduct the reviews. As a part of the reviews, measures reports are produced. Although significant changes to the core goals and objectives are rare, revisions to the plan are considered as a part of the quarterly review. These revisions generally address any non-conformities with respect to the established objectives. The business planning process at the case utility is depicted in Figure G-2.

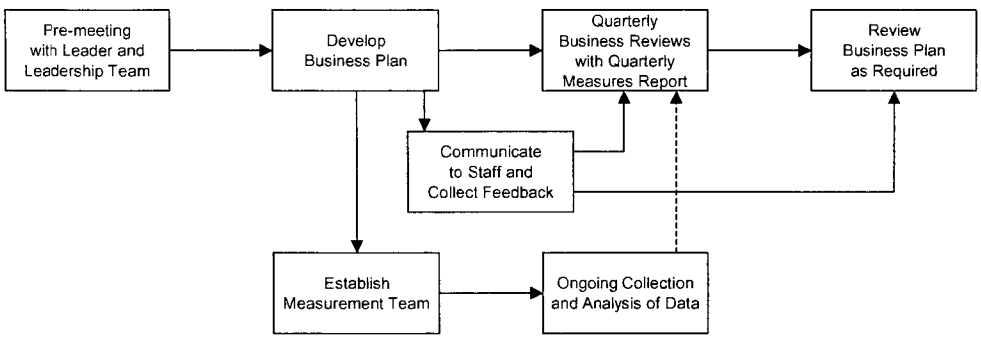

FIGURE G-2
THE CASE UTILITY'S BUSINESS PLANNING PROCESS

The relationship between the business planning process and the performance measurement system is expanded in Figure G-3.

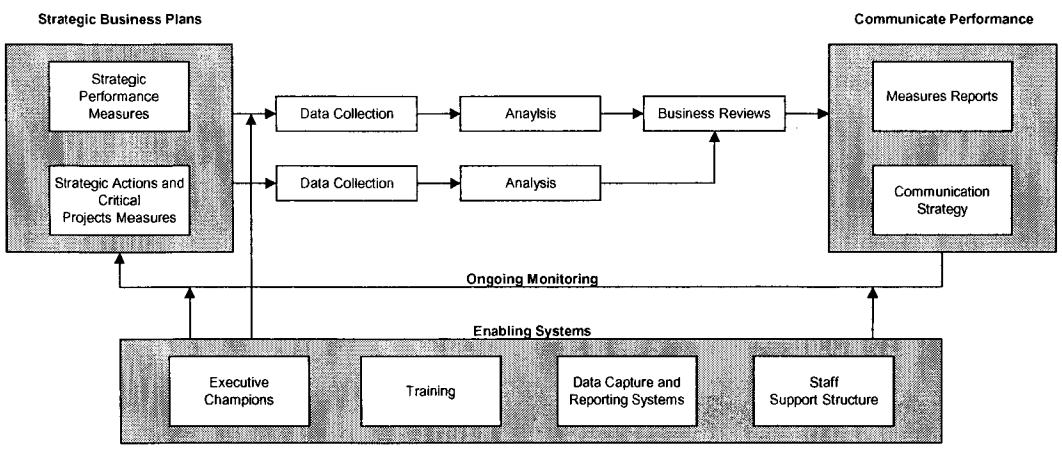

FIGURE G-3
THE CASE UTILITY'S PERFORMANCE MEASUREMENT SYSTEM

CEA ECR Program

The case utility is a member of the Canadian Electricity Association's (CEA) Environmental Commitment and Responsibility (ECR) Program. At the heart of the program are four principles intended to guide members towards improved environmental performance. Each principle is represented by a few environmental performance indicators. The CEA ECR principles and indicators relevant to the transmission system are presented in Table G-1.

TABLE G-1
CEA ECR PROGRAM: PRINCIPLES AND TRANSMISSION INDICATORS

Principle	Indicators
1. To be more efficient in our use of resources.	• Internal energy efficiency for transmission • Reuse of electrical insulating oil
2. To reduce the adverse environmental impacts of our business.	• Atmospheric emissions: carbon dioxide • Atmospheric emissions: sulphur dioxide • Atmospheric emissions: nitrogen oxides • Total number of reportable spills • PCB management • Environmental aspects indicator for fish • Treated wood poles (pilot indicator) • Species at risk and habitat stewardship (pilot indicator)
3. To be accountable to our constituents.	• Public reporting of environmental performance • Responding to external input concerning environmental performance
4. To ensure that our employees understand the environmental implications of their actions and have the knowledge and skills to make the right decisions.	• Evidence of an effective employee awareness and training program

Source: CEA, 2004

Although many of the indicators in the current version of the CEA ECR Program are not applicable to the transmission system, the principles themselves may be applied to all business units. Given that CEA initiatives are well established in the case utility, they provide another access point in integrating the system of indicators.

ISO 14001 Environmental Management System

In addition to the reporting on the ECR indicators, all CEA member utilities are required to implement an ISO 14001 Environmental Management System (EMS). The case utility currently has a registered ISO 14001 EMS for each of the Corporate, T&D, and Power Supply business units. The CS&M business unit was considered in the development of the T&D EMS. Similar to the Corporate Strategic Plan, the Corporate EMS serves as a model for EMS at the business unit level. Management reviews of the EMS are conducted on a quarterly basis while auditing occurs annually.

The Corporate Environmental Management Review Committee conducts a quarterly review of the EMS at the corporate level. At the business unit level, there is a separate EMS Review Committee for the T&D Business Unit. The EMS Review Committee for T&D

includes the division managers and the Corporate EMS Coordinator. Further details on the requirements of an ISO 14001 EMS are available in ISO (2004).

Sustainable Development Report

The case utility annually publishes an electronic sustainable development report on its website. The report draws on a number of internal initiatives including information from the annual report, the CEA ECR Program, and the Corporate Strategic Plan. It reports on some aspects of the organization's performance in economic, environmental, and social areas. It is one of the utility's primary mechanisms of communicating sustainable development information with the public and therefore provides another important means of integrating the sustainable development indicators with existing business infrastructure.

Corporate Intranet

The case utility has an extensive intranet in place that is accessible by all employees. It functions as a core component of the utility's internal information system. Users may electronically access all corporate policies, plans, goals, and measures, among other news and information. The corporate intranet is becoming increasingly integrated and therefore provides an excellent opportunity to link the system of indicators, and all of its hierarchical levels, with existing business infrastructure in a format that is meaningful and useful to internal stakeholders.

Other Initiatives

There are many other initiatives at the case utility that have relevance to this project. Some include: environmental impact statements and site selection environmental assessments (SSEA), demand side management programs, transmission line maintenance and information systems, planning criteria documents, process flow charts, and other corporate reports, including the Annual Report.

In addition to the initiatives noted previously, the system of indicators could potentially help inform decision-making in each of these plans, programs, and documents.

Comments Received in Integration Consultations

In the consultations, the experts were presented with three proposed indicator integration models and two proposed assessment models. To provide the needed context, the draft models are presented prior to the comments received from the experts.

Draft Indicator Integration Models

The first proposed model for a generic indicator integration model is illustrated in Figure G-4. Using a systems approach, the model was designed to accommodate both existing and future initiatives at the case utility. It was organized around eight key elements common to all of the case utility's initiatives. The elements were selected based on the expert consultations conducted throughout the process and a review of published literature related to integrated management systems. Furthermore, since it must be able to control or adjust its own performance in response to outputs generated by the system itself, the model was represented as a closed-loop system.

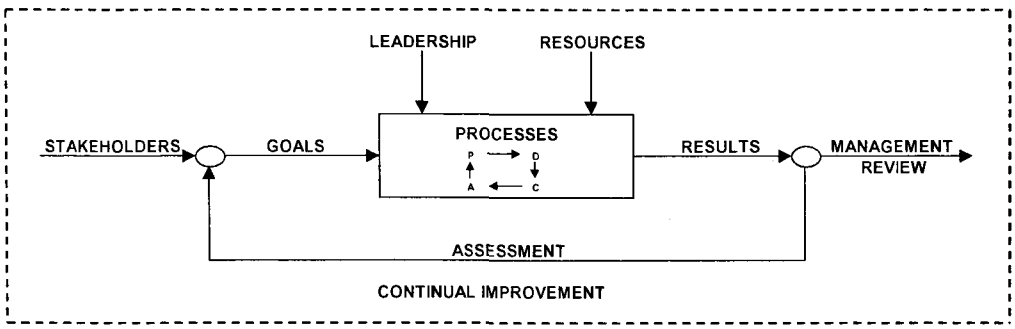

FIGURE G-4
DRAFT INDICATOR INTEGRATION MODEL – OPTION 1

The alternate models for a generic indicator integration model are presented in Figure G-5. As illustrated in the figure, the elements are similar to the ones used in the model above. However, some differences, notably the inclusion of the elements "policy", "plans", and "principles", were incorporated into the alternate models to provide the participating experts with another basis for discussion. There were two versions of the alternate model. The elements are the same, however, the visual presentation was different.

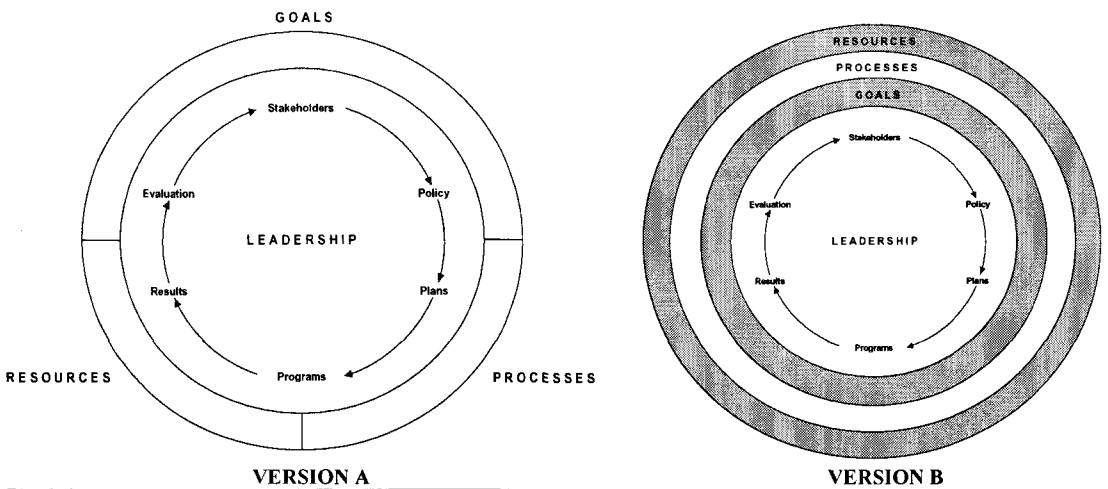

FIGURE G-5
DRAFT INDICATOR INTEGRATION MODEL – OPTION 2

Draft Indicator Assessment Model

The participants were presented with two options for the assessment of the indicators. The first proposed assessment model is illustrated in Figure G-6. As illustrated in the figure, it consisted of 13 essential steps (listed again below since the figure may not be clear):

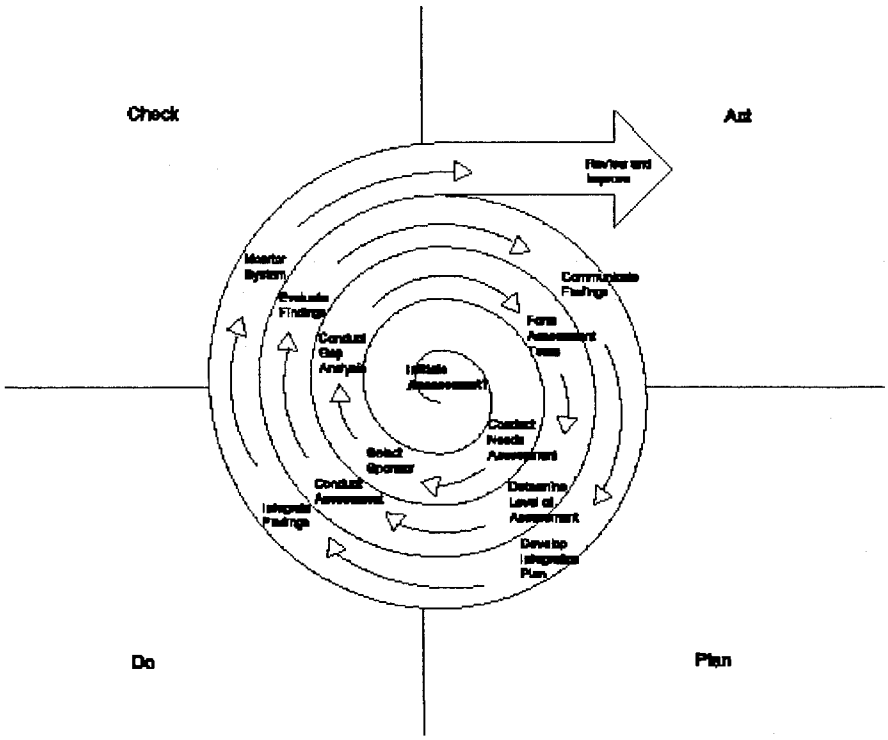

FIGURE G-6
DRAFT INDICATOR ASSESSMENT MODEL – OPTION 1

1. Initiate Assessment.
2. Conduct Needs Assessment.
3. Identify Top Management Sponsor.
4. Conduct Preliminary Gap Analysis.
5. Form Assessment Team.
6. Determine Level of Assessment.
7. Conduct Assessment.
8. Evaluate Findings.
9. Communicate Findings.
10. Develop Integration Plan.
11. Integrate Findings.
12. Monitor System.
13. Review and Improve.

The second proposed model is illustrated in Figure G-7. Note that this model was based in part on an initial draft created during a brainstorming session with Miguel Rocha.

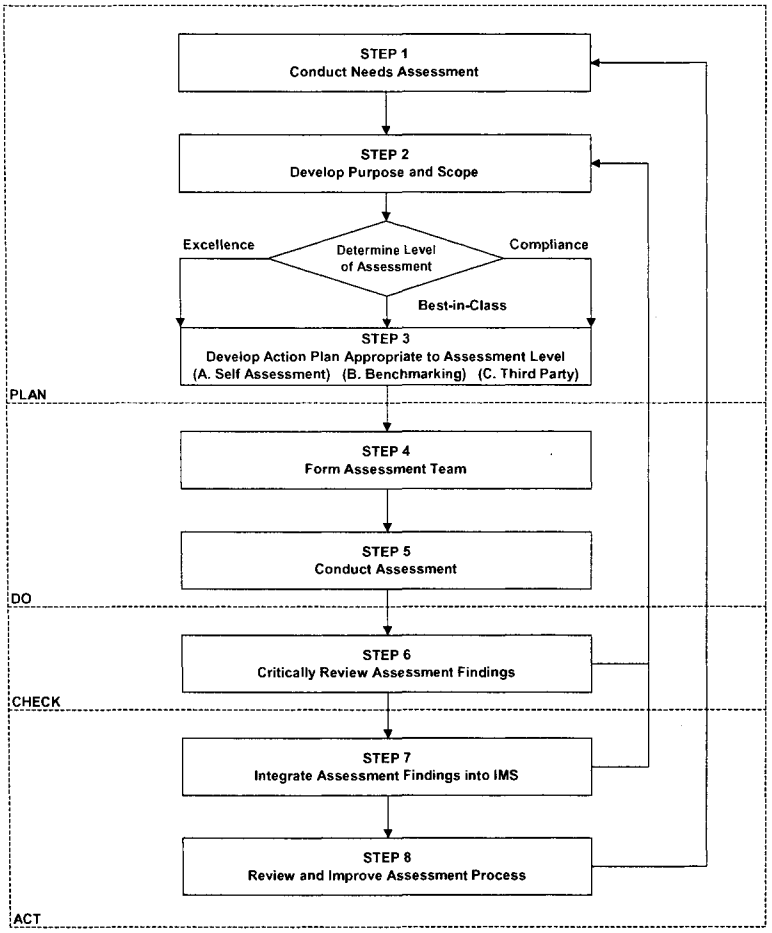

FIGURE G-7
DRAFT INDICATOR ASSESSMENT MODEL – OPTION 2

Comments Received

The key comments on the integration models were:

- The business planning process, the corporate intranet, and the sustainable development reporting process are the most relevant internal systems for the indicators. The integration plans proposed therefore address the appropriate level of integration for the purposes of this project. However, the recommendations for future work should note the need for further integration of the company's existing internal management systems.
- Each of the proposed integration models contains several complex thoughts in a simple diagram. For this reason, it is important that the models are accompanied by clear explanations. Explaining how the models apply to the case utility is of particular note.
- For the example modeled on a feedback control system, three key comments were received. First, it is important to recognize that the PDCA cycle is an inherent part of the entire system, not just the "processes" element. Second, the arrow for the "management review" element should be reversed. Third, it will also be important to clearly explain the meaning of the ovals.

- For the circular examples, several key comments were also received. First, the profile of the "stakeholders" element should be raised. It should be elevated to the same level as the "goals" and "resources" elements. Second, careful thought should also be given as to how the "goals", "resources", and "stakeholders" elements should be visually represented.

The key comments on the assessment model were:

- The spiral model is an interesting way of visually presenting the model. However, it might be useful to consider presenting it as a "bottom-up" model (as in the ISO standards).
- Several steps in the model could be combined. The first five steps were particularly highlighted for consolidation.
- Self-assessment, benchmarking, and third party assessments shouldn't be presented as distinct options, but rather as different levels of assessment. It is also useful to note that they mimic the first, second, and third party assessments of the ISO standards.

A complete summary of the comments received on the proposed integration plans is presented in Table G-2.

TABLE G-2
SUMMARY OF DISCUSSION ON THE PROPOSED INTEGRATION PLANS

- One of the biggest gaps in the existing management system is linking information to decision-making. Although the company has a systematic approach to gathering information, this does not always carry over to the decision-making process. It was emphasized that the company must therefore focus on using the right information at the right time.
- The participants agreed that the correct internal systems had been taken into account in the development of the integration model. The business planning process, the corporate intranet, and the sustainable development reporting process are the most relevant internal systems to the indicators. The integration plans proposed therefore address the appropriate level of integration for the purposes of this project.
- However, it was noted that the company's current management systems do suffer from incomplete integration. Although the purpose of this project is to focus only on those existing systems most relevant to the indicators, the recommendations for further work should note the need for further integration of the company's existing internal management systems. Building the three systems noted above into other systems such as the integrated financial forecast and the power resource plan is a long-term effort that the company may want to study in the future.
- The participants had several comments on each integration model. In each case, the participants noted that there was several complex thoughts put into a simple diagram. This is good for promoting the needed discussion, but the key is to make sure the people who view the model are able to quickly and easily understand it.
    - Specific comments on the model based on a feedback control system:
        - While it is correct to note that the PDCA cycle is an inherent part of the process element, it must be remembered that the PDCA cycle also applies to the system as a whole.
        - The participants noted that it would be important to clearly explain what occurs in each of the ovals depicted in the diagram. For instance, it would need to be clear that management might not necessarily be involved in all aspects of every assessment.
        - The participants questioned where the final arrow labeled management review leads. It was suggested that the arrow should be reversed so that it faces into the oval rather than away from it.
        - It is important to explain how the model applies to the case utility. A generic model is okay but it must be applicable to the company using it.

TABLE G-2
SUMMARY OF DISCUSSION ON THE PROPOSED INTEGRATION PLANS

- Specific comments on the circular models:
  - The participants noted that removing the "stakeholders" element from the loop and making it an overall enabler could raise its profile in the system.
  - The participants agreed that "leadership" should remain at the center of the diagram. This is because this is where the decisions are made and it should therefore have the highest implied priority.
  - The participants discussed the best way of illustrating the key enablers of "goals", "resources", and "stakeholders". One approach is to illustrate them with their own rings (as in Version B), moving from stakeholders, to resources, and finally to goals as you move away from the center of the diagram. The other approach is to illustrate them as in Version A, except with the bars eliminated. It was noted that the bars might suggest a lack of continuity.

- The participants also had several comments on the indicator assessment models.
  - The participants generally liked the method of presenting the model in the spiral.
  - The participants noted that the first several steps in the model might be combined into a single step such as "confirm usefulness of the indicators". It was also noted that steps such as a gap analysis and selecting a sponsor might be viewed as inputs to other steps.
  - The participants suggested that one possible alternative to presenting the model would be to have it spiral up in a manner similar to the diagrams in ISO 9001 and ISO 14001.
  - The participants discussed whether benchmarking might actually be considered as a part of self-assessment. It was discussed that both may be considered as components of a strong assessment rather than separate options. The issue might therefore be presented as one of levels of assessment rather than options.
  - It was also noted that self-assessment, benchmarking, and third party assessment might also be viewed in the context of the first, second, and third party assessments of the ISO standards.

Alternate Indicator Integration Model

As noted in Section 6, an alternate representation of the indicator integration model was prepared. It is presented in Figure G-8.

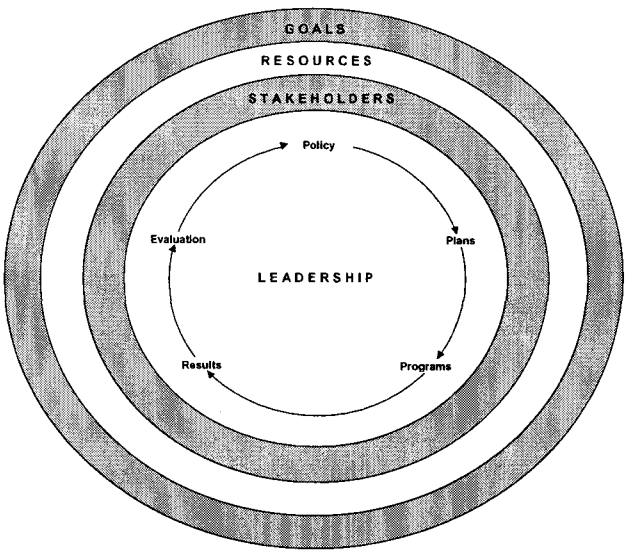

FIGURE G-8
INDICATOR INTEGRATION MODEL – REPRESENTATION 2

The second model consists of five elements supported by four enablers. As illustrated in Figure G-8, the enablers are stakeholders, goals, resources, and leadership. These are essential components of any system. The elements are:

1. **Policy**: Policies represent the overall organizational goals, vision, and values. Although not a roadmap, they provide the general direction to guide decision-making at all levels of the organization.
2. **Plans**: Plans are required in order to provide more specific guidelines on the implementation of the organizational policies.
3. **Programs**: Programs provide the most detailed directions and initiatives for achieving the organizational policies. Management system standards (MSS) for quality, environment, safety, corporate social responsibility, and others are some examples of programs.
4. **Results**: The description given for the model described in Section 6 also applies here.
5. **Evaluation**: The description given for the "Assessment" and "Management Review" sections in Section 6 also apply here.

As is clear from a comparison of the integration models, the descriptions of the elements and enablers are similar with the primary difference being the additions of policy, plans, and programs and the subtraction of processes in Representation 2. In the Figure G-8, the processes element is implicit in the loop in the center of the diagram. While the model in Section 6 builds on a control systems approach and strongly emphasizes that the process must start and end with stakeholders, the circular model highlights the non-linear nature of management systems. With that in mind, a description of the elements in the Figure G-8 is presented in Table G-3.

TABLE G-3
SUMMARY OF KEY POINTS FOR ALTERNATE INDICATOR INTEGRATION MODEL

Element	Integration Notes
Stakeholders	The company consults regularly with a wide variety of stakeholders on a number of issues, particularly as a part of the environmental licensing process. The indicators help further emphasize the need for proactive engagement. Key external stakeholders include the general public, Aboriginals, non-governmental organizations, landowners, federal and provincial regulators, and federal and provincial technical advisors. Industry associations may also be considered for other external programs.
Policy	The principles of sustainable development are already embedded in many of the company's policies. Rather than making new commitments, the system of indicators will therefore help measure progress towards the statements made in the company's vision, operating principles, and policies. In particular, the indicators will help demonstrate that the company is striving to address its Corporate Policy Statement on Relationships, its Corporate Policy Statement on Operations, its Environmental Management Policy, and its Sustainable Development Policy and Principles. Therefore, the indicators should be used to help pursue commitments towards these policies from the earliest stages of the decision-making process.
Plans	The strategic plans developed as a part of the business planning process are the primary plans with which to integrate the indicators. As described previously, the system of indicators have been integrated with the business planning hierarchy, goals, and existing internal measures. The indicators may also help inform the development of other planning criteria documents. The key issues diagrams are another item to consider integrating with existing planning protocols and may have particular relevance to the environmental assessment process.
Programs	There are numerous programs that the system of indicators can help strengthen. The EMS, CEA ECR program, sustainable development report, the corporate

TABLE G-3
SUMMARY OF KEY POINTS FOR ALTERNATE INDICATOR INTEGRATION MODEL

Element	Integration Notes
	intranet, and others are some of the primary examples. The indicators build on existing goals in each of these programs and help further measure progress towards those goals. The indicators also further demonstrate the company's commitment to those goals and the indicators may therefore be cited as a relevant initiative in the development of reports.
Results	The company's progress towards meeting its goals must be assessed. Each indicator must be evaluated against defined goals and, if necessary, corrective action must be specified. Existing data analysis systems provide an ideal place on which to build this work since the company already has many employees skilled in the analysis of data. As in other systems currently in place, it is suggested that the results are compiled and assessed as described in the Management Review element.
Evaluation	The identification of gaps should be an ongoing process. The system of indicators will never be perfect and must evolve over time to reflect the current business realities. The procedure for assessment of the indicators is described by the assessment protocol. In the absence of a sustainable development coordinator, it is recommended that that the indicators are assessed annually in a process lead by the corporate planning manager. The review of the indicators may be integrated with existing review processes. The TDSP, EMS, and CEA ECR programs all require quarterly progress reports and annual reviews of objectives and targets by senior management. Given the many linkages between the system of indicators and existing programs, the review of the system of indicators may be incorporated into these reviews.
Goals	There are a number of goals that exist throughout the company. However, most are based on those set in the Corporate Strategic Plan (CSP) and, in the case of this business unit, the T&D Strategic Plan (TDSP). The system of indicators builds strongly on the TDSP's existing goals. In addition to the linkages to the TDSP, a specific goal for each indicator has been identified. In every case, it has been clarified if the indicator should increase, decrease, or maintain an appropriate range. Cases where the indicators are based on a binary (i.e. yes/no) evaluation have also been identified.
Resources	The indicators must build on existing data collection and analysis systems in the business planning, EMS, CEA ECR, and sustainable development reporting processes. Where surveys are required, existing public and employee surveys provide an excellent starting point. In any case, specific departments must be assigned responsibility for each indicator. Similarly, reporting of the indicators must also build on existing systems. Although the CSP, CEA ECR, and sustainable development reporting systems have already been noted, it will also be critical to incorporate the indicators into the corporate intranet. The indicators could be presented at different levels of information, from the aggregated index down to the data itself through a series of links. This would allow users to access the level of information most suitable to their needs.
Leadership	The support and commitment of top management may be demonstrated by emphasizing the need to consider sustainable development issues in decision-making, particularly as it relates to the existing business planning process, EMS, and CEA ECR programs. It is also critical that the indicators are linked to the sustainable development policy and principles and other relevant policies in the company. Considering the information in the system of indicators will help ensure that data is used to help pursue commitments from the earliest stages of the decision-making process rather than only to justify decisions after they have already been made. One tangible expression of leadership will be to ensure that the indicators are considered as a part of the "Management Review" element. The business unit manager of transmission and distribution could serve as the executive champion.

Indicator Trade-off Criteria

To initiate the indicator trade-off criteria consultations, the participating experts were provided with a summary of the general rules for making decisions about trade-offs developed by Gibson (2004). However, the participants all agreed that the trade-off criteria provided by Gibson (2004) were overly prescriptive from the perspective of the case utility.

In a follow-up consultation conducted through email, it was determined that the criteria listed in Section 6 were more appropriate. It is important to note that relatively few comments on the criteria were received. This was due to the fact that the utility did not specifically request the development of indicator trade-off criteria. The criteria were developed to satisfy the requirements of another funding organization.

APPENDIX H
SUPPORTING MATERIALS FOR REVIEW AND IMPROVE

A summary of the key comments received during the email consultations for Step 6 is available in Table H-1. The comments primarily relate to the lessons learned.

TABLE H-1
SUMMARY OF COMMENTS RECEIVED DURING STEP 6 – REVIEW AND IMPROVE

- It is important to always remind oneself that there needs to be a good fit with a utility's "culture" and processes.
- It is quite reasonable and strategically important to start with a few "key" indicators and let the process evolve and expand that list to the needs of the utility.
- Buy in at the executive level is not necessarily easily achieved, even though the appearance of buy in / commitment may exist.
- The development of indicators should be an iterative process with links to business planning being developed that enhance / develop "buy-in" and application.
- A company can determine an appropriate indictor (through this type of process) where no data currently exists. In such a case, the company will have to commit resources to develop processes in order to gather the required data. This will mean the importance of the indicator has to be relayed to those designing the collection process and to those collecting the data.
- A "champion" or owner is required to implement indicators in a corporation. This would allow the commitment to unfold and also build in accountability.
- Many of the lessons learned could be applied to other areas beyond the system of indicators.
- The objectives of the process were fully met.
- The group consultations worked very well. Off-line, individual consultations also worked well. In all cases there were good meeting agendas, a good supply of pre-meeting materials, and good documentation of meeting results.
- However, the group meeting attendance should have been better. The inconsistent attendance was likely due to employee's assigned tasks taking precedent over the research needs. This, however, is not an unusual problem when people are asked to go beyond their "core" work.
- No comments were offered on what could have been done better.