A SUSTAINABLE DEVELOPMENT INDICATOR DESIGN PROCESS FOR MANITOBA HYDRO

By

Cory Searcy

A Practicum Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements
for the Degree of

MASTER OF SCIENCE

Department of Civil Engineering
The University of Manitoba
Winnipeg, Manitoba
R3T 5V6

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

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Abstract

Manitoba Hydro has made a commitment to apply the principles of sustainable development in all aspects of its operations. One method the company has identified to achieve this goal is the creation and implementation of sustainable development indicators. However, before undertaking any indicator development project, the company feels that it is necessary to create a detailed plan.

To fill this need, the aim of this project was to develop a Sustainable Development Indicator (SDI) Design Process for Manitoba Hydro. Recognizing the importance of planning in the success of any indicator project, that protocol articulates a methodology for the development of indicators at Manitoba Hydro. Although effort was devoted to creating a process suitable for application to all aspects of the company's operations, particular emphasis was devoted to ensuring the process was relevant to the Transmission System.

To achieve that goal, the project was divided into two fundamental phases. The first focused on developing a generic SDI Design Process while the second focused on applying selected steps of the process to Manitoba Hydro's Transmission System. Taking a systematic approach, both phases involved an extensive review of published literature as well as consultation with internal and external expertise.

Those procedures ultimately lead to the development of a flexible, six-step SDI Design Process: (1) conduct needs assessment; (2) conduct process planning; (3) develop a draft set of sustainable development indicators; (4) test and adjust the indicators; (5) implement the indicators; and (6) review and improve the indicators. The key activities in each of these steps are illustrated in process flow charts, while other important points are described in thorough explanations. Throughout the entire protocol, special care was taken to incorporate the comments of the experts participating in the consultations.

The creation and implementation of sustainable development indicators at Manitoba Hydro could be achieved by implementing the process described in this report. During any implementation, however, consultation with key stakeholders will be required and significant time and effort will be needed to develop a set of indicators.

Acknowledgements

Funding for this project was provided by Manitoba Hydro's Research and Development Program. In addition to the funding organization, I would like to thank the following individuals for their guidance and assistance. Without their input, completion of this thesis would not have been possible.

- Dr. Carole Burnham, Consultant, Carole Burnham Consulting
- Mr. Dennis De Pape, Principal and Senior Consultant, InterGroup Consultants
- Mr. John Fjeldsted, Corporate Coordinator Environmental Management System, Manitoba Hydro
- Ms. Tammy Gibson, Policy Analyst, Sustainable Resource Management Branch, Manitoba Conservation
- Dr. Daryl McCartney, P. Eng., Associate Professor, Department of Civil Engineering, University of Manitoba
- Mr. Sheldon McLeod, P. Eng., Consultant, SLMcLeod Consulting
- Mr. Wade Munro, Senior Environmental Assessment Officer, Licensing and Environmental Assessment Department, Transmission Planning and Design Division – Transmission and Distribution, Manitoba Hydro
- Dr. Laszlo Pinter, Senior Project Manager, International Institute for Sustainable Development
- Dr. Caroline Piotrowski, Associate Professor, Department of Family Studies, University of Manitoba
- Ms. Erin Searcy, M.Sc. Candidate, Department of Biosystems Engineering, University of Manitoba

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SECTION 1.0
Introduction

1.1
Overview

In 1987, the World Commission on Environment and Development (WCED) published *Our Common Future*, a groundbreaking report that brought the terms "sustainable development" and "sustainability" into widespread use. That report defined sustainable development as "meeting the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED, 1987) and called on the global community to take steps towards that goal. Building on that definition, numerous efforts have been undertaken to put this concept into practice.

One of the most prominent activities in this regard was the development of Agenda 21 as a part of the Earth Summit of 1992. A global action plan for achieving sustainable development, Agenda 21 has provided a useful starting point for many government and industry-based projects. For instance, sustainability projects have been initiated at the national, regional, and local government levels all over the world. Many industries have also recognized the value in pursing sustainable development with forestry being one of the many examples. In any case, it is important that continued progress is made in adopting sustainable strategies across all levels of society.

One industry where progress has recently been observed is the energy sector. At the international level, organizations such as Helio International and the World Business Council for Sustainable Development have undertaken, or are in the process of undertaking, projects related to the sustainability of that industry. Progress may also be seen at the national level. For example, the Canadian Electricity Association (CEA) has encouraged its members to do more on the sustainability front through initiatives such as its Environmental Commitment and Responsibility (ECR) program.

These developments are of particular interest to Canadians since the citizens of this nation are among the highest per capita consumers of electricity in the world. Virtually all aspects of Canadian society rely upon some form of energy use and much of this energy is supplied in the form of electricity. This resource has become one of the

backbones of our economy and is in large part responsible for the high quality of life enjoyed by most residents of the country.

However, the consumption of such an enormous amount of electricity has not come without costs. While the benefits of electricity use are well known, there is a general consensus that our energy practices do not fully acknowledge the costs of producing and consuming energy with respect to environmental, social, and economic considerations (Manitoba Conservation, 1998). The infrastructure required in the generation, transmission, and distribution of electricity is substantial and the impacts – both positive and negative – caused by this infrastructure are wide-ranging.

Considering decisions made today in the electricity industry will have an ongoing impact on the environment, the economy, and society for decades, it is essential that clear, orderly information is available to evaluate decisions on the basis of these three interconnected categories (GRI, 2000). Fortunately, many of the electric utilities in Canada have acknowledged the need to address issues using an integrated approach considering the overall implications of their decisions. One such utility is Manitoba Hydro.

One of the largest electric and natural gas utilities in Canada, Manitoba Hydro is the primary producer of electricity in the Province of Manitoba. With the majority generated via self-renewing water power, Manitoba Hydro provides electricity to over 400 000 customers located throughout the Province (Manitoba Hydro, 2002). Given the impact such operations have on life in Manitoba, it is significant that the concept of sustainable development has been supported by the company. In its most recent *Sustainable Development Report*, Manitoba Hydro stated it "will apply the principles of sustainable development in all aspects of its operations to achieve environmentally sound and sustainable economic development" (Manitoba Hydro, 1998).

To this end, the Corporation has adopted a sustainable development policy identifying thirteen key principles outlining Manitoba Hydro's sustainability goals. The thirteen sustainable development principles outlined by Manitoba Hydro address critical elements of sustainable development such as integration of decisions, efficient use of resources, stakeholder participation, and responsibility for actions on the local and global levels. A copy of the full sustainable development policy and principles is available in

Appendix A. Since the energy sector is one of the cornerstones of sustainable development (Manitoba Conservation, 1998), it is important to ensure continued progress is made in the effort to put these principles into practice.

Determining progress, or lack thereof, demands measurement (CEA, 2000). Without the feedback provided by a measurement system, it is impossible to know how close or how far one is from achieving their goals. An absence of feedback also makes it difficult to ascertain where adjustments to the systems are necessary and virtually impossible to conclude exactly what effect these adjustments had. Equally difficult is attaching accountability to any decisions made with respect to the system in question. In other words, one can only manage what is measured.

Building on that premise, in order to achieve a company operating according to the principles of sustainable development, Manitoba Hydro must be able to recognize the presence or absence of sustainability, or threats to sustainability, in the systems under its stewardship (Bossel, 1999). However, one of the most challenging aspects of pursuing a commitment to sustainable development is determining a method of measuring progress towards that goal (IISD, 1997). Sustainable development is such a broad concept it is often difficult to even know where to start.

One method in which these challenges may begin to be addressed is through the creation and implementation of sustainable development indicators. Sustainable development indicators provide a means with which to measure progress towards sustainable practices. While recent initiatives at Manitoba Hydro, such as the ongoing implementation of the ISO 14001 Environmental Management System (EMS), have helped raise environmental awareness in the company, there is still much work to be done with respect to integrating sustainable development considerations into the day-to-day operations of the organization. As previously noted, sustainable development is much more than an environmental idea. Corporate accountability is increasingly not just about the environment, but about people and values too (Elkington, 1999).

According to internal personnel, one of the largest gaps in the developing EMS at Manitoba Hydro is the lack of sustainable development indicators. Currently, there are few measurable, tracked indicators in place and those that are tracked are not widely used

in decision-making. However, existing programs have provided a strong base upon which a move to more sustainable practices may be initiated.

While there are several sustainable development indicator programs in existence, most of these programs deal with issues on an international, national, or regional level. A discussion of some existing programs is presented in Section 2.0. Though some lessons learned from these existing programs may be transferable to issues faced by an electric utility, there are currently no well-established indicator development processes particularly suited to an electric utility. Since careful planning is critical to the success of any indicator project, a systematic approach that takes a holistic perspective will be needed to develop a process relevant to the specific needs of Manitoba Hydro.

1.2 Purpose

The purpose of this project was to develop a Sustainable Development Indicator (SDI) Design Process for Manitoba Hydro. As a complement to the programs already in place at Manitoba Hydro, this protocol provides the company with a guide on how to produce sustainable development indicators for all aspects of its operations. Although effort was devoted to creating a process suitable for application to all aspects of the company's operations, particular emphasis was devoted to ensuring the process is directly relevant to the Transmission System.

1.3 Scope

As noted in Section 1.2, one of the major objectives in this research project was to ensure the overall SDI Design Process was flexible enough to be applied to all aspects of Manitoba Hydro's operations. However, since the operations of the company are so extensive, it was not possible to examine in detail every project with which Manitoba Hydro is involved. Therefore, it was necessary to set some boundaries, assumptions, and limitations on which the study was based.

Like many other projects, the two most pertinent limitations to which the study was subjected were time and, to a lesser extent, budget. As a direct consequence of these

conditions, it was necessary to prioritize certain items over others. In particular, these limitations played an important role in considerations associated with the following:

- Internal and External Consultations
- Background Research
- Focus on the Transmission System
- Implementation

1.3.1 Internal and External Consultations

Since Manitoba Hydro is such a large company influencing many aspects of the environment, economy, and society in the Province of Manitoba, the group of internal and external stakeholders in any project is potentially quite large. However, in the interests of time, it was not possible to meet with representatives from each of these stakeholder groups as a part of this project. Therefore, it was necessary to undertake a more limited consultation. In an effort to draw on the experience of past projects having relevance, these consultations focused on meeting with experts in the field of sustainable development indicators as well as selected internal experts at Manitoba Hydro. The experts who participated in the project, and the extent of their involvement, is discussed in Section 3.0.

1.3.2 Background Research

The influence of time restrictions on the literature review must also be considered. As in any research project, substantial time was devoted to the task of reviewing relevant literature at the start of the project. This initial literature review was supplemented by further research as a part of an ongoing process spanning the duration of the entire project. Though it is possible appropriate information was missed, every effort was made to identify and review all relevant information.

1.3.3
Focus on Transmission System

While substantial effort was devoted to creating a generic SDI Design Process, another phase of the project focused on testing that process against the Transmission System at Manitoba Hydro. The Transmission System is a part of one of the four main business units at Manitoba Hydro, Transmission and Distribution. The other units include Power Supply; Corporate, Finance, and Administration; and Customer Service and Marketing.

The main reason for the selection of the Transmission System as a point of emphasis was that little published work is available in this area with respect to sustainable development indicators. This fact, combined with the interest of the involved personnel at Manitoba Hydro, lead to the decision to focus on the Transmission System.

1.3.4
Implementation

Given the significant amount of time and resources necessary to develop a set of sustainable development indicators for any business unit at Manitoba Hydro, it was not possible to apply the entire SDI Design Process to one of these units as a part of this project. In the context of this project, the validation of the Design Process was conducted through consultations with experts on sustainable development indicators and the Transmission System at Manitoba Hydro. Though the ideal situation would involve conducting a full test of the Design Process, the experience of the participants in the consultations should help to minimize any key elements that may have been overlooked.

1.4
Research Objectives

The development of the SDI Design Process required a systematic approach taking a holistic perspective to develop a process relevant to the specific needs of Manitoba Hydro. Keeping this fact in mind, the development of the protocol was based on achieving two fundamental research objectives:

Objective 1: Develop a generic SDI Design Process for Manitoba Hydro.

Objective 2: Apply selected steps of the SDI Design Process to Manitoba Hydro's Transmission System.

Both of these objectives represented a major phase of the project. Within each of these two phases were many sub-divisions that included fulfilling more specific objectives in support of the two stated above. These are discussed further in Section 3.0.

1.5 Rationale

There are many reasons why this project was undertaken. In the pages that follow, the rationale for the project is explained as a part of two sections: *Benefits to Manitoba Hydro* and *Contribution to Academic Knowledge Base*.

1.5.1 Benefits to Manitoba Hydro

Developing such a SDI Design Process offers Manitoba Hydro a number of benefits that are potentially wide-ranging. The primary benefit of the process is the provision of a methodology for the creation of sustainable development indicators at Manitoba Hydro. Therefore, creating this protocol provides Manitoba Hydro with a framework, previously unavailable to the company, designed to assist in its assessment of progress towards the goals outlined in its sustainable development policies and principles. Though this is the main benefit of the research from Manitoba Hydro's perspective, there are several other benefits likely to arise as a direct result of implementing the SDI Design Process itself.

Perhaps the most important of these related benefits, particularly in the long-term, will be the learning process that takes place throughout the implementation of the protocol. As demonstrated throughout Section 4.0, this is strongly related to a principle that is emphasized throughout the actual Design Process itself: how the indicators are developed is just as important as the actual indicators themselves. Since the SDI Design

Process is significantly based on internal (as well as external) stakeholder consultation, implementing the process will help raise awareness in the company and elsewhere regarding sustainability and sustainable development indicators. Such education is critical, because ultimately, the success or failure of the sustainable development concept rests in the hands of those who will actually apply its principles on a day-to-day basis.

Other possible benefits related to the implementation of the process include:

- Helping to link sustainability issues with other initiatives in the company
- 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)
- Further demonstrating Manitoba Hydro's commitment to the Canadian Electricity Association's Environmental Commitment and Responsibility Program and its own Sustainable Development Policy and Principles
- Enhancing accountability to stakeholders through the provision of greater transparency on sustainability issues

Furthermore, with the importance of this topic still emerging, the implementation of the process, and subsequent development of the indicators, may also contribute to Manitoba Hydro's desire to be seen in a position of leadership with respect to this work in Canada.

1.5.2 Contribution to Academic Knowledge Base

Although previous research has been performed with respect to sustainable development indicators, there are no known projects that describe the methodology for creating indicators covering the full range of issues challenging electric utilities. While there are some methodologies available for use in community sustainability indicator projects, these protocols are generally not applicable to electric utilities without considerable modifications. Since one of the greatest challenges to moving sustainable development forward is the need to emphasize the methodology and development of

indicators (NRTEE, 2002) these weaknesses necessitated that a protocol was created with the particular needs of electric utilities in mind.

In addition to providing a useful starting point for other electric utilities, the SDI Design Process may also provide the basis for the creation of similar methodologies in other areas that do not have any existing protocols. For instance, this project may be of particular use to other corporations. While many of the previously published methodologies have focused on developing indicators for communities, this SDI Design Process provides an example of a methodology, and its development, in the corporate context. Having an example to work from may help to facilitate the learning process in other corporations by reducing the amount of trial and error required. Not only that, but the SDI Design Process may also provide the basis for improving existing methodologies.

Finally, one other academic contribution of this project is in its linking of sustainable development with the concept of continuous improvement. Sustainable development can be thought of as a concept that seeks to achieve continuous improvement across all sectors of the company's operation. This link has particular value in that it may help organizations gain a greater appreciation and understanding of the concept of sustainable development by tying into an existing (and growing) knowledge base companies have invested significant time and effort in developing.

SECTION 2.0
Literature Review

One of the most significant parts of the project involved an ongoing review of published literature. Given the project's focus on producing a methodology for the creation of sustainable development indicators at Manitoba Hydro, special effort was dedicated to locating information pertaining to sustainable development indicators as it applies to the electric utility industry. However, with few examples to work from in that area, it was necessary to look at how sustainable development indicators have been applied in other situations. Though the context of each project is certainly unique, the rationale underlying this approach was that much can be learned from the experiences of others, even if that experience was gathered in a different scenario. Building on that premise, information was gathered from the local, regional, national, international, and corporate sectors through a review of a wide variety of sources.

The literature review is organized into three sections:

- Introduction of sustainable development indicators
- Creation of sustainable development indicators
- Ancillary issues

The first section provides a general introduction to sustainable development indicators including information on sustainable development, indicators, and examples of existing programs. The second section focuses on issues related to the actual creation of these indicators such as sample processes, conceptual frameworks, and communicating the indicators. Finally, the third section of the literature review focuses on ancillary issues related to the creation of sustainable development indicators. Topics addressed there include project management, stakeholder consultations, and continuous improvement. Where appropriate, these sections incorporate material gathered from a review of internal literature at Manitoba Hydro.

2.1 Introduction to Sustainable Development Indicators

Sustainable development is a term still subject to some confusion. Adding the term indicator to those two words only complicates the matter further. Therefore, an important starting point in any project related to sustainable development indicators is clarifying what is meant by those terms. Answering the following questions can do this.

- What is sustainable development?
- What is an indicator?
- What are sustainable development indicators?
- What are the benefits of creating sustainable development indicators?
- What cautions are associated with creating sustainable development indicators?
- What are some examples of sustainable development indicators?

2.1.1 Sustainable Development

Sustainable development is typically defined as meeting the needs of the present generation without jeopardizing the ability of future generations to meet their own needs. While no single definition can claim universal agreement, this is the classic definition of the term provided by the Brundtland Commission (WCED, 1987) upon which nearly all other versions are based. The definition of sustainable development utilized by Manitoba Hydro is along this line of thought. The *1998 Sustainable Development Report* (Manitoba Hydro, 1998) states "through its decisions and actions to provide electrical services, the Corporation will endeavour to meet the needs of the present without compromising the ability of future generations to meet their needs."

One of the underlying influences of the definition given above is the precautionary principle, which states: facing the radical uncertainty of the long-term future, one has to consider the future use of natural assets by future generations (Montgolfier, 1999). Explicitly considering the future is one of the distinguishing traits

of sustainable development. However, while the definitions given so far certainly illustrate the breadth of the overall concept, it is important to touch on some of the key points that can be implied by those definitions.

One distinction not immediately clear is between growth and development. Sustainable development is not sustained growth (Hart, 1998). Growth inherently suggests getting bigger. On the other hand, while development can mean growth, it can also mean improving or achieving potential.

The other key point to note is that sustainable development is a concept emphasizing the need to establish a balance between, and ultimately an integration of, economic, environmental, and social concerns. Rather than treating issues related to these items as though they are mutually exclusive or in competition with one another, sustainable development recognizes the need for integrated solutions to problems and cannot be viewed as a disconnected initiative (INAC, 2001). Though putting these theories into practice can be a difficult balancing act to achieve (Manitoba Conservation, 2000), doing so helps to prevent problem shifting from one area to another.

2.1.2 Indicators

An indicator is simply a measure of things we value (Walter and Wilkerson, 1998b). Using both quantitative and qualitative information, indicators are pieces of information reflecting the status of larger systems. While an indicator cannot tell us everything about the system in question, they should be able to tell us enough to make good decisions possible (Manitoba Conservation, 2000). This means an indicator can point out the general direction in which to move, and in doing so may provide guidance on a possible course of action, but it does not prescribe a step-by-step solution that may be followed to correct any imbalance. They are essentially feedback mechanisms helping us to understand where we are, which way we are going, and how far we are from where we want to be (Sustainable Calgary, 1998).

2.1.3
Sustainable Development Indicators

Having introduced the components making up the term, it is now possible to draw some conclusions regarding sustainable development indicators. Sustainable development indicators must provide us with the ability to recognize the presence or absence of sustainability, or threats to sustainability, in the systems under our stewardship (Bossel, 1999). They must provide the feedback that will help decision-makers to understand the linkages, connections, and interdependencies between the environment, economy, human health and social well-being (Manitoba Conservation, 2000). By providing this information, sustainable development indicators can provide a much needed corrective to the undue emphasis often placed on economic issues at all levels of planning (Walter and Wilkerson, 1998b).

What is measured often defines how the world is seen. Sustainable development is a concept that has often been viewed as being difficult to measure or even understand in an operational sense. By using indicators to measure sustainable development, we can change the way we look at the world (Hart, 1998) by bringing the concept of sustainable development into focus. While it is difficult to say sustainability is something directly measurable, it is possible to look for signs, trends, or warnings identifying relationships based on defined parameters. These relationships are the basis of a sustainable development indicator program.

2.1.4
Benefits

While some of the benefits for creating sustainable development indicators may be implicit in the discussions above, there are many others that may be thought of as noteworthy. For example, in addition to illuminating the linkages between the environment, economy, and society, possible reasons for creating a set of sustainable development indicators include:

- Sustainable development is smart business
- The right set of indicators can be powerful information tools

- Indicators can help to make decision-makers more accountable for their actions
- Applying the concept of sustainable development forces the users to consider the "big picture"

Sustainable development is smart business. From a practical standpoint, what sustainable development essentially does is call for a more effective deployment of resources already in use. After all, a primary goal of a sustainable entity is to produce the greatest possible ends with the least possible means (Meadows, 1998). If viewed in this light, sustainable development is really just smart business that may ultimately lead to significant cost savings. Therefore, rather than seeing sustainable development as another "add-on" to the company's expense sheet, it is important to recognize the inherent value in moving towards more sustainable forms of practice. Sustainable development indicators can help facilitate this transition.

The right set of indicators can be powerful information tools. Sustainable development indicators can be important tools because they go to the heart of decision-making (Pinter et al. 1999). One of the greatest strengths of any set of indicators is their ability to help simplify complex matters. This simplified, structured form of presenting information is valuable in areas such as education, communication, and decision-making.

Indicators can help to make decision-makers more accountable for their actions. Since indicators provide a means for measuring progress on complex systems that were often previously unmeasured, the effects a particular decision has on the system are more apparent. Such feedback can be valuable in future decision-making. In addition, creating a set of sustainable development indicators can help demonstrate the organization is serious about being more accountable to its external stakeholders.

Applying the concept of sustainable development forces the users to consider the "big picture." Considering that everything is to be taken as a whole, one of the underlying assumptions of sustainable development is to ensure all elements associated with a decision are considered. In other words, it emphasizes the importance of whole-systems thinking. Considering all of the impacts associated with any particular decision in environmental, social, and economic terms can lead one to the type of thinking that

helps prevent problem shifting from one stage to another and also tends to aid in preventing problems before they occur.

2.1.5 Cautions

Sustainable development indicators are not in themselves the cure to all the problems facing Manitoba Hydro or any other organization. There are many important items to consider throughout the duration of a process of this nature including:

- Designing a set of sustainable development indicators will take time
- The manner in which the indicators are produced is just as important as the indicators themselves
- Indicators provide hints in which direction to move, not explicit directions
- Indicators are supposed to help simplify the issues
- The wrong set of indicators can be damaging

Designing a set of sustainable development indicators for any part of the company will take time. It must be recognized the development of a useful set of indicators is an ongoing process that must evolve over time. Each set of sustainable development indicators must be designed according to the system they will reflect and the context in which they will be used. Though it is certainly possible to learn from initiatives undertaken previously by others, there is no one universal formula for how to develop a system of effective indicators.

The manner in which the indicators are produced is just as important as the indicators themselves. While the final set of indicators is certainly important, the learning and change that takes place over their development should not be underestimated. Much of the value of any indicator set resides in the actual assessment and development of the indicators themselves (Walter and Wilkerson, 1998a). The organizational learning that takes place during this exercise can help not only in the immediate future, but also help lay the groundwork for future sustainability initiatives as well.

Indicators provide hints in which direction to move, not explicit directions. Indicators represent, at best, only a small part of what decision-makers need to pay attention to (Innes and Booher, 2001). This statement serves to highlight the fact that not everything can be tracked. In addition to issues related to cost and time, having too many indicators can complicate analysis of trends and compromise understanding (Manitoba Conservation, 2000). It is therefore critical indicators most relevant to the system and organizational goals are selected.

Indicators are supposed to help simplify the issues. It makes sense to keep the indicators themselves simple so they may be easily understood. If people cannot understand an indicator or can't see what they can do to fix the problem, it won't help (Hart, 1998). For example, most successful indicator sets use ratios rather than absolute values. This form of presentation is often easier to understand and allows people to identify more readily with the problems at hand.

The wrong set of indicators can be damaging (Pinter et al. 1999). Although the creation and implementation of the right set of sustainable development indicators can provide many benefits, the wrong set of indicators can present an inaccurate representation of the system under examination. Such a scenario is one to avoid since it is unlikely decisions made using incorrect information will turn out as well as those made with accurate information available. The real challenge facing organizations then is in developing the right set of indicators.

2.1.6
Examples of Sustainable Development Indicators

A review of published literature revealed few well-established efforts devoted to developing sustainable development indicators for electric utilities. However, although there is currently no known, full-fledged set of these indicators for electric utilities, there are a limited number of environmental performance indicators in use at electric utilities in Canada. Most of the electric utilities in Canada are members of the Canadian Electricity Association (CEA) which has developed a set of environmental performance indicators in support of its Environmental Commitment and Responsibility (ECR) Program. Many of the CEA's member utilities report on these indicators as a part of their Environmental or

Sustainable Development Reports. The environmental performance indicators used by members of the CEA include (CEA, 2001):

- Internal Energy Efficiency
- Energy Conversion Efficiency of Fossil Fuel Generation
- Reuse of Electrical Insulating Oil
- Utilization of Solid Combustion By-Products
- Atmospheric Emissions of CO_2, SO_2, and NO_x
- Number of Reportable and Priority Spills
- Environmental Aspects Indicators for Fish
- PCB Management
- Generation of Low and Intermediate Radioactive Waste
- Public Reporting of Environmental Performance
- Responding to External Input Concerning Environmental Performance
- Evidence of an Effective Employee Awareness and Training Program

However, while those indicators do measure some aspects of environmental performance, they are not really a set of sustainable development indicators. A set of sustainable development indicators normally should include issues related to economic and social concerns in addition to considering environmental issues. Therefore, with only a limited set of examples to work from in the electric utility industry, it is necessary to look at how sustainable development indicators have been applied in other situations.

Over the past decade there has been a dramatic increase in the number of sustainable development indicator projects throughout virtually every level of society. Today, there are sustainable development indicators in use (and more in development) at the international, national, and regional/local levels.

2.1.6.1 International Programs

Indicators in this classification are designed by international organizations for use at the national level. The indicators are often meant to be applied in the same manner in

each country so comparisons can be made on a relative basis. As can be expected from something international in nature, the indicators utilized in these types of programs are very "high level." Therefore, while these indicators may help provide some clues on the types of issues to be considered by electric utilities in the development of their sustainable development indicator programs, there is little that may be directly applied to the specific issues facing them. However, there is still some value in studying "high level" sustainable development indicator programs as they may help spur some ideas on how to deal with issues at the corporate level.

Perhaps the most famous set of sustainable development indicators are those outlined by the United Nations in *Agenda 21*. The indicators in this program are grouped into the four general categories of social, economic, environmental, and institutional issues. Within each of these categories, there are several indicators and the indicators themselves are further divided into the categories of driving force, state, and response indicators. Sample indicators include adult literacy rate, floor area per person, annual energy consumption, annual withdrawals of ground and surface water, and potential scientists and engineers per million population (UNEP, 1999). This very broad set of indicators is designed for application at the national level. Other examples of very broad sets of indicators include those proposed by the Organization for Economic Cooperation and Development (OECD, 1998) and the World Bank.

As far as projects more closely related to the challenges faced by electric utilities, there has been some work in the energy sector. Of particular note is the set of eight indicator categories developed by *Helio International* (Helio, 2000):

- Per capita energy sector carbon dioxide emissions
- Most significant energy-related local pollutant(s)
- Households with access to electricity
- Investment in clean energy
- Energy reliance: energy trade
- Burden of energy investments
- Energy productivity
- Renewable energy deployment

The indicators listed above have been broken into four categories with the first two indicators representing the environmental category, the last two representing the technological category, and the four indicators in the middle representing the societal and economic categories respectively.

The World Business Council on Sustainable Development is performing another international project of interest. Recently, this organization initiated a three-year project focused on topics pertaining to sustainability in the electric power industry. The project is still in the preliminary stages and the issues to be dealt with have yet to be determined.

2.1.6.2 National Programs

One of the more prominent sustainable development indicator programs in Canada is the *Environment and Sustainable Development Indicators Initiative (ESDI)* being undertaken by the National Round Table on the Environment and the Economy (NRTEE). Launched in September 2000, it is a three-year project designed to create a set of national indicators that is credible, relevant, and well accepted. This set of indicators will be used to determine whether today's economic activity is threatening the ability of future generations to create their own healthy economy (NRTEE, 2002). In order to achieve this goal, the ESDI has been organized into three phases:

1. Determine the approach for measuring indicators
2. Develop specific indicators
3. Test and disseminate proposed indicators

Having completed Phase 1 in March 2001, the project is currently in Phase 2. Though the specific indicators have yet to be finalized, their selection will rely heavily on trends related to the stocks of Canada's produced, natural, and human capital (NRTEE, 2002).

At Environment Canada, work related to sustainable development indicators is currently focused on developing the *Canadian Information System on the Environment (CISE)*. As a complement to the work being done by the NRTEE on the ESDI, this program will see the design and implementation of an integrated national environmental knowledge and information system (NRTEE, 2002). Though not specifically a set of

sustainable development indicators, such a system will certainly help future sets of indicators by providing credible environmental information in a useful format.

Aside from those two projects, there are many other sustainable development indicators in use or in the process of being developed in Canada. One example is the Canadian Council of Forest Ministers' *Criteria and Indicators of Sustainable Forest Management in Canada* (2000).

2.1.6.3 Regional and Local Programs

While there are a number of ongoing sustainable development indicator programs at the national and international level, there are many more at the regional and local levels. Regional programs refer to those programs including several communities within its scope while local programs refer to those that include only one specific community.

With further information available in the References and Bibliography, some examples of the many regional programs include *Minnesota Milestones*, *New Jersey's Sustainable State Project*, and the *Central Texas Indicators Project*. Of particular interest is the *Provincial Sustainability Indicators* program in Manitoba. Having only recently being completed, this project has provided a strong base for future sustainability work in the Province and should therefore be closely examined.

Similar to the regional programs mentioned above are many of the sustainable development indicator initiatives at the local level. Although exact statistics are unavailable, it is estimated there are several hundred local sustainable development indicator programs that have been completed or are in the process of being developed in North America alone. Some examples of the local programs include the *sustainable cities* programs undertaken in Seattle and Calgary.

2.2 Creation of Sustainable Development Indicators

Understanding the concept of sustainable development should ideally lead to carefully planned effective action. However, the hardest part about sustainability is

actually achieving it (Hart, 1998). Though it may not be easy, the concept of sustainable development must be translated into the practical dimensions of the real world (Bossel, 1999). As previously established, one way to help do this is through the creation of sustainable development indicators.

Having clarified the term "sustainable development indicators", it is possible to begin looking more closely at how they are actually created. While there is no one universal formula for creating a set of sustainable development indicators, answering the following questions can help provide the basis for designing a process appropriate to the needs of the organization:

- What types of processes have been used to create sustainable development indicators?
- What is a conceptual framework?
- What makes a good indicator of sustainability?
- How many indicators should be selected?
- How should the indicators be communicated?

Finally, one set of principles that can help provide further guidance on the creation of sustainable development indicators are the Bellagio Principles of Assessment. Since these Principles provide some direction on dealing with the types of questions raised immediately above, they are briefly discussed as well.

2.2.1 Sample Processes

The following sections briefly highlight some examples that can help provide the basis for creating a process to develop sustainable development indicators. The examples are organized into two sections: processes designed specifically for use in the area of sustainable development indicators and processes designed for use in other disciplines (but having relevance to sustainable development indicator projects).

2.2.1.1
Sustainable Development Indicator Creation Processes

In some cases, the sustainable development indicator reports for the programs mentioned in previous sections are accompanied by a brief description of the methodology they used in creating their indicators. For example, the *Provincial Sustainable Development Indicators* program in Manitoba (Manitoba Conservation, 2001) identified a ten-step process consisting of:

1. Form a working group.
2. Clarify purpose of indicators/initiative.
3. Identify values and vision.
4. Review existing models, indicators and data.
5. Draft a proposed set of indicators.
6. Convene a public participation process.
7. Perform a technical review of indicators.
8. Research the data.
9. Publish and promote the report.
10. Update the report regularly.

This process is very similar to that described in *The Community Indicators Handbook* (Norris et al. 1997), which outlines the process used in many sustainable community projects.

Though there are almost always some differences from community to community, most communities will incorporate each of the steps listed above at some point in one manner or another. How they group and define the steps though, is often different. As an illustration of this point, *Sustainable Calgary* (1998) defined their approach as:

1. Preliminary research and development.
2. Development of criteria.
3. Public consultation.
4. "Think Tank" process.
5. Indicator research.
6. Report writing and publication.

Unfortunately, in most cases the actual methodology used in the development of the indicators was not included as a part of the final report.

In addition to those specific examples, there are a few generic processes that have been developed. These processes can provide valuable guidance to a group creating a set of sustainable development indicators. Though they may not be directly transferable to all cases, they do offer ideas to consider at various stages of the project.

One of the most comprehensive of the known sustainable development indicator frameworks is the Community Sustainability Auditing (CSA) protocol created by Walter and Wilkerson (1998b). This framework identifies ten steps as being necessary to complete the process:

1. Form a working group.
2. Clarify the purpose, context, and scope of the audit.
3. Develop a plan of action.
4. Train the working group.
5. Select or develop a conceptual framework.
6. Generate a set of auditing questions.
7. Select a set of indicators.
8. Conduct the audit.
9. Prepare, promote, and distribute the report.
10. Update the report regularly.

In the *Towards Sustainability Indicators* section of their paper *A Guide to Community Sustainability Indicators*, Valentin and Spangenberg (2000) outline a six-step process for the development of sustainability indicators. These six steps are:

1. Preparing the process.
2. Forming a working group.
3. Defining the "leitbild" (defining the perspective of the desirable and the possible).
4. Choosing indicators and data.
5. Discussing targets and measures.
6. Follow-up.

Although this list is not as detailed as the CSA approach proposed by Walter and Wilkerson, it does contain several similar elements and provides further insight into the types of things a generic process for creating sustainable development indicators might strive to include.

2.2.1.2 Other Processes

The previous section focused on models specifically designed for use in sustainable development indicator projects. However, many other processes may have some application to sustainable development indicator projects. For example, though they may not have been designed specifically for use in this area, processes from areas as diverse as strategic planning, research protocols, and project management can provide ideas on how to approach a sustainable development indicator project.

One example from the strategic planning discipline is the *Strategic Planning for Public and Non-profit Organizations* process described by Bryson (1995). A ten-step process, it breaks down as follows:

1. Initiate and agree upon a strategic planning process.
2. Identify organizational mandates.
3. Clarify organization mission and values.
4. Assess the organization's external and internal environment to identify strengths, weaknesses, and opportunities.
5. Identify the strategic issues facing the organization.
6. Formulate the strategies to manage these issues.
7. Review and adopt the strategic plan or plans.
8. Establish an effective organization vision.
9. Develop an effective implementation process.
10. Reassess strategies and the strategic planning process.

Though the process described by Bryson was not designed specifically for the creation of sustainable development indicators, there are several points on the above list having relevance to this form of project.

A second example of a model providing some ideas is the nine-step procedure for *Carrying Out an Enquiry* described in the text *Real World Research* (Robson, 1993):

1. Deciding on the focus.
2. Developing the research questions.
3. Choosing a research strategy.
4. Selecting the methods.
5. Arranging the practicalities.
6. Collecting the data.
7. Preparing for, and carrying out, analysis.
8. Reporting what you have found.
9. Acting on the findings.

Again, as with the model proposed by Bryson, this model was not specifically designed for a sustainable development indicator project, but it does illustrate some of the items that may be included in any form of project.

Finally, an example from project management may also provoke thought. In their text *Successful Project Management*, Gido and Clements (1999) outline a nine-step approach to problem solving. This process is:

1. Develop a problem statement.
2. Identify potential causes of the problem.
3. Gather data and verify the most likely causes.
4. Identify problem solutions.
5. Evaluate the alternative solutions.
6. Determine the best solution.
7. Revise the project plan.
8. Implement the solution.
9. Determine whether the problem has been solved.

There are many other processes that may have relevance to a sustainable development indicator project. Though identifying every one of them is beyond the scope of this section, the key is to remember much can be learned from processes not

necessarily written for this type of project. Many processes have application outside of the context within which they were preformed or created.

2.2.2 Conceptual Frameworks

Before a set of sustainable development indicators can be developed for any system, it is necessary to determine what should be measured. This in itself is a challenging task as there is currently no consensus on all of the essential characteristics of a sustainable electric utility, much less the individual business units that together make up the company. One tool that can assist in the identification of key issues is the selection or development of a conceptual framework. Though it is not implicit in the description of every process listed in Section 2.2.1, all sustainable development indicator projects use some form of conceptual framework.

A conceptual framework is a set of interrelated concepts, principles, and ideas that help organize and direct thinking about a particular issue or topic, in this case sustainability (Walter and Wilkerson, 1998b). Therefore, an effective framework should help determine priorities in the choice of indicators and help trigger the identification of indicators that may be more important in the future (IISD, 1997). There are a number of different frameworks currently in use and a study of them can provide a starting point on which to build any set of indicators. Some examples include:

- Environment-Economy-Society
- Ethics-Conservation-Cooperation-Competition
- Effectiveness-Thrift-Margin
- Pressure-State-Response
- Capital Stocks

2.2.2.1 Environment-Economy-Society Framework

The most widely known and applied of the conceptual frameworks is the theme-based environment-economy-society model. Under this framework, the themes are organized into the three areas sustainable development is traditionally categorized. The

theory underlying this approach is the economy is a part of society, which in turn exists in the environment. In other words, all three elements are recognized as integral parts of the system. This concept is illustrated in Figure 2.1.

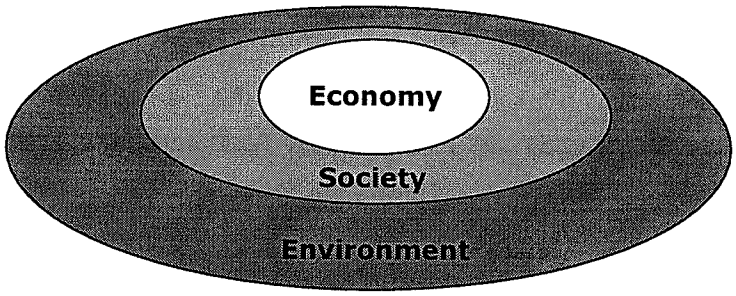

FIGURE 2.1
ECONOMY IN SOCIETY IN ENVIRONMENT
Source: Sustainable Community Indicators Trainer's Workshop. Hart, 1998.

Given that it is the most popular of the conceptual frameworks, there are many published examples illustrating the use of this model. Most of these examples are currently represented by sustainable community projects, but there are some efforts to apply this model in industry as well. A sample of these efforts is provided on the following pages.

Community Applications

For an example of the types of indicators that might be developed for a community using this framework, consider the indicators presented in Table 2.1. Though those indicators were developed for the United States rather than for a specific community, they do provide an excellent representation of the types of indicators many communities will ultimately adopt.

TABLE 2.1
ENVIRONMENT-ECONOMY-SOCIETY EXAMPLE INDICATORS (COMMUNITY)

Environment	Economy	Society
• Surface Water Quality	• Labor Productivity	• Crime Rate
• Greenhouse Gas Emissions	• Income Distribution	• Life Expectancy
• Soil Erosion Rates	• Unemployment	• Population

Source: Sustainable Development in the United States. U.S. Interagency Working Group on Sustainable Development Indicators, 1998.

Industrial Applications

One example demonstrating the types of projects in this category is the general framework detailed by Azapagic and Perdan (2000). Using a life cycle approach, this framework provides a base to help develop sustainable development indicators across any industry. Though more specific categories will be necessary depending on the exact nature of the organization's business, the categories listed in Table 2.2 can help provide a place to start.

TABLE 2.2
INDICATORS OF SUSTAINABLE DEVELOPMENT FOR INDUSTRY: A GENERAL FRAMEWORK

Environmental Indicators

Environmental Impacts

- Resource use
- Global warming
- Ozone depletion
- Acidification
- Eutrophication
- Photochemical smog
- Human toxicity
- Ecotoxicity
- Solid waste

Environmental Efficiency

- Material and energy intensity
- Material recyclability
- Product durability
- Service intensity

Voluntary Actions

- Environmental Management Systems
- Environmental improvements above compliance levels
- Assessment of suppliers

Economic Indicators

Financial Indicators

- Value added
- Contribution to GDP
- Expenditure on environmental protection
- Environmental liabilities
- Ethical investments

Human Capital Indicators

- Employment contribution
- Staff turnover
- Expenditure on health and safety
- Investment in staff development

Social Indicators

Ethics Indicators

- Preservation of ethical values
  - stakeholder inclusion
  - involvement in community projects
- International standards of conduct
  - business dealings
  - child labor
  - fair prices
  - collaboration with corrupt regimes
- Intergenerational equity

Welfare Indicators

- Income distribution
- Work satisfaction
- Satisfaction of social needs

Source: Indicators of Sustainable Development for Industry. Azapagic and Perdan, 2000.

2.2.2.2
Ethics-Conservation-Cooperation-Competition Framework

Presented as a part of the Community Sustainability Auditing (CSA) protocol, one of the underlying goals of this approach is to make more explicit a number of issues that may not be immediately evident when one considers the environment-economy-society framework (Walter and Wilkerson, 1998a). Keeping this goal in mind, the concept of sustainability is organized according to four fundamental themes, namely ethics, conservation, cooperation, and competition. Touching on numerous multi-dimensional issues (Walter and Wilkerson, 1998a), these themes can help one begin to better understand the linkages between the environment, the economy, and society.

Each of these four closely related areas are initially used to help develop questions related to critical issues surrounding sustainability. An approach unique amongst the conceptual frameworks discussed in this review, this is a process loosely inspired by the ISO 14000 environmental auditing procedures. The fundamental idea in posing a series of questions is to attempt to capture all of the major issues related to the sustainability of a community (Walter and Wilkerson, 1998b), or in this case, organization. Building on the questions developed under this framework, indicators are then created in an effort to address the issues raised by the questions.

Perhaps the best way to illustrate the conceptual framework proposed by Walter and Wilkerson is to provide examples of the types of questions that might be asked under each of the four categories. Prior to doing so however, it is important to establish that the questions will vary depending on the circumstances faced by any particular community or organization. Furthermore, it should be noted questions asked under this framework often raise similar issues. As a result, there will often be some overlap between the categories. This in itself can be advantageous, as determining linkages between the issues raised by these questions is one of the fundamental principles of sustainable development. A selection of sample of questions is presented in Table 2.3.

TABLE 2.3
CSA SAMPLE QUESTIONS

Ethics
- Is access to employment equitable?
- Is income distribution equitable?

Conservation
- Are provisions in place for the renewal and conservation of natural resources?
- Is the community investing in human resource renewal and acquisition?

Cooperation
- Does community development have the active support of other levels of government?
- Is there equal and adequate access to community planning processes?

Competition
- Does the community have a diverse and vital economy?
- Are educational achievement levels and the quality of education comparable with other communities in the region?

Source: Community Sustainability Auditing. Walter and Wilkerson, 1998a and 1998b.

Building on the example provided by Table 2.3, it is possible to consider the development of actual indicators under this framework. The first point to make is that, although the indicators are created using the four themes identified above as important guiding principles, the final set of indicators is not actually organized under those headings. Though each indicator is considered in terms of its relationship with the themes of ethics, conservation, cooperation, and competition, they are actually grouped into areas representing core community concerns when they are presented. For instance, consider some of the examples from one set of indicators generated using this framework in Table 2.4.

The second important point to make regarding the indicators developed under this model is also illustrated in Table 2.4. It is significant to note that in every case, each of the indicators has been compared to perceptions gathered from a survey of local people (Walter et al. 1999). This is noteworthy because it serves to underline the fact that operationalizing sustainable development cannot be a purely technical exercise.

TABLE 2.4
CSA SAMPLE INDICATORS

Health and Safety Indicators
- Number of physicians/10 000
- Crime rate/1 000
- Distance to family physician
- Perception of change in crime rate

Community Involvement Indicators
- Expenditure on recreation and culture
- Volunteerism in community
- Satisfaction with recreation programs
- Participation in cooperative activities

Education Indicators
- Highest educational achievement
- Enrollment in special education
- Adequacy of training programs
- Quality of special education

Economic Indicators
- Male/female job distribution
- Unemployment rates
- Adequacy of employment opportunities
- Economic security of future generations

Environment and Natural Resource Indicators
- Forest harvest volume
- Water quality
- Sustainability of timber harvest
- Perception of water quality

Source: What Matters in Vanderhoof British Columbia? Walter et al. 1999.

Finally, it can be seen from a study of Tables 2.3 and 2.4 that many of the questions asked and indicators developed are not directly applicable to the types of issues faced by electric utilities. However, they do provide useful examples that may help to provoke thought regarding the issues facing electric utilities. The real strength in considering alternative frameworks is they are different than the "traditional" model and help to provide those developing indicators with a different perspective.

2.2.2.3 Effectiveness-Thrift-Margin Framework

The Sustainable Development Records (SDR) approach outlined by Nilsson et al. (1998) provides another possible model for the creation of sustainable development indicators. In the broadest sense, this approach regards sustainable development as an economic question. Therefore, it's not surprising to find it has its theoretical roots in the writings of an economist, Herman E. Daly. Accordingly, it is useful to begin the consideration of the SDR approach with a brief discussion of Daly's steady-state economy concept (1977) and what it means in the context of sustainable development.

The very use of the words "steady-state economy" challenges one of the most universally accepted goals in the world: economic growth. Under conventional economic thinking, the system that grows the most and the fastest is considered to be the best. However, the steady-state economy explicitly adopts the concept of "development" over "growth." Discussed previously in Section 2.2.1.1, this distinction is also a key principle of sustainable development.

Building on that concept, Daly (1977) defines a steady-state economy as "an economy with constant stocks of people and artifacts maintained at some desired, sufficient level by low rates of maintenance 'throughput.' " Recognizing the need to take a whole-systems approach, this definition implicitly ties the economy to both society as a whole and the natural environment. These connections are made possible by the inclusion of two physical populations in that definition, namely people and artifacts.

Both people and artifacts place stress on the natural environment. The magnitude of this stress is largely related to the number of people and the number of artifacts and the amount of resources required to build, maintain, and dispose of these populations. The implication is, with continued growth of these populations, there will undoubtedly come a time (if it hasn't already) when the benefits provided by these larger populations will not be worth the costs. In this case, the benefits provided by these populations are in the form of services while the costs are largely in the form of degradation to the natural system and the services it provides.

The amount of throughput required to maintain these populations is thus a critical component of maintaining the steady-state. Since the definition given above includes the word "rates" when referring to throughput, this is a concept based on flows. More specifically, throughput is the entropic physical flow of matter-energy from nature's sources, through the human economy, and back to nature's sinks (Daly, 1977). Based on the laws of thermodynamics, it is a concept that recognizes everything has to come from and go somewhere. Therefore, while service is the final benefit of economic activity, throughput – in the form of sacrificed ecosystem services – is the final cost (Daly, 1977).

With particular relevance to sustainable development, the concept of the steady-state economy helps provide the basis for the SDR approach. As illustrated in Figure 2.2,

the SDR model is a systematic approach conceptually organized into three broad categories:

1. **Resource Base**: consists of the financial, environmental, and social resources required for the operation to exist
2. **Operation**: generates different kinds of services
3. **Services**: satisfaction experienced when wants are satisfied

The "throughput" illustrated in Figure 2.2 links the operation to the resource base and consists of both material (e.g. water) and immaterial flows (e.g. knowledge).

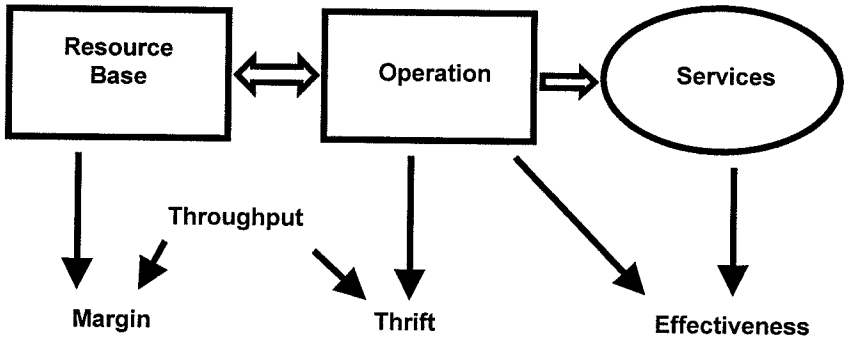

FIGURE 2.2
SDR APPROACH
Source: Greening of a Campus Restaurant at Stockholm University. Nilsson et al. 1998.

Using those three categories as the conceptual model, indicators are created to represent the linkages between them. To provide further guidance in the creation of the indicators, three additional areas are illustrated in Figure 2.2. Referred to as the actual SDR ratios themselves, these additional categories are:

- Effectiveness
- Thrift
- Margin

The SDR ratios are particularly useful because they help encourage those developing the indicators to consider a broad range of issues. Furthermore, by considering the issues in this manner, it is possible to begin to see the relationships between each of the three categories in the overall conceptual model.

The starting point to applying the SDR approach is to associate with each of the ratio categories one fundamental question. This question helps to illustrate the context of each ratio while providing a framework for organizing the key issues the project seeks to address. This, in turn, provides a starting point for developing the indicators. To help enhance understanding, each of these questions is accompanied by a definition of the individual ratios.

1. Effectiveness: Is the system getting closer to its overall goals?

$$\text{Effectiveness} = \frac{\text{A measure of the services delivered}}{\text{A measure of the size of the operation}}$$

2. Thrift: Is the system thrifty with its resources?

$$\text{Thrift} = \frac{\text{A measure of the size of the operation}}{\text{A measure of the size of the throughput}}$$

3. Margin: Can the resource-base sustain the operation in the long run?

$$\text{Margin} = \frac{\text{A measure of the size of the throughput}}{\text{A measure of the size of the resource base}}$$

As alluded to earlier, it is possible to incorporate several issues into each of these categories. Furthermore, for each of the issues raised, it must be emphasized it is possible to develop several indicators related to that issue. In cases where multiple indicators are developed for one issue, these indicators are referred to by Nilsson et al. (1998) as "clusters."

Among others, one of the situations in which the SDR approach has been tested is on a restaurant. Although a restaurant certainly faces different challenges than an electric utility, it is quite useful to examine a sample of the indicators developed for the restaurant using the SDR approach. Table 2.5 presents this example.

TABLE 2.5
SDR SAMPLE RATIOS

Aims	Ratios	Definition
Effectiveness:		
• Environmental Image	• Guests' Perception	• Number of customers that perceive the restaurant as environmentally adapted/total number of customers
• Profitability	• Profitability	• Profit/number of meals served
Thrift: (N = number of meals served)		
• Chemicals	• N/chemicals used (meals per kg)	
• Labour	• N/labour used (meals per working hours)	
Margin:		
• Chemicals	• Not environmentally hazardous	• Not environmentally hazardous chemicals/total use of chemicals
• Waste	• Composting	• Organic waste composted/total amount generated

Source: Greening of a Campus Restaurant at Stockholm University. Nilsson et al. 1998.

2.2.2.4 Pressure-State-Response Framework

The Pressure-State-Response conceptual model provides another tool that may be useful in identifying possible ways to structure the set of indicators. Essentially, this framework is based on the principle of measuring cause and effect relationships. By examining the issues in this manner, those developing the indicators are encouraged to consider all impacts associated with any particular decision.

According to Hart (1998), the three categories in this framework can be defined as follows:

- **Pressure**: activity causing state
- **State**: condition that exists
- **Response**: actions to change state

As with the other conceptual frameworks described in this section, an example may be the best way to demonstrate the use of this particular framework. A sample of possible considerations under each of the three categories is presented in Table 2.6.

TABLE 2.6
PRESSURE-STATE-RESPONSE SAMPLE INDICATORS

Pressure	State	Response
• Pounds of toxics used	• Air quality (ppm)	• Number of air permits
• Vehicle miles driven	• Air quality	• Cars inspected
• Number of single use/disposable goods purchased	• Tons recycled, incinerated, or landfilled	• Number of permitted landfills or incinerators

Source: Sustainable Community Indicators Trainer's Workshop. Hart, 1998.

The state and response categories are often measured by many organizations. However, though it is the most important, the pressures causing the state to exist are frequently neglected (Hart, 1998). By dealing with issues in the pressure category, the organization can reduce the impacts caused in the other two.

This is an idea strongly related to the concept of prevention. Rather than reacting to problems after they have occurred, this concept emphasizes dealing with those problems at their source. Such an approach can be advantageous since dealing with the problem directly can often provide better results at a lower cost than dealing with the problem through indirect means.

One important weakness to keep in mind regarding the pressure-state-response framework is it was developed for environmental issues. Although it works well for those types of indicators, it is more difficult to apply this framework to social and economic issues. What it is most useful for is in helping to establish a context and draw a boundary around the problem before deciding what the pressures, states, and responses are (Hart, 1998).

2.2.2.5 Capital Stocks

The underlying principle of this framework is to track stocks of key forms of capital required to fulfill human needs while maintaining a healthy natural environment. Like the SDR approach discussed in Section 2.2.2.3, the roots of this framework can be traced back to the work of the economist Herman E. Daly (1973).

As noted by Meadows (1998), the important concept offered by Daly was that the human economy is situated within a hierarchy resting on a foundation of natural resources and reaching to the height of some ultimate end. Under this model, the economy was considered as an intermediate stage on the journey to that ultimate end rather being an end in itself. This is an important concept because it emphasizes the need to consider issues associated not only with the economy, but also with the points both above and below it on the hierarchy.

Building on the theoretical base provided by Daly, key types of capital have been identified as being necessary to meet the ultimate ends. The exact divisions and definitions of these forms of capital varies somewhat depending on the source. For example, the World Bank identifies four forms of capital: man-made, natural, human, and social (Serageldin, 1996). However, because it provides a local example, the definitions considered here are those utilized by the National Round Table on the Environment and the Economy (NRTEE). In their ongoing efforts to develop a national set of sustainable development indicators for Canada, the NRTEE has adopted the capital stocks approach using the following three divisions and definitions (NRTEE, 2002):

- **Natural Capital**: includes the elements associated with natural resources, land, and ecosystems
- **Produced Capital**: includes machinery, equipment, and other durable items used to produce goods and services used by final consumers
- **Human Capital**: focusing on education and health, this form of capital is commonly defined as the capabilities of the working-age population that allow it to work productively with other forms of capital to sustain economic production

Like all other capital stocks-based programs, the logic underlying this emphasis on capital is it helps to shift the focus of indicators from traditional measures of economic performance such as GDP to trends in the status of stocks of the different forms of capital supporting a high quality of life (NRTEE, 2002).

As previously noted in Section 2.1.6.2, the NRTEE's Environment and Sustainable Development Indicators (ESDI) Initiative program – of which this capital

stocks initiative is a part – is an ongoing program and indicators to represent issues related to these categories are still in the process of being finalized. Therefore, no examples of indicators created under this framework are currently available from the NRTEE.

In order to provide examples of this framework it is necessary to look to other sources. The examples provided by Meadows (1998) in *Indicators and Information Systems for Sustainable Development* are particularly useful since they are organized around divisions of capital defined similarly to those of the NRTEE. Organized into the categories of natural capital, built capital, and human and social capital, some examples of indicators developed using this framework are presented in Table 2.7.

TABLE 2.7
CAPITAL STOCKS SAMPLE INDICATORS

Natural Capital	Built Capital	Human and Social Capital
• Renewable resources used/total natural resources used	• Average productive lifetime of capital	• Average layers of management between employees and owners
• Loss of primary forest/total primary forest remaining	• Maintenance inputs to capital stock/productive output of capital stock	• Income of top 10 percent/income of bottom 10 percent
• Quality of river water entering city/quality leaving city	• Resource (material and energy) throughput/end use output	• Percent of time contributed to civic, religious, and other non-profit causes

Source: Indicators and Information Systems for Sustainable Development. Meadows, 1998.

* * *

The conceptual frameworks introduced in this section further illustrate there are many ways to approach a sustainable development indicator project. What is important is that factors such as such as the vision, purpose, clients, and audiences are taken into account before selecting a particular framework (Dilks, 1996). Each of the frameworks described have their own particular strengths and weaknesses so it is imperative a framework relevant to the specific project being undertaken is selected.

Finally, while those involved may wish to use one of these methods on their own or in combination with another, they are also free to develop their own conceptual framework. As Walter and Wilkerson state (1998a), the process of developing a conceptual framework can be a beneficial learning exercise that helps the group accept the operational meaning of sustainability. Under such a scenario, however, those developing the indicators may find existing frameworks useful as analysis tools. In any case, whatever tool helps to identify the key issues that must be addressed by the indicators is certainly valid.

2.2.3
Desirable Characteristics of Indicators

Before the selection of sustainable development indicators can begin, it is first necessary to attain an understanding of what makes a good indicator of sustainability. To provide guidance in this regard, every sustainable development indicator project identifies a set of indicator selection criteria prior to attempting the creation of specific indicators. With that in mind, the following sections outline a set of example indicator selection criteria as well as other important considerations to note when indicators are being selected.

2.2.3.1
Indicator Selection Criteria

There are many examples of indicator selection criteria. One set that incorporates many of the characteristics found in those examples is presented in Table 2.8. Though it is longer than the typical list, Table 2.8 does illustrate well the types of criteria that will appear in other programs. In many cases, the differences between the various sets of criteria are in language only.

TABLE 2.8
SAMPLE INDICATOR SELECTION CRITERIA

1. Scientific validity/theoretical soundness
2. Representativeness
3. Responsiveness
4. Relevance to stated goals
5. Accuracy
6. Accessibility and availability of data
7. Understandable by potential users
8. Able to provide early warnings of change
9. Comparable to thresholds or targets
10. Comparable with indicators developed in other jurisdictions
11. Cost effective to collect and use
12. Unambiguous
13. Attractive to media
14. Integrative of environmental, social, and economic factors
15. Able to take account of social, environmental, and economic distribution of conditions within a population or across a geographic region
16. Focus on linkages between indicators
17. Able to distinguish between local and non-local sources and impacts

Source: Measuring Urban Sustainability. Dilks, 1998.

The main caution to note in utilizing indicator selection criteria is that, while criteria are certainly useful in helping to provide guidelines for selecting indictors, they are not a guarantee the indicators selected will be most meaningful to any given audience (Pinter et al. 1999). Though it is relatively easy to list the characteristics of ideal indicators, it is not so easy to find indicators actually meeting these ideal characteristics (Meadows, 1998).

2.2.3.2 Characteristics of a Good Indicator

To ensure that indicators are useful to the audiences having an interest in them, it is helpful to consider some representative examples of good indicators.

First, consider the two indicators: "number of good air quality days" and "number of vehicle miles traveled." The disadvantage of "number of good air quality days" as an indicator is that it does not show links between good air quality and other economic or social issues (Hart, 1998). On the other hand, "vehicle miles traveled" shows the link between social and economic behaviour and environmental results (Hart, 1998).

A second example is to consider the difference between the indicators: "pounds of material recycled" and "number of products made from recycled material." While the

first indicator is linked closely to society and the environment, it does not really address the issue of carrying capacity; a concept referring to whether resources are being consumed faster than they are being renewed or restored. "Number of products made from recycled material" however links the production process to the disposal of solid waste and so addresses carrying capacity (Hart, 1998).

Although the above examples may not apply to the systems operating under the auspices of electric utilities, they do illustrate the types of concepts that need to be considered in the formulation of the indicators. It should be remembered that studying other indicator projects will help gain some appreciation of the range and type of indicators in use (Walter and Wilkerson, 1998b).

In addition to those examples, it is useful to consider the advice provided by Hart (1998) for making a better indicator. Although nothing is going to guarantee the set of indicators produced is optimal, keeping the following three points in mind may help keep the group developing them on track:

- Measure what you want to be
- Make a measure that speaks to people
- Measure the cause, not just the effect

2.2.4 Number of Indicators to Select

Having established what makes a good indicator, it is necessary to determine how many indicators are needed. If too many indicators are selected, it raises the potential problem that the users will be overwhelmed with information. On the other hand, if not enough indicators are developed, there is a risk the users will be unable to develop an appreciation for the overall picture. The number of indicators used will therefore need to be determined based on the specific needs of the users.

Furthermore, consider that settling on a number of individual indicators may not be the only solution. One possible criticism of having a series of many individual indicators is that it may not be convenient or practical to actually use them in decision-making. This in turn leads to the question of whether or not the indicators should be subjected to some form of aggregation.

2.2.4.1 Aggregation

Aggregation is essentially the search for one crosscutting integrated indicator. However, whether or not the indicators should be aggregated into a single number or "sustainability index" is one of the most debated areas in the field today (AtKisson, 1996). Compelling arguments can be made for both sides.

Those advocating the practice believe a certain aggregation is needed to provide indicators with the influence to really have a substantial effect on decision-makers. In this context, the logic is aggregated indicators have more of an impact on the mind and are more effective in attracting attention (Hardi, 2001). On the other side of the argument is the belief that aggregated measures often combine so much into one measure it is impossible to use them to identify what is problematic or going well (Innes and Booher, 2001). The general feeling here is that what is gained in simplicity is lost in detail.

Another point that complicates the issue further is the question that if aggregation is selected, exactly how will this be accomplished? Presently, there is no universally accepted system of aggregation. This means the group developing the indicators would have to design their own method. The main problem comes in the challenge of determining an acceptable theory of weighting the issues against one another (Jesinghaus, 1999). For instance, take into account that not all issues have the same importance in all situations and therefore some indicators should be considered more pertinent than others. However, determining how important one indicator is relative to another is fraught with difficulties and controversy (Walters and Wilkerson, 1998b).

Assuming these difficulties could be overcome, one scenario to consider would be to have different levels of indicators where each set of indicators focuses on the system at its own particular level before being aggregated to inform the system at the next level (Meadows, 1998). In such a case, particular care must be taken given the fact that information is lost at each stage of aggregation. Furthermore, any decisions made in the development of the index must be clearly documented and it must always be possible to drill down as many levels as necessary to see the numbers that have been put together to make the aggregate indicator (Meadows, 1998).

Since there is still no consensus on how to deal with the question of aggregation, each organization will have to weigh the positives and negatives of such a course of action and make a decision that reflects what they are trying to accomplish. To date, most of the sustainable development indicator sets produced have not been subject to aggregation. If it is determined that aggregation is to be implemented, it is important that the appropriate time and effort is devoted to this task. A case study that may be of assistance in this situation is the *Dashboard of Sustainability* model currently under development by the International Institute for Sustainable Development.

2.2.5
Communicating the Indicators

Once a final set of sustainable development indicators has been selected, this information must be available in a format useful to all having an interest in it. Properly presented, the indicators should have uses for a number of different audiences such as those at the governing level, the operational level, and as a communication tool with stakeholders (GRI, 2000). It is therefore necessary that all findings are summarized in a clear, well-organized manner that addresses the diverse needs of these audiences.

There are numerous ways in which to communicate the findings of any sustainable development indicator project. Two general classifications that may be used in the consideration of these options include the creation of a stand-alone sustainable development indicator report or the integration of the indicators with existing reporting mechanisms. It is also possible that a combination of these methods may be utilized.

2.2.5.1
Stand-Alone Reports

Since the majority of reports fall into this category, there are a number of models from which ideas may be drawn. Some examples that demonstrate the various reporting formats include: the Global Reporting Initiative, the Canadian Electricity Association's Environmental Commitment and Responsibility program, corporate sustainability reports produced by other Canadian companies, and the many sustainable community reports.

Global Reporting Initiative

The Global Reporting Initiative (GRI) is an effort devoting focus to the development of a set of sustainability reporting guidelines for voluntary use by organizations of all types. The logic behind the Initiative is external non-financial reporting to date has not been widely accepted and by reducing the confusion surrounding these reports, the information within them may become more credible. Since credibility is an issue for many sustainable development or environmental reports, this type of program could ultimately offer significant value to any reporting organization. Though currently under review, the GRI in its current form does offer a number of useful guidelines any organization should consider when reporting on its sustainable development activities.

For example, it notes that care needs to be taken to ensure any graphics used do not unintentionally lead readers to make incorrect interpretations of data and results (GRI, 2000). However, while these types of considerations are certainly of value, they are common to the preparation of virtually any kind of report. More significant is the discussion the GRI provides on what it refers to as its "underlying principles."

The six underlying principles of GRI reporting are:

- **Reporting entity principle**: boundary conditions used in the report must be clearly defined; essential in maintaining transparency
- **Reporting scope principle**: clarify the scope of activities reported and provide explanations for any restriction in reporting scope
- **Reporting period principle**: impacts, events, and activities must be reported in the reporting cycle in which they occur or are identified
- **Going concern principle**: the published data will reflect the assumption that the reporting organization is expected to continue operations into the foreseeable future
- **Conservatism principle**: the reporting organization will claim credits for only those achievements that can be directly attributed it
- **Materiality principle**: materiality in economic, environmental, and social reporting is dependent on what is relevant either to reporting organizations

or to their external stakeholders (keeping in mind different stakeholders may not agree on what is material)

Those underlying principles alone can provide the basis for creating any sustainable development report. However, the GRI has taken it several steps further and has also suggested a possible framework for organizing any sustainability report. Accordingly, the GRI believes a report containing the following sections will be logical and complete, and will facilitate comparability and benchmarking (GRI, 2000):

1. Chief Executive Officer (CEO) statement
2. Profile of reporting organization
3. Executive summary and key indicators
4. Vision and strategy
5. Policies, organization, and management systems
6. Performance (i.e. the indicators and any supplementary information)

Environmental Commitment and Responsibility Program

The member utilities of the Canadian Electricity Association (CEA) have prepared a set of guidelines outlining reporting protocols for the Environmental Commitment and Responsibility (ECR) program. The purpose of the program is to ensure that member utilities strive to improve their environmental performance. At the heart of the program are four principles intended to guide members towards this ideal:

Principle 1: To be more efficient in our use of resources

Principle 2: To reduce the adverse environmental impact of our business

Principle 3: To be accountable to our constituents

Principle 4: To ensure our employees understand the environmental implications of their actions and have the knowledge and skills to make the right decisions

Each of these principles is represented by a few environmental performance indicators with the indicators being presented as a part of an annual ECR Utility Progress Report.

As a part of the reporting guidelines, a number of items have been identified as being an important part of the report. The first point to note is that reports must be accompanied by a letter signed by the Chief Executive Officer (CEO) of the reporting utility (CEA, 2001). Reports are also required to contain several other elements. These include general utility information, quantitative data for each indicator, and qualitative discussion/comments for the data or indicators as appropriate (CEA, 2001). Should they meet the applicable criteria, utilities also have the option of including up to three "success stories" related to one of the four principles in the report. While the exact format for the report is left to the discretion of the individual utilities, all of this information should be presented in the same order as the principles and indicators.

In addition to the requirements above, several other important points are addressed. For example, one item raised is that all data and records used in the development of annual reports are to be retained for a period of not less than five (5) years. These types of considerations are also important to keep in mind when preparing a sustainable development indicator report.

Corporate Sustainability Reporting in Canada

Though the vast majority of Canadian companies have yet to begin issuing sustainable development reports, some companies have undertaken this task. In a recent study of corporate sustainability reporting in Canada entitled *Stepping Forward: Corporate Sustainability Reporting in Canada* (Stratos, 2001), thirty-five of the fifty-seven identified examples were reviewed in an effort to assess how companies report on their sustainability practices. In particular, the study focused on how those reporting dealt with issues related to the "triple bottom line" of the company's economic, environmental, and social management and performance.

To assess how effective each of the reports was in dealing with issues associated with the triple bottom line, the study scored each of the corporate sustainability reports on fifty-two criteria grouped into ten categories. Building on the guidelines provided by the Global Reporting Initiative and recognizing that a triple bottom line approach requires an integrated vision, the report concluded with ten key recommendations on good reporting:

- Be clear about your intended audiences

- Have a clear purpose for reporting aligned with the company's vision and your CEO's public commitments
- Describe clearly the what and where of your business
- Be clear on scope
- Don't leave policies and commitments unstated
- Set and report on targets
- Present performance trends
- Don't gloss over tough issues
- Demonstrate accountabilities
- Help readers access other important information

Sustainable Communities Reporting Practices

There are a wide variety of reporting formats that have been used by the various communities undertaking a sustainable development indicator initiative. However, though each report will be somewhat unique, there are often many similarities between the individual community reports. For instance, many reports include an executive summary, acknowledgements, a user's guide, a brief introduction to the project, and a summary of the necessary background information in addition to sections containing the actual indicators. Typically, each indicator is outlined on a single page including a definition and discussions of trends, linkages, assumptions, knowledge gaps, and data sources. Most of the indicators include a graph, a table, or both as a supplement to the text. Where applicable, the indicators may also be compared to other local, regional, or national statistics.

For some representative examples, consider the reporting formats of past projects such as *Sustainable Calgary* (1998), *Minnesota Milestones* (1998), and *New Jersey Future* (1999). It may also be helpful to consider the reporting guidelines suggested by the *Community Sustainability Auditing (CSA)* protocol (Walter and Wilkerson, 1998a and 1998b) and *The Community Indicators Handbook* (Norris et al., 1997).

* * *

While there is no universally accepted method dictating exactly how any report should be prepared, there are a number of useful guidelines contained in the discussion of

the examples in this section. For example, the involvement of top management in the report should be seen as a necessity. The general considerations of providing the necessary background information; presenting data related to indicators in graphs, tables, or charts; explaining all assumptions; clarifying why the issues presented are important to the company and how they were determined to be so; addressing both positives and negatives associated with those issues; identifying the reporting period; and ensuring all is done so in a clear and easy to understand format should also been seen as integral parts of any report. The point to be made is that while there is a certain amount of flexibility associated with creating any report, it must ultimately be seen as valuable and useful to those that actually use it. The needs of the end users must always be kept in mind.

2.2.5.2 Integrated Reporting

While all of the examples presented in this section to this point have focused on producing a stand-alone sustainable development or sustainable development indicator report, other options are available. Though examples of this form of reporting are limited, it may be possible to incorporate some key information into existing reporting frameworks (such as the company's annual report). Though under this type of plan a separate stand-alone report would likely still be necessary, it illustrates there are many ways other than simply creating another separate report to consider when disseminating this type of information.

An even more ambitious reporting scheme is to consider the possibility of an integrated reporting and information system. Under such a system, key information pertaining to the indicators could be established in a database connected to the company intranet or, if the company so desired, the Internet. This would allow for those interested to access up-to-date information on the indicators as needed instead of simply relying on an annual report. Though it should be noted few companies presently have such an integrated system, it is something to consider in the future.

What the possibility of integrated reporting really serves to demonstrate is it is important to ensure alignment with other initiatives already in place in the organization. Tieing into the existing organizational infrastructure wherever possible will go a long

way towards seeing the indicators do become a valuable decision-making tool for both internal and external stakeholders. Doing so will also help ensure consistent messages are expressed in all forms of reporting, which in turn will help to demonstrate the company's commitment to the integration of sustainability issues in its overall business strategy (Stratos, 2001).

2.2.6
Bellagio Principles for Assessment

The Bellagio Principles of Assessment are perhaps best thought of as overall guiding principles to consider when engaging in any sustainable development indicator project. Though not a specific step-by-step process outlining how to create sustainable development indicators, there are many important points covered that any indicator project should consider. The Bellagio Principles of Assessment are (IISD, 1997):

1. Guiding vision and goals.
2. Holistic perspective.
3. Essential elements.
4. Adequate scope.
5. Practical focus.
6. Openness.
7. Effective communication.
8. Broad participation.
9. Ongoing assessment.
10. Institutional capacity.

Collectively, these ten interrelated principles deal with four overarching aspects that must be a part of any process focused on assessing progress towards sustainable development. More specifically (IISD, 1997):

- Principle 1 deals with the starting point of any assessment
- Principles 2-5 deal with the content of any assessment
- Principles 6-8 deal with key issues of the process of assessment

- Principles 9-10 deal with the necessity for establishing and continuing capacity for assessment

Applied as a complete set, these principles can serve as guidelines for the entire assessment process while providing a link between theory and practice (IISD, 1997). With that in mind, a brief discussion of each of the four aspects follows.

Aspect 1 Starting Point

The only aspect incorporating just one of the ten principles, this aspect emphasizes the need to have a clear vision of sustainable development and goals defining that vision (IISD, 1997). Since this vision and its accompanying goals will essentially form the basis for the rest of any sustainable development indicator project, it is critical these points are clearly articulated up front and that they are understood by all involved.

Aspect 2 Content

This aspect deals with the next four of the Bellagio Principles, Principles 2-5. One of the main themes underlying each of these Principles is the need for the project to address any relevant issues using a "whole systems approach." This means that rather than addressing issues independently, it is recognized the best results will be achieved by recognizing the interrelationships between those issues. Adopting an approach considering all aspects associated with a given issue over the course of its full life cycle will provide a perspective on the entire system that facilitates an emphasis on prevention over reaction (IISD, 1997).

Though an emphasis on the whole system is a major theme amongst these Principles, so too is the theme of maintaining a sense of practicality. This necessitates that boundaries are carefully selected and that the scope of the effort is clearly defined. Effort should be devoted to issues that actually have a chance of being addressed with a focus on implementation being maintained throughout the process.

Aspect 3 Key Issues of the Process

The three Bellagio Principles included in this aspect of assessment are openness, effective communication, and broad participation. Offering valuable advice on the actual performance of the assessment, these principles explicitly recognize the need to involve key stakeholders in decision-making. Furthermore, when these stakeholders are actually being engaged, it is important an emphasis on openness and communication is maintained throughout the process. If the indicators are not developed in a transparent manner that includes explanation where appropriate, the legitimacy of any set of indicators ultimately selected will be severely undermined.

Aspect 4 Establishing and Continuing Capacity

Finally, it is important to remember the process of creating sustainable development indicators is iterative. Therefore, it follows that the assessment process must be ongoing if confidence and credibility in the indicators is to emerge (IISD, 1997). However, for this ongoing assessment to even take place, sufficient resources must be allocated specifically to that task. Without the necessary human and financial resources, any capacity for assessment simply cannot evolve (IISD, 1997).

2.3 Ancillary Issues

Having examined information relating to sustainable development indicators, it is possible to see there are many disciplines that play a part in projects on this topic. In fact, how the information and tools from these disciplines are used can have a large impact on the success or failure of the overall sustainable development indicator program. Though they don't really fall into any of the categories previously discussed, four of the most important elements to consider in any sustainable development indicator project include:

- Top Management Commitment
- Project Management
- Stakeholder Consultations
- Continuous Improvement

2.3.1
Top Management Commitment

The support and commitment from key decision-makers is necessary if any project is to succeed in the long-run. Without the support of top management, the legitimacy of any set of sustainable development indicators will be undermined and the effectiveness of any set of indicators will be severely limited. Therefore, prior to beginning any project of this nature, the appropriate authorization must be obtained.

One of the prerequisites of obtaining project approval is there is someone to initiate the project. Who this is may vary depending on the organization. Regardless, before soliciting commitment from the appropriate authority, there are several points that merit consideration. For example, when senior management are approached regarding project approval, they are likely to question the purpose, cost, duration, and personnel requirements. Many of these questions can be answered by preparing a preliminary project proposal. Although a written proposal may not always be necessary as a part of obtaining approval for the project, addressing the issues in writing may help the project proponent to organize his or her thoughts.

2.3.1.1
Project Proposals

There are numerous models that can be considered when developing a project proposal. Regardless of the model selected, any proposal should be clear, concise, cogent, compelling, and correct (Brewer et al. 1998). These are the five "C's" of carefully crafted proposals and can help guide the creation of a proposal for virtually any type of project.

For more specific guidance on creating the proposal, one need only look at some of the internal documents at Manitoba Hydro. For example, there is the booklet outlining guidelines for creating proposals related to Research Grants at Manitoba Hydro (Manitoba Hydro, 1999). This document suggests the following elements are included:

- Summary
- Background

- Proposal
  - Introduction
  - Body
  - Cost Summary
  - Restrictions
  - Conclusions
  - Appendix

Within these sections, are several other requirements that are not explicit from the category titles, though they are noted in the descriptions of the relevant categories. These include elements such as a purpose, a scope, a description of potential challenges, a milestone schedule, a summation of expected results, and names of all participants (Manitoba Hydro, 1999). These elements are frequently made more explicit in other explanations of project proposals by including them as their own separate categories.

As an alternative example, consider the model proposed by Meador in his book *Guidelines for Preparing Proposals* (1985). Though the author notes individual proposals vary depending on the circumstances, some of the key elements suggested for inclusion in any proposal are: summary, introduction, statement of research problem, objectives, expected benefits, project description, timetable, key participants, budget, administrative provisions, alternate funding, post-project planning, appendices, and bibliography/references (Meador, 1985).

2.3.1.2 Project Charters

One way of expressing top management commitment to the project is in the form of a project charter. According to Taylor (2001), this document is:

- Signed by a senior executive with authority
- An internal document that identifies the project manager and gives him or her the authority to begin the project
- Identifies the functional area responsibilities and which functional managers are to support the project

- A way to obtain buy-in for the project

2.3.2 Project Management

Three of the most significant areas of project management as it relates to sustainable development indicators include directions on:

- Forming Working Groups
- Formulating the Purpose and Scope
- Developing Action Plans

2.3.2.1 Working Groups

Like any other type of project, someone or some group of people needs to be responsible for ensuring the sustainable development indicator project succeeds in addressing the specific needs of the organization. As demonstrated in Section 2.2.1, this group of people is often referred to by the term "working group." Specifically, the role of the working group is to oversee the project and guide it through all of the steps required to ensure that a useful, relevant, and clear set of sustainable development indicators is created for the system under examination.

Since the context of any sustainable development indicator project is unique, the makeup of the working group will vary somewhat depending on the project. Whatever the precise nature of the working group, the selection of group members should reflect the variety of tasks to be completed (Walter and Wilkerson, 1998b). As such, incorporating the necessary expertise, experience, and open-mindedness is critical if the working group is to have any credibility. While this list may not be comprehensive, it does illustrate the types of things that are going to be necessary for any working group to successfully undertake a sustainable development indicator project.

Expertise. Within any working group, there must be a thorough knowledge of the system under examination, an ability to recognize what makes a good sustainable development indicator for that system, and the knowledge of how to deal with auxiliary

issues such as stakeholder consultation. Ideally, members of the working group will have knowledge of similar programs within the organization and elsewhere.

Experience. Having team members who have worked with the system in question, who have worked with and developed sustainable development indicators, and who have experience working with stakeholders can help increase the chances the project will be successful. Where, due to time conflicts or resource constraints, a member with experience in one or more of these areas cannot be included in the team, having access to this experience in the form of an outside advisor or consultant will be necessary.

Open-mindedness. Finally, it must be recognized the working group is not going to have all of the answers or have the perspective of everyone affected by the system for which the indicators are being developed. The working group must realize the points raised by stakeholders have legitimacy and recognize that these points must be addressed in a fair and respectful fashion.

Within the discussion of those three points, several other key points might be considered implicit. For example, the working group should be as representative of the system under examination as possible. However, it must also be noted the working group should not be so large that it is cumbersome to operate. A very real challenge is in forming a group that meets the criteria discussed above while staying within the limits of 4-12 members (Randolph and Posner, 1992).

Finally, there are two other prerequisites the working group must meet to ensure the best possible chance of creating a useful set of indicators. First, the working group must have the necessary resources available to them to see that the project may be carried through to completion. It should be kept in mind that a sustainable development indicator process is a time consuming undertaking and it will impose significant time requirements on the members of the working group. Secondly, the working group must also possess the authority to make key decisions throughout the project. This point again comes back to the issues of credibility and accountability. In cases where other parties will be responsible for a decision, this must be made explicit so that the limitations of the working groups authority are fully understood by all participants.

Team Charter

Once the working group has been formed, it is important to establish a Team Charter (i.e. reach agreement on how the group will work together). From the outset the roles and responsibilities of each member, including the project manager, must be clear so everyone knows what is expected. It should be kept in mind the working group is going to make decisions affecting the outcome of the project at every stage of the development process. Decisions ranging from when to call meetings, who will record the minutes, how funds are spent, which stakeholders to engage, how the group will communicate with each other, how the group will communicate with the rest of the company, and who will write the final report are only a small sample of the types of decisions that will be required.

Decision-making Mechanisms

According to Mediation Services (2001), there are a number of methods in which a decision can be made including:

- **Fiat**: decisions made by an authoritative order
- **Expert**: decisions made by a person or group of people having special skills or knowledge derived from training or experience
- **Delegated Authority**: a person or group delegated to act on behalf on the participants
- **Voting**: specifying what majority is required for a decision, to determine the outcome by a vote of all participants
- **Decision by Non-decision**: if an agreement cannot be reached, a previously established alternative will be selected
- **Consensus**: (see below)

If consensus is selected as the decision-making method, it is critical the working group take the time to define what they mean when they say "consensus." One set of information helpful in determining when a decision should be labeled as a consensus-based decision or not is the levels of consensus model proposed by Mediation Services (2001). Under this model, there are six different levels of consensus with each

participant required to state which level most closely represents their feeling on a decision. The six levels of consensus are (Mediation Services, 2001):

1. I can say an unqualified "yes" to the decisions. I am satisfied that the decision is an expression of the wisdom of the group.
2. I find the decision perfectly acceptable.
3. I can live with the decision though I'm not especially enthusiastic about it.
4. I do not fully agree with the decision and need to register my view about why. However, I do not choose to block the decision. I am willing to support the decision because I trust the wisdom of the group.
5. I do not agree with the decision and feel the need to stand in the way of this decision being accepted.
6. I feel that we have no clear sense of unity in the group. We need to do more work before consensus can be reached.

It is important to note the model outlined above essentially gives every participant veto power over any decision being made by the group. What must be made clear here is that blocking consensus is a serious option that should not be taken lightly. Blocking should not be a personal action. It is a deep insight into what would be best for the whole group (Mediation Services, 2001).

If consensus is chosen as the decision-making method of choice and a situation arises where the group cannot come to a consensus, the group may wish to have a "back-up" decision-making method. This method may be selected from the categories given above or be created by the group itself. What is most important is that the back-up decision-making method is established and documented up front.

Extended Working Groups

A final point to consider regarding the issue of working groups is the possibility of supplementing the "core" working group with an "extended" working group that, while involved with key policy decisions and strategy formulation, is not involved in the day-to-day operation of the project. This was the model employed in the *Provincial Sustainability Indicators* program undertaken by Manitoba Conservation (Manitoba

Conservation, 2000). Under this type of format, the core working group could report to the extended working group at predefined intervals or whenever deemed necessary.

Establishing such a system provides several advantages including the ability to incorporate broader representation, helping keep the core working group on track, and allowing for some testing of ideas prior to meeting with stakeholders. The main disadvantage of utilizing such a group is it will place time demands on even more members of the company. In any case, it is important to emphasize if an extended working group is established that all relevant organizational issues associated with that decision are considered.

2.3.2.2 Purpose and Scope

The purpose and scope of the effort must be clear so everyone associated with the project has an understanding of what they are striving to attain. Often neglected, it is important the appropriate time and consideration is devoted to the development of these elements since they will essentially form the basis for the rest of the project. After all, without proper attention given to these points, it is difficult to determine if the project was successful or not.

Though not developed strictly for a sustainable development indicator project, one set of rules that provides guidance in the early stages of the project are those described by Randolph and Posner in their book *Getting the Job Done* (1992). As a part of their ten rules for getting the job done, they list the first four rules using the acronym **GO-CARTS**. The complete statements represented by the acronym are:

Rule 1: Set a clear **G**oal.

Rule 2: Determine **O**bjectives.

Rule 3: Establish **C**heckpoints, **A**ctivities, **R**elationships, and **T**ime estimates.

Rule 4: Create a Picture of the **S**chedule.

Although they do not represent a complete process that may be followed in sequence from the start of the project to the very end, the above points do provide a strong basis for

creating that process. Specifically, the last three points can help guide the creation of an action plan, while the first one can aid in establishing the basis for that action plan.

While a process for creating the action plan is described in Section 2.3.2.3, it is first necessary to establish the purpose and the scope of the project. Both of these points are implicitly covered in the goal definition section of the book by Randolph and Posner; i.e. Rule 1 above. Though there is certainly some overlap, they are presented separately here because each merit special attention.

Purpose

Like any other project, a sustainable development indicator project should be undertaken in response to a specific need or problem. Being particularly clear on this point from the outset is critical since different purposes will give rise to the development of different indicators (Meadows, 1998). For example, always keeping in mind how the project relates to other initiatives in the company, the project might be undertaken to provide one, or a combination, of the following (Walter and Wilkerson, 1998b):

- a planning background
- a performance evaluation
- or as an education initiative

The reason(s) for undertaking the project would, of course, have an impact on the definition of the projects' purpose(s). But while the examples for undertaking the project given above may be representative of the overall context of the project, they are not in themselves a complete definition of the purpose or the project's overall goal.

The definition of the overall project goal is a difficult process that takes a lot of time and energy. Sometimes, it may even be difficult to be clear on a purpose right away (Randolph and Posner, 1992) and it may need to be updated as the project progresses. Since the purpose is essentially a goal itself, it is possible to examine some generally accepted guidelines on goal setting and apply that to the formulation of a purpose statement for a sustainable development indicator project. Discussed in texts such as *Getting the Job Done* (Randolph and Posner, 1992) and *Fundamentals of Project*

Management (Lewis, 1997), an effective goal has five characteristics. These terms are represented by the acronym **SMART** which suggest goals should be:

- Specific
- Measurable
- Agreed upon
- Realistic
- Time (cost) framed

These characteristics can be used as a check for the projects' purpose. If it lacks any of these characteristics, the project is quite likely on the path to disappointment (Randolph and Posner, 1992).

* * *

For the most effective results, everyone must be directing their efforts in the same direction from the very beginning of the project. Clarifying the purpose can eliminate a great deal of unnecessary conflict in an organization and can help channel discussion and activity productively (Bryson, 1995). The purpose or overall goal definition will determine the intended users of the study results, it will influence the types of analysis needed and the manner in which the results are presented (Todd et al. 1999). Furthermore, it essentially provides the basis for the formation of the scope, as only those activities supporting the purpose should be undertaken.

Scope

Before we can develop indicators for sustainability, we must decide which system components we wish to measure (Levy et al. 1998). One point that must be considered during this exercise is a determination and understanding of the potential project audiences as well as the needs of each of those audiences. This is critical since it will have a large impact on how the project is ultimately scoped. Whatever the case, it is necessary to set some boundaries for what the project is attempting to address and, having done that, then break the subject up into manageable pieces.

The scope describes the system to be studied and directs how much information is to be collected, in what categories, and to what levels of detail and quality (Todd et al.

1999). In other words, it sets the boundaries, assumptions, limitations, and allocation procedures on which the rest of the project will be based. Given the complexity of many modern organizations, it is critical that exactly what is included in the analysis and exactly what is excluded from the analysis are made absolutely clear. Knowing what is not being emphasized is as important as knowing what is (IISD, 1997).

2.3.2.3 Develop an Action Plan

Having identified the purpose and scope of the project, a plan must be created to see that the purpose can be fulfilled within the identified scope. Therefore, working with the base provided by the purpose and scope, the working group will need to walk through the project, step-by step, and determine what needs to be done to achieve the project goals. Although developing this plan of action will require a significant investment in time, it is an essential piece of any project since good planning will facilitate "going faster later" (Randolph and Posner, 1992).

As mentioned in Section 2.3.2.2, some useful guidelines for developing the action plan are provided by the GO-CARTS model. In particular, Rules 2-4 are noteworthy with respect to this stage of the project. Building on the rules provided in the GO-CARTS model, the action plan should seek to incorporate several key components:

- Objectives
- Activities
- Relationships
- Task Assignment
- Time Estimates
- Deliverables
- Budget

Determine Objectives

Objectives are the sub-goals that support the achievement of the purpose or overall project goal. Therefore, accomplishment of all the objectives leads to the overall

project goal (Randolph and Posner, 1992). Setting objectives is very similar to the setting of goals except they are now for a more specific component of the overall project.

Identify Required Activities

All of the major tasks necessary to complete the project should be identified as a part of the action plan. In a project such as this, the list of required tasks will be diverse and lengthy. However, taking the time to identify these tasks up front will provide a much clearer picture of where the project is headed and give everyone an idea of the types of challenges that will be encountered along the way.

Determine Task Relationships

Once activities have been established, it is necessary to determine the relationships amongst them. This may be looked at as assigning priority to each of the tasks relative to the others. Certain activities may need to be performed before others, while others may be performed simultaneously (Randolph and Posner, 1992). These relationships will influence the order in which tasks are assigned for completion.

Assign Tasks

Once all of the required tasks have been identified, it is necessary to determine exactly who will carry out each of these tasks. The task may be assigned to outside expertise, to an individual in the working group, or to a sub-committee comprised of group members. In some cases, such as making a major decision, the entire working group may be assigned the task. Whatever the case, the task should be assigned to a person or group who has the necessary skills to complete it in an acceptable fashion.

Estimate Time Required

A timeline must be established indicating when each of the tasks or steps are to start and when they are to be completed. By writing down the estimated time associated with each task, the working group is forced to consider the relative importance of each task and when the deliverable from this task will be needed. As noted in the section on Task Relationships, many steps in the project are dependant on the outcomes of previous

steps. It is therefore important to set realistic time restraints and to meet those deadlines whenever possible. As with the points already discussed, this is necessary to help clarify expectations and to help keep the group focused and motivated.

Once the group has developed the schedule, it should create a picture of it. The fourth rule in the GO-CARTS model, this concept is based on the old cliché that a picture is worth a thousand words. Some common methods for the graphical representation of the schedule are bar charts, gantt charts, and flow charts.

Establish Deliverables

Every task is undertaken for one reason or another. While some tasks will likely lead to "dead-ends" most should result in something contributing to the overall project goal. This contribution may be in the form of a piece of information, a presentation, a written paper, an agreement, or something else. It is important the group establish what they expect to be delivered from each task. Doing so will help to further clarify expectations with the group and should help to assist everyone in seeing how each of the individual tasks fit together.

Estimate Budget

Many of the tasks identified as necessary will have a cost associated with their completion. For example, a stakeholder consultation may require long distance phone calls, external facilitators, travel expenses, the provision of refreshments, and the renting of space to hold the meeting. For every task, each of the costs should be carefully documented.

* * *

It should be noted the action plan developed in the early stages of a project is merely a starting point. It is virtually assured the plan will not be perfect initially. In most cases it isn't possible to predict every one of the necessary tasks that will be required right at the outset since the required information may not yet be available. However, identifying as many of these tasks up front should help keep the project on track and help the working group remain focused.

In any case, the development of the action plan should be a collaborative effort. Having one person develop the plan increases the risk that tasks will be overlooked (Taylor, 2001). Moreover, as the project moves forward, the plan should be continually reviewed and, where necessary, revised to reflect the realities facing the group. Whatever the case, however, it is critical that alignment with other relevant initiatives in the organization is kept in mind throughout all stages of the project.

2.3.3 Stakeholder Consultations

A stakeholder is defined 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 (Bryson, 1995). In other words, a stakeholder is anyone who has a vested interest in the project or anyone who thinks that he or she has a vested interest in the project (Taylor, 2001). It is important to note under this definition that perceived concerns must be taken seriously and treated along with the rest of what the organization initiating the consultations believes are legitimate concerns. Generally, stakeholders may be grouped into the classifications of "internal stakeholders" and "external stakeholders." An internal stakeholder refers to those individuals or groups that operate under the umbrella of the organization while an external stakeholder refers to those individuals and groups that do not operate under the umbrella of the organization.

One of the most important considerations in any sustainable development indicator project is that both internal and external stakeholders accept any set of indicators as a fair representation of the system in question. Without this acceptance it will be extremely difficult, if not impossible, to convince people to "buy in" to the system and make it work. Since ultimately, it is people who work with and are affected by the system that will make the improvements, any indicators must strive to address the needs of the stakeholders.

Building on that premise, the way to attain a truly meaningful, useful, and representative set of sustainable development indicators is to involve a broad section of participants in the selection process (Sustainable Calgary, 1998). In other words, the key to success is the satisfaction of key stakeholders. Though it is certainly a challenge to

weigh all of the various interests and develop a solution all groups can accept, efforts must be made to construct an indicator set the stakeholders can live with.

Consulting stakeholders is an iterative process requiring a significant investment of time, energy, and resources. However, the mere investment of those resources does not guarantee the process will be a success. Improperly handled, a consultation can actually alienate the participating stakeholders as well as the larger audience and, in doing so, damage the reputation of the company (Elkington, 1999). For that reason, it is essential a sufficient amount of time and resources be allocated to preparing for the consultations in advance. Keeping that in mind, some of the key issues that must be addressed to ensure that any consultation process is effective include:

- Clarifying objectives
- Identifying key stakeholders
- Determining when to involve stakeholders
- Determining how to involve stakeholders
- Preparing for stakeholder consultations
- Conducting the stakeholder consultations

2.3.3.1 Clarify Consultation Objectives

Though objectives for the entire project should have been developed as a part of the action plan, it will likely be necessary for the working group to clarify the specific objectives of any stakeholder consultation. According to Sterne (1997), some possible objectives of stakeholder consultation include:

- Obtaining information to make better decisions
- Transferring knowledge and facilitating better understanding of issues
- Empowering stakeholders to participate in the decision-making process within defined parameters
- Developing partnerships with stakeholders
- Meeting commitments to consult

Whatever the specific objectives of the consultations may be, it is important that they are explicitly stated so that all associated with the project understand them.

2.3.3.2 Identify Key Stakeholders

The specific stakeholder groups that will be consulted in any particular project depend on a number of factors including the decisions at stake, the impact of decisions on stakeholder groups, the goals of the project, the period available for consultation, and the available resources. Given the broad definition used for the term "stakeholder," the potential list of stakeholders in any project could be quite large. Determining who these stakeholders are and how they should be engaged is one of the most significant steps in the overall sustainable development indicator project. In fact, one of the biggest mistakes that can be made in a process such as this is to choose the wrong people to participate (Greenbaum, 2000).

Whatever the case, any stakeholder consultation process should include both experts and non-experts as it relates to the system under examination. According to Meadows (1998), experts are necessary to supply comprehensive understanding, perspective on the development of the system over time, knowledge of what data are available, realism about what can be measured, and credibility to the process. Non-experts help ensure the indicators ultimately selected will be relevant and understandable. Just as the expert brings scientific credibility to the indicator selection process, the non-expert brings political credibility (Meadows, 1998).

As a part of identifying the stakeholders it must be clarified what the reasons for including that stakeholder are. For example, consider that reasons for soliciting the participation of a stakeholder may include perspective on key issues, acquisition of information, or simply keeping that particular group up to date. The important thing to emphasize is that having a clear picture of why the stakeholder is being consulted is essential since will strongly influence how that stakeholder is engaged.

Keeping that in mind, a useful starting point for identifying stakeholders is presented by Bryson (1995) in the text, *Strategic Planning for Public and Nonprofit Organizations*. However, since Bryson's example was meant as a generic starting point

for government, some minor modifications will be necessary to make this map applicable to an electric utility like Manitoba Hydro. For example, in addition to those stakeholders listed by Bryson, any stakeholder list for Manitoba Hydro will need to explicitly include potential stakeholders such as aboriginals and industry associations.

2.3.3.3 Determine When to Involve Stakeholders

The specific internal and external organizations, units, groups, or individuals who should be involved or informed of the sustainable development indicator initiative need to be clarified in the early stages of the project. At this time, it also needs to be decided when these particular stakeholders will become involved and when their participation will come to an end. Throughout this process, it must be kept in mind that there are different stakeholders for different stages of the project.

2.3.3.4 Determine How to Involve Stakeholders

Stakeholder concerns can be considered and addressed through a variety of means. One manner in which the type of consultation may be classified is as described by Sterne in his *Public Consultation Guide* (1997). In that guide, the levels of consultation are divided into the four different categories detailed in Table 2.9. The main point to keep in mind is that how the stakeholders are actually consulted is greatly influenced by the reason for which they are being consulted.

It should be noted that a particular stakeholder may be engaged using a combination of the classifications identified in Table 2.9 and that the level of consultation may vary for each stakeholder depending on the stage the project is in. For example, at one point in the project a particular stakeholder group may be given the opportunity to participate in meetings, while in others their participation might be limited to written comments. Furthermore, within each of the four levels of consultation, there are many methods that may be used to carry out a consultation appropriate to that level. These are discussed further in Section 2.3.3.4.

TABLE 2.9
LEVELS OF CONSULTATION

Method	Description
Written Comments	Notice of a proposal is given with an opportunity provided to submit comments within a specified period
Dialogue	Stakeholders are given the opportunity to discuss particular issues in one or more meetings
Agreement	Stakeholders are brought together to determine levels of agreement and disagreement
Consensus	Stakeholders are brought together to develop consensus on issues, options, and/or decisions under examination

Source: Adapted from Public Consultation Guide. Sterne, 1997.

Whatever the level of consultation ultimately selected, it must be made explicitly clear what the specific objectives of the consultation are as well as what issues will be open for consideration and those that will not. It must also be explicit how comments will be used and shared once they are received. Furthermore, focus must be devoted to issues that actually have a legitimate chance of being addressed rather than those that do not. On issues open for consultation, it must be clear that a decision has not already been made. This is an important consideration given that one general concern stakeholders may have is that the process only legitimizes decisions that have already been made (Chess, 1999).

2.3.3.5 Prepare for Stakeholder Consultations

Completing the tasks described in previous sections is only the beginning of planning for a consultation process. Other items to be addressed include recruiting the stakeholders, scheduling activities appropriate to the level of consultation, and developing the meeting agendas. It should be noted these tasks are not presented in an order that is necessarily chronological. For example, before recruiting stakeholders the working group should already have some idea of how they will be consulted. However, the working group probably will not want to schedule all of the planned activities until the stakeholders have agreed to participate.

Recruit Stakeholders

It is a given that lines of communication must be established between the working group and potential stakeholders if anyone is to participate in the proposed consultations. The initial communication with stakeholders is key because how it is handled will heavily influence whether they are willing to participate. Though it is certainly the most relevant item at this point, in addition to developing the initial communication, it is probably a good idea if the working group develops an overall communication strategy that will be consistently employed throughout the project. A separate communication strategy may be necessary for both internal and external stakeholders.

In any case, the invitation to participate in the consultations should briefly identify why the stakeholders are being contacted, what they are being asked to do, how their input will be used, and an estimate of how much time will be required. It should also include a possible consultation period giving the potential participants the opportunity to specify when they will be available. Further details on the actual project itself, who is involved, and the consultation process should be included with a brief terms of reference in an attachment to the invitation.

Develop Activities Appropriate to Level of Consultation

Once the stakeholders have indicated they are interested in participating, the working group must develop specific activities appropriate to the level of consultation. Alternatively, the working group may seek input from the participants on how they would like to be consulted (Gibson, 2001). In particular, the working group may wish to employ this strategy in consultations with groups having unique needs to ensure the most meaningful information is obtained.

There are many ways in which stakeholder consultations may be conducted such as completing questionnaires or workbooks. Individual meetings, workshops, focus groups, open houses, or some combination thereof are some of the other methods of consultation. Though it must be emphasized the list is more illustrative than comprehensive, a summary of some common consultation methods is presented in Table 2.10.

TABLE 2.10
COMMON CONSULTATION METHODS

Method	Description
Focus Group	Useful in obtaining a snapshot of opinion on a particular issue, a focus group is a gathering of 8-10 individuals with a strong interest in the project who represent a cross section of those affected by the issue
Open House	A relatively informal event that enables people to drop in and obtain information at their convenience
Public Hearing	A structured public meeting at which stakeholders can make formal statements about the issue under examination
Workshop	A facilitated meeting of between 5-25 people with the goal being to solve problems and build consensus for action

Source: Adapted from Public Consultation Guide. Sterne, 1997.

In situations where the consultation level involves in-person meetings, it is often desirable to bring the stakeholders together in groups rather than being met with individually. Bringing the stakeholders together for a meeting as a group offers several advantages including (Sherraden, 1998):

- Less meeting time than that required by separate meetings with individual stakeholders
- People tend to express views they might not express in other settings
- Social interaction with the group yields freer and more complex responses
- Responses have high face validity

Having a group meeting however, requires preparation such as requiring the working group book the appropriate space, the necessary equipment, and arrange for refreshments. Furthermore, the working group will need to determine the skills required and train the consultation personnel as required (Sterne, 1997).

Any consultation involving a group meeting will require someone to lead the meeting, someone to keep time, and someone to record what is being discussed. Who will do these things needs to be determined in advance. For example, the working group will likely want to be represented by at least one of its members who may serve in one or

more of these roles or simply as an observer. Additionally, it may also wish to have a professional facilitator experienced in external consultations lead the meeting.

Having an impartial facilitator manage the consultation process is a strategy that has been recommended based on the experience of groups having previously undertaken this type of initiative (Meadows, 1998). In such a case, possible roles for the facilitator could include coordinating the meetings, guiding the discussion in those meetings, helping to prepare background documents, and synthesizing the results (Meadows, 1998).

While the above points have so far dealt with consultations involving some form of meeting, the consultations may also center on written comments. With respect to stakeholder groups participating in this form of consultation, it is important to remember that preparation is required here as well. In addition to preparing the material and attached questionnaire, someone qualified needs to be available during the period allotted to the consultation to respond to questions or comments from the participants. Arrangements for this person should be made well in advance.

* * *

In the case of every form of consultation, the working group should attempt to anticipate the range of answers that will be received and identify possible areas where conflict may arise. There will almost certainly be areas where conflict may come up and planning strategies on how to deal with these issues in advance should help the consultation run more smoothly. Another issue the working group may want to consider is having the participants sign a confidentiality agreement.

Develop Meeting Agendas

Having scheduled the meetings, the working group must undertake the task of developing agendas for each of the kick-off meetings. Once created, the working group must share the meeting agendas with each of the stakeholders prior to the meeting. Doing so allows the participants to prepare in advance and reduces the possibility of surprises at the meeting. As a part of sharing the agenda, the working group should also allow the participants to comment on it and suggest revisions.

A set of sample objectives for kick-off meetings is presented in *The Project Management Workshop* (Taylor, 2001). Although all of these points may not necessarily

apply to any individual meeting, they can help guide the creation of the meeting agenda by the working group. According to Taylor (2001), a kick-off meeting agenda should:

- Introduce participants to one another
- Establish working relationships and lines of communication
- Set goals and objectives
- Review project status
- Review project plans
- Identify project problem areas
- Establish individual and group responsibilities and accountabilities
- Obtain individual and group commitments

Accomplishing each of these objectives will require that the working group ensure its representative(s) in the meetings are fully prepared to discuss these issues.

In addition to the types of issues illustrated above, the working group may wish to accomplish more in the initial meetings with stakeholders. If this is the case, following the discussion and/or review of above points, the working group will then have to have a clear agenda for what they intend to accomplish for the rest of the meeting.

It must also be clear the members of the working group are not the only ones who will have to prepare for the meeting. Stakeholder participants will also likely need to do some preparatory work for the meeting. This will require some additional work on the part of the working group or the facilitator such as the preparation of discussion papers covering the relevant background material. This material should be provided with sufficient time to review it before the meeting.

2.3.3.6 Conduct Stakeholder Consultations

Building on the previous discussions, Manitoba Hydro's thirteen sustainable development principles provide several hints on how to conduct a stakeholder consultation. In particular, principles two, nine, ten and eleven provide relevant guidance on performing a stakeholder consultation. While not a step-by-step prescription on how

to effectively conduct a stakeholder consultation, they can help provide the basis for creating that methodology. Respectively, these principles are:

Principle 2: Shared responsibility.

Principle 9: Access to adequate information.

Principle 10: Public participation.

Principle 11: Understanding and respect.

Principle 10 explicitly recognizes the legitimacy of external stakeholder concerns and input while the other three principles provides guidance on how to engage the stakeholder groups. Although these, principles were written solely from the organization's perspective, they also help shed some light on the role of stakeholders as well.

Shared Responsibility. Often the most difficult parts of a sustainable development indicator project is ensuring that key stakeholders are represented and feel as though they are a part of the process (Hart, 1998). The most successful consultations focus on creating partnerships with stakeholders rather than merely attempting to get through the process without excessive arguing. The underlying theory in sharing responsibility is that people are more likely to support an agreement they had a hand in shaping (Susskind, 1999).

Access to Adequate Information. An integral element in the effective sharing of responsibility is the sharing of information. All groups must commit to exchanging all non-proprietary information relevant to the project in an open manner. As noted by Sterne (1997), transferring knowledge from one group to another can help to facilitate a better understanding of issues and help dispel myths.

Understanding and Respect. The consultation must be run according to the principles of no discrimination, no secrets, and no surprises (O'Brien, 1999). The mistrust that is generated from these types of actions is extremely difficult to dissolve and would threaten to disrupt the entire process. Building trust and mutual respect are keys to the entire process and are necessary if the organization is to gain a greater appreciation for the issues raised by stakeholders and if stakeholders are to gain a greater appreciation for the issues faced by the organization.

One key to developing respect is that the organization only promises what can be delivered. If stakeholders see the company is sincerely doing its best in dealing with the issues, they may be willing to provide the organization with a greater tolerance for occasional mistakes (Elkington, 1999).

* * *

The thirteen sustainable development principles at Manitoba Hydro provide several hints on how to conduct a stakeholder consultation. Building on the previous discussions, it is then possible to develop a manner in which any stakeholder consultation in a sustainable development indicator project should be undertaken.

Establishing the Process for Consultation

Before the actual process of identifying sustainable development indicators can begin, the facilitator, the working group, and the participants must clarify a number of issues related to how the process will run. One program already in place providing some insight into the types of issues to address here is the *Sustainable Forest Management System* (SFM) developed by the Canadian Standards Association. Using that program as a template to build on, some of the items that should be addressed when developing the consultation process include defining (McLeod, 2001):

- General Guidelines
- Access to Information
- Goals
- Timelines
- Communication Plans
- Resources
- Roles, Responsibilities, and Obligations
- Mechanism to Adjust the Process
- Dispute Resolution Mechanism
- Decision-making Methodology

In the actual SFM standard, the "general guidelines" category is not explicitly listed. It has been identified separately here in order to ensure that its importance is highlighted.

Nonetheless, clarifying each of these points in advance is critical given that the process of selecting the indicators is the place where legitimacy and comprehension are built (Meadows, 1998).

General Guidelines

These guidelines may be regarded as the overall guiding principles of the meeting sessions. Essentially, they are basic "ground rules" to ensure everyone involved in the meeting knows what type of behaviour is expected of themselves and what they in turn can expect from other members of the group. Guidelines may include items such as confidentiality, respect of other people and their opinions, openness, and participation (Mediation Services, 2001).

Access to Information

The importance of everyone having equal access to information was discussed earlier in this section.

Goals

Clarifying the goals and objectives of the process is necessary to ensure everyone understands what it is they are working towards. This can help focus energy on what it is the participants have been brought together to do and minimize discussion of issues not related to the task at hand.

Timelines

Realistic deadlines are necessary throughout the process. These deadlines should help keep the discussions focused and may, in some respects, motivate the participants to come to an understanding.

Communication Plans

Protocols must be established to facilitate communication between the members of the group. How the working group will communicate with the participants before,

during, and after meetings should be clarified.

Resources

Any human or financial resources that are available to assist the participant group should be explicitly stated up front.

Roles, Responsibilities, and Obligations

As noted previously, it is important everyone have a clear understanding of what is expected of them and what they can expect of everyone else. By clearly defining the roles, responsibilities, and obligations of all involved, accountability within both the stakeholder participant group and the working group can be promoted.

Mechanism to Adjust the Process

As the process unfolds, it may become apparent that some of the initial decisions are not working out. Since it may therefore be necessary to adjust some of those decisions, the group must decide up front how they will handle these situations.

Dispute Resolution Mechanism

Since disagreement is a natural and inevitable by-product of all meetings (Mediation Services, 2001), strategies for handling disputes should be developed. To increase the chance that any dispute is resolved to the satisfaction of all involved, the working group and participants should agree on these strategies in advance.

Decision-making Methodology

How decisions will be made must be clarified at the outset of the process. A discussion on possible decision-making models was discussed in Section 2.3.2.1.

* * *

One of the most important points to keep in mind throughout the selection of the indicators is that complex issues often involve several rounds of highly interactive stakeholder involvement (Sterne, 1997). What is important is that the working group and the participating stakeholders continue talking and keep working towards a set of

indicators that measure the key issues. Everyone's opinion is equally valid and those involved in the development of the indicators should not be afraid to be creative.

It should also be noted that while a stakeholder consultation can offer an organization many potential benefits, it is not without its drawbacks. The organization must be careful not to overestimate the capabilities of a consultation. Even if it is handled well, there is always going to be some uncertainty in the decisions made.

Having noted that caution, it is often the case that the potential benefits outweigh the costs or risks. Essentially, this is why the consultations were undertaken in the first place. Consulting with stakeholders is not a case of altruism on the company's part, but rather good business (IISD, 1992) as it can help to reduce the number of disagreements later on.

Finally, it is important to note that while the discussions in this section do highlight many of the most important items the working group will need to carefully consider, they are not in themselves a complete guide to undertaking stakeholder consultations. For additional guidance on all aspects related to stakeholder consultations, see the *Public Consultation Guide* by Sterne (1997) and *Opening the Door: Improving Decisions Through Public Consultation* by McMillan and Murgatroyd (1994).

2.3.4 Continuous Improvement

The ultimate goal of reporting on the economic, environmental, and social dimensions of organization level activity – let alone a fully integrated sustainability assessment – is at the earliest stages of a journey that will continue for many years (GRI, 2000). This is not entirely surprising when it is considered that any technology will be at its lowest performance at the time it is first introduced (Nicholas, 1998). The trick is to resist ignoring it because of the initial, relatively poor showing. This sentiment is one that may be applied to the case of sustainable development indicators at any organization. When a system is complex, it takes trial, error, and learning to produce a serviceable set of indicators (Meadows, 1998).

Therefore, rather than being satisfied with the set of indicators produced on the first try, efforts must be made to continuously improve them. The term improvement

implies something about the method has changed for the better (Nicholas, 1998). It also implies, however, that the change is only an improvement if other aspects have not been degraded (Nicholas, 1998). Keeping that in mind, two classifications that are generally used to describe the types of improvement that may be achieved are incremental improvement and improvement by innovation. These classifications have application when considering the ongoing improvement of sustainable development indicators.

2.3.4.1 Incremental Improvement

Incremental improvement is essentially the process of making something better through the accumulation of small, piece-meal improvements (Nicholas, 1998). This type of approach may be considered in the context of the old cliché "one step at a time." The underlying theory behind this approach is that eventually, great improvement will come from a series of small, incremental gain. This is an approach frequently used in the manufacturing sector and is often referred to in literature as the *kaizen* method.

One of the best ways to help explain the concept of incremental improvement is by studying a standard S-curve. One of these diagrams is presented in Figure 2.3.

As illustrated in the S-curve, at first improvement is slow, but as the system under scrutiny is better understood, learning accelerates and improvement consequently occurs at an accelerated rate (Nicholas, 1998). In other words, though initially the new changes or methods may be difficult, once people working with the system have gotten over the "educational hump" so to speak, they are in a position to make rapid improvements to it. This is a concept relevant to the current state of sustainable development indicators.

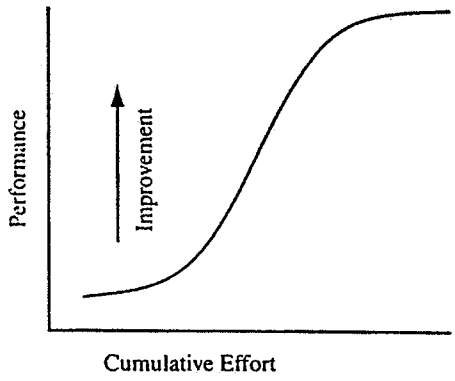

FIGURE 2.3
S-CURVE
Source: Competitive Manufacturing Management. Nicholas, 1998.

Continuing to build on the example provided by the S-curve, after a period of relatively rapid improvement, there will come a time when improvements to the system become less and less – regardless of the amount of effort expended. In other words, the system can only be improved so much before the costs become prohibitive. When this happens, higher performance is achieved only by adopting a new technology or new way (Nicholas, 1998). By moving to something fundamentally different and innovative, the performance limitations placed on the existing system are removed. This type of improvement is known as improvement by innovation.

2.3.4.2 Improvement by Innovation

Improvement by innovation involves creating or implementing a completely new method of performing the required task. An example of this type of improvement could be the replacement of the propeller engine with the jet engine (Nicholas, 1998). Both perform the same function, but approach the problem in a very different manner. Although the initial change may result in some discontinuity and require substantial effort, once the new way has been adopted the process of incrementally improving the system may once again be undertaken.

This notion regarding innovation has relevance to the concept of sustainable development in that it highlights the fact that sustainable development indicators may one

day be eclipsed by some other technology. Though they may be the best solution available for addressing the issues today, that by no means guarantees they will be the best solution tomorrow. In fact, it is virtually assured that, in time, a better way will be discovered. Current technology should never be assumed as a given.

* * *

The main point to be made by the discussion involving the S-curve is that for real continuous improvement, both forms of improvement discussed above must be actively pursued. On their own, neither is enough to ensure the system is continuously improving. Organizations must change their thinking to be more in line with the theory of "if it isn't perfect improve it" rather than "if it ain't broke, don't fix it" (Besterfield, 1998). However, while doing so, the reasons for any changes whatsoever to the existing indicators must be made transparent. Given that changing the indicators could be confusing to those using them, this point cannot be overemphasized. Not only that, but as updates are made to the indicators, alignment with other initiatives in the organization must always be kept in mind.

Regardless of their business, any company must continuously improve to meet its stakeholders' expectations. This is a belief that may be applied to the sustainable development indicators produced as a part of any sustainability project. What is important to stakeholders who participated in development of these initiatives may not be so important to them, or other stakeholders, in the future. The environment within which the organization operates will change over time. An organization's ability to survive depends in large part on how well it adapts to demands imposed by that changing environment (Nicholas, 1998).

Though constant adaptation and innovation is a formidable challenge, the philosophy of continuous improvement must be integrated with daily operations (Obloj et al. 1995) – including those related to sustainable development indicators. One manner in which to look at this approach is to have the organization maintain constructive dissatisfaction with the present level of performance (Besterfield, 1998). This requires that the company develops the needed infrastructure to support the improvement activities.

SECTION 3.0
Methodology

The project was divided into two phases corresponding to the fundamental research objectives. These phases were:

Phase 1: Develop a generic SDI Design Process for Manitoba Hydro.

Phase 2: Apply selected steps of the SDI Design Process to Manitoba Hydro's Transmission System.

The relationship between these phases is illustrated in Figure 3.1. Following a brief introduction to the project steering committee, both of the phases are described in detail.

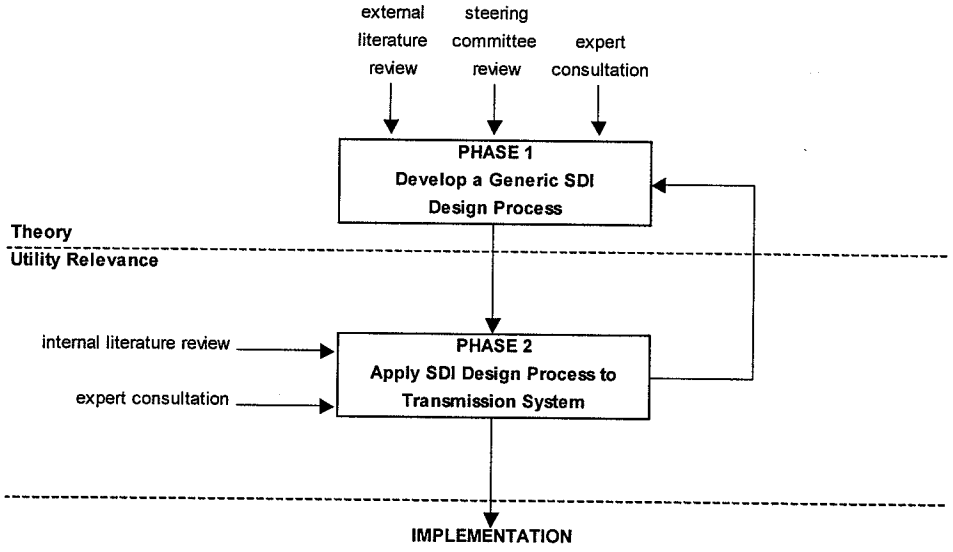

FIGURE 3.1
PROJECT PLAN

3.1
The Project Steering Committee

Before the process of addressing the two fundamental research objectives could begin, it was necessary to form a project steering committee. This process began in December 2000, as soon as agreement on the topic area was reached, and additional members were added throughout the project as needed. Listed alphabetically, all members of the final steering committee are identified in Table 3.1.

TABLE 3.1
THESIS STEERING COMMITTEE

Name	Organization	Title	Area of Expertise
Mr. John Fjeldsted	Manitoba Hydro	Corporate Coordinator, Environmental Management Systems	Manitoba Hydro Environmental Management Systems
Ms. Tammy Gibson	Manitoba Conservation	Policy Analyst, Sustainable Resource Management Branch	Manitoba Sustainability Indicators Program
Dr. Daryl McCartney	University of Manitoba	Associate Professor, Civil Engineering	Environmental Engineer
Mr. Sheldon McLeod	SLMcLeod Consulting	Consultant	Environmental Management Systems, Environmental Policy, and Stakeholder Consultations
Mr. Wade Munro	Manitoba Hydro	Senior Environmental Assessment Officer, Transmission and Distribution	Manitoba Hydro Environmental Assessment, including stakeholder consultations
Dr. Laszlo Pinter	International Institute for Sustainable Development	Senior Project Manager	Regional, national, international, and industrial experience with sustainability indicators
Dr. Caroline Piotrowski	University of Manitoba	Associate Professor, Family Studies	Stakeholder Consultation

It was determined at the outset the role of the steering committee would to be to provide overall guidance to the project to ensure it satisfied the requirements of Manitoba Hydro and fulfilled the necessary criteria for a Master of Science thesis at the University of Manitoba. To ensure these goals could be attained, the steering committee incorporated people having a diverse set of expertise. For example, in addition to representatives from Manitoba Hydro, the steering committee members had experience working in areas such as sustainable development, sustainable development indicators, stakeholder consultation, project management, and process improvement.

3.2
Phase 1: Develop a Generic SDI Design Process for Manitoba Hydro

Building on the base provided by the project proposal, a step-by-step process evolved that enabled the creation of a draft SDI Design Process for Manitoba Hydro. The steps followed in Phase 1 of the project were as follows:

Step 1: Perform background research

Step 2: Consult with experts regarding key elements that must be addressed by the SDI Design Process

Step 3: Prepare a draft SDI Design Process for review

Step 4: Conduct a critical review of the SDI Design Process

Step 5: Finalize the SDI Design Process

3.2.1
Perform Background Research

The first step in Phase 1 involved a detailed study of the necessary background information. It should be explicitly stated that this was not the only stage of the project where research was conducted. Preliminary research was conducted in the preparation of the proposal and additional research was conducted throughout other stages of the project as needed. As a part of the work performed in this stage of the project, an extensive review of internal and external documentation was conducted. The results of this literature review were summarized in Section 2.0.

3.2.2
Consult with Experts

To ensure the relevant issues were adequately captured, it was determined the identification of key elements to be addressed by the SDI Design Process required consultation with a select group of experts. In particular, focus at this stage was devoted to consulting with experts who had prior experience working with sustainable development indicators.

Consulting with expertise in the area of sustainable development indicators provided an opportunity to access experience that may not have been reflected in the literature review. In particular, building on the experience of the participants, the key to these consultations was to help identify any gaps in our thinking at the time along with a greater appreciation for the types of things that worked well and those that didn't work well in previous sustainable development indicator initiatives.

It should be explicitly noted that this consultation only related to the actual SDI Design Process itself. This consultation did not focus on the development of specific sustainable development indicators for Manitoba Hydro.

Experts Participating in the Identification of Key Elements

The specific participants that were involved in the identification of key elements are presented in the Table 3.2. Those participants were selected based on their experience in a number of sustainable development indicator projects including projects on the local, regional, national, international, and corporate level.

TABLE 3.2
EXPERTS PARTICIPATING IN THE IDENTIFICATION OF KEY ELEMENTS

Representative	Organization
Dr. Carole Burnham	Carole Burnham Consulting
Ms. Tammy Gibson	Manitoba Conservation
Dr. Daryl McCartney	University of Manitoba (Civil Engineering)
Dr. Laszlo Pinter	International Institute for Sustainable Development

It should be noted that invitations were sent to a limited number of other experts, but they were unable to participate.

Consultation Method

After discussion with a professional facilitator, Mr. Dennis DePape, it was determined the most appropriate method for consulting with experts was individual meetings. Based on that premise, all participants located in the Winnipeg area were consulted through individual, in-person meetings with the graduate student. Participants located outside of Winnipeg were consulted over the telephone.

With the length of the consultation varying from 1 to 2 hours, each individual meeting followed a structured format consisting of introductions, a brief project overview, a brief overview of the consultation, a series of standard questions, and a summary of the next steps in the project. The questions were organized into two distinct categories. The first focused on questions more general in nature and the other focused on questions specifically related to this project. Particular effort was devoted to ensuring that the questions provided the participants with the flexibility to answer in any manner they deemed appropriate and, as such, all questions were open-ended in nature. The questions posed to each participant are presented in Table 3.3.

TABLE 3.3
QUESTIONS POSED TO PARTICIPANTS OF KEY ELEMENTS CONSULTATION

General Questions

1. What types of Sustainable Development Indicator projects have you been involved with?
2. What types of activities did you undertake preparing for these projects?
3. Based on your experiences in previous projects, are there any other activities you would add to that list in future Sustainable Development Indicator projects?
4. What were some of the difficulties you encountered while developing Sustainable Development Indicators?
5. How did you address these difficulties?
6. What were some of the strategies you employed/parts of your initial plan that you felt worked well in your project?
7. Aside from the difficulties already discussed, what, if anything, would you do differently in future Sustainable Development Indicator projects?
8. In your opinion, what are the most important elements in a Sustainable Development Indicator project?

Questions on this Project

1. Having reviewed the information distributed prior to this meeting, do you have any questions on the proposed SDI Design Process?
2. Did you identify any gaps in the proposed methodology?
3. If so, where/when might you consider addressing these items within the framework provided?
4. Do you feel that any of the steps should be combined with others?
5. Do you feel that any of the elements contained with a certain step should be separated to highlight their importance?
6. What changes, if any, would you make to the order in which the steps are presented?
7. Are there any other updates that you would suggest to the proposed process?

3.2.3
Prepare Draft SDI Design Process

Based on the literature review and the consultations with individual experts, the first draft of the SDI Design Process for Manitoba Hydro was written. Completed in January 2002, this version of the SDI Design Process was originally organized around the thirteen steps identified in Section 4.1.1.1. Incorporating much of the material now located in Section 2.0, each step was thoroughly described with particular attention devoted to describing the rationale behind any of the suggested courses of action.

3.2.4
Conduct Critical Review of Draft SDI Design Process

The first draft of the SDI Design Process formed the basis for the next round of consultations in Phase 1. Following an internal review of the draft by the thesis advisor, this consultation provided the participants with the opportunity to conduct a critical review of the draft SDI Design Process. Keeping in mind an emphasis on consultation throughout the entire research project, this was rooted in the belief that confirmation of any draft had to come from those having expertise in the discipline.

Participants in the Critical Review

To ensure that the entire consultation process remained as transparent as possible, all participants from the first consultation were invited to participate in the critical review process. In addition to those individuals, the other members of the steering committee were also invited to participate. The participants were:

- Mr. John Fjeldsted, Manitoba Hydro
- Ms. Tammy Gibson, Manitoba Conservation
- Dr. Daryl McCartney, University of Manitoba
- Mr. Sheldon McLeod, SLMcLeod Consulting
- Mr. Wade Munro, Manitoba Hydro
- Dr. Laszlo Pinter, International Institute for Sustainable Development
- Dr. Caroline Piotrowski, University of Manitoba

As can be seen from a comparison of Table 3.1 and the list above, all participants in the critical review ultimately became members of the steering committee.

Consultation Method for Critical Review

The consultation method selected for the critical review was a combination of written and oral comments. All participants were invited to two group meetings where they were free to provide oral comments on any item related to the SDI Design Process.

The first meeting, in February 2002, focused on comments related to the first draft of the SDI Design Process. To ensure that the participants were provided with an opportunity to thoroughly review the document, a copy of the first draft was distributed several weeks prior to the first group meeting.

After the first meeting, a second draft of the SDI Design Process was created in an effort to address comments on the first draft and to provoke further discussion. The second draft was depicted by a series of flow charts organized around the ten steps identified in Section 4.1.1.2. This second draft formed the basis for the second critical review meeting. As before, the relevant information was distributed to participants several weeks prior to the meeting (held in March 2002).

During the critical review of both drafts, those unable to attend the meetings were provided with the opportunity to provide comments in writing or in separate meetings with the graduate student. As in the larger group meeting, comments were not restricted in any way.

Comments related to the first draft of the SDI Design Process are summarized in Table 4.1 while comments related to the second draft are summarized in Table 4.2.

3.2.5 Finalize SDI Design Process

Based on the commentary received during the critical review, the draft SDI Design Process was again reviewed and updated in an effort to address concerns raised. Ultimately, a consensus emerged amongst the participants on the process depicted in Figure 4.3. Further details on the evolution of the SDI Design Process and the final version itself are provided in Section 4.0.

3.3
Phase 2: Apply the SDI Process to Manitoba Hydro's Transmission System

Phase 2 of the project focused on applying two key steps of the SDI Design Process created in Phase 1 to the Transmission System at Manitoba Hydro. This was conducted not only to provide a practical example of the SDI Design Process, but also to help improve the output of Phase 1 itself. Building on the framework provided by Figure 3.1, Phase 2 can be divided into two steps:

Step 1: Perform background research

Step 2: Tailor selected steps in the SDI Design Process to Manitoba Hydro's Transmission System

Keeping in mind there was some overlap between these steps, both of them are described in more detail on the pages that follow.

3.3.1
Perform Background Research

Using the template provided by the SDI Design Process developed in Phase 1, additional research was conducted in an effort to flesh out the protocol. Therefore, documentation at Manitoba Hydro related to possible inputs and outputs to the process was reviewed. For example, information related to strategic planning, reporting, relevant policies, and organizational hierarchy was among that examined. This internal documentation was supplemented by the external documentation gathered as a part of Phase 1. Essentially, the background research performed in Phase 2 was an extension of the research conducted throughout Phase 1. The notable difference is that more focus was devoted specifically to issues pertaining to the Transmission System.

3.3.2
Tailor the SDI Design Process to Manitoba Hydro's Transmission System

In the second step of Phase 2, selected steps in the generic SDI Design Process

were analyzed in an effort to determine how they could be made more applicable to Manitoba Hydro's Transmission System. As noted previously, in addition to tailoring parts of the protocol to the Transmission System, this procedure provided the opportunity to test the validity of the generic protocol itself through the identification of any significant gaps. Given time considerations, the effort was devoted to considering Steps 2 and 3. Steps 1, 4, 5, and 6 were not explicitly considered since they would require time going beyond the scope of this thesis project.

Step 2: Conduct Process Planning

The primary purpose of this procedure was to provide an example of how one step in the SDI Design Process developed in Phase 1 might be tailored to a specific situation, in this case Manitoba Hydro's Transmission System. Completing this task required consultations with two separate groups of experts. It should be noted that all of these experts were members of the thesis steering committee. Furthermore, each meeting involved active participation from the graduate student.

One group of experts was made up exclusively of internal personnel at Manitoba Hydro. In addition to the graduate student, the primary participants in these consultations were:

- Mr. John Fjeldsted, Manitoba Hydro
- Mr. Wade Munro, Manitoba Hydro

During the consultations with this group of internal experts, all elements of Step 2 in the SDI Design Process were considered from the perspective of Manitoba Hydro's Transmission System. This task was approached in a systematic manner with discussions taking place on each of the individual elements. This process involved determining how to link the SDI Design Process to existing initiatives and documentation within the company, and in some cases, also included the creation of previously unavailable material that will be needed to conduct the process. Furthermore, it should be noted that some elements of Step 3 were considered at this time as well. In particular, a specific process for completing that step as well as a process for consulting with external stakeholders was considered by this group.

The second group of experts focused on selecting a conceptual framework appropriate to Manitoba Hydro's Transmission System. The experts involved in this consultation included:

- Ms. Tammy Gibson, Manitoba Conservation
- Dr. Daryl McCartney, University of Manitoba
- Dr. Laszlo Pinter, International Institute for Sustainable Development

As in the consultations with the internal experts, this consultation was completed through an in-person meeting. The first part of the meeting focused on the identification of evaluation criteria for selecting a conceptual framework. This set of criteria was based on those available in published literature and the experience of the participants. Following an agreement on an appropriate set of evaluation criteria, each of the available frameworks (see Section 2.2.2) were considered on the basis of those criteria. This resulted in the selection of one framework by consensus. It should be noted this result was discussed with, and approved by, the internal experts.

The results of these meetings may be found in Section 4.2.1.

Step 3: Develop a Draft Set of SDI

The process for completing Step 3 involved consultations carried out over a series of three meetings. As in Step 2, it should be noted all of the participants in these meetings were members of the steering committee and that each meeting involved the active participation of the graduate student.

In the first meeting, participants were brought together to identify and prioritize key issues that must be addressed by sustainable development indicators for Manitoba Hydro's Transmission System. The rationale underlying the need for this meeting was that before a set of sustainable development indicators can be developed for any system, it is necessary to determine what should be measured. With that in mind, the agenda for the first meeting is presented in Table 3.4.

TABLE 3.4
AGENDA FOR FIRST MEETING IN FACE VALIDITY TEST OF STEP 3

1. Confirm Agenda
2. Review Background Information
   i. Review SDI Design Process
   ii. Clarify Purpose of Meeting
   iii. Introduce Conceptual Framework
3. Brainstorm Key Issues
4. Develop Criteria for Prioritization of Key Issues
5. Prioritize Key Issues
6. Review Next Steps
   i. Actions Before Next Group Meeting
   ii. Next Group Meeting

The agenda illustrated in Table 3.4 was developed with the input of a professional facilitator, Mr. Sheldon McLeod, who also led the meeting. In addition to the facilitator and graduate student, the participants in this meeting were:

- Mr. John Fjeldsted, Manitoba Hydro
- Ms. Tammy Gibson, Manitoba Conservation
- Mr. Wade Munro, Manitoba Hydro
- Dr. Laszlo Pinter, International Institute for Sustainable Development

Due to time constraints, the participant group was unable to complete agenda item number 5. This necessitated a second meeting with a smaller group of experts to help prioritize the key issues generated in the meeting with the group identified above. The participants in this consultation were:

- Mr. John Fjeldsted, Manitoba Hydro
- Mr. Wade Munro, Manitoba Hydro

Using the prioritization criteria developed in the first meeting, each of the key issues were ranked, by means of a majority vote involving the participants and the graduate student, in terms of their relation to that criteria. To accomplish this task, a three-point scale was created to determine whether that relation was of high, medium, or low importance. To help better separate the most important issues from the others, those issues with a rating of "high" were then assigned a score of 3, "medium" a score of 2, and

"low" a score of 1. For each key issue, these scores were then multiplied using each of the six criteria.

In the second meeting, the primary purpose was to develop sustainable development indicators that addressed the key issues identified in the previous meeting. However, before that was possible, it was necessary to review the results of the previous meeting, discuss how the issues were prioritized, and review a set of indicator selection criteria developed by the graduate student. These tasks were reflected in the agenda used for the meeting. That agenda is presented in Table 3.5.

TABLE 3.5
AGENDA FOR SECOND MEETING IN FACE VALIDITY TEST OF STEP 3

1. Confirm Agenda
2. Review Results of Previous Meetings
3. Discussion of Prioritization Process
4. Review of Indicator Selection Criteria
5. Develop Indicators that Address Key Issues
6. Reflect on Process and Results
7. Review Next Steps

The agenda in Table 3.5 was developed with the input of the meetings' facilitator, Mr. Sheldon McLeod, and the thesis advisor, Dr. Daryl McCartney. In addition to the facilitator and graduate student, the participants in the meeting were:

- Mr. John Fjeldsted, Manitoba Hydro
- Ms. Tammy Gibson, Manitoba Conservation
- Dr. Daryl McCartney, University of Manitoba
- Mr. Wade Munro, Manitoba Hydro

Lastly, it should be noted that all of the consultations concerning Step 3 (Develop a Draft Set of SDI) were conducted as a face validity test of the SDI Design Process. In other words, these consultations were organized as a trial run of the process developed in Phase 1 with the intent being to identify opportunities for improvement. With that in mind, the results of these consultations are presented in Section 4.2.2.

SECTION 4.0
Results and Discussion

The thesis project was divided into two phases. In Phase 1, effort was devoted to creating a generic SDI Design Process while Phase 2 focused on applying that process to Manitoba Hydro's Transmission System. This section presents the results of those efforts accompanied by discussions meant to provide the necessary clarifications.

4.1
Phase 1 – The SDI Design Process

The development of the SDI Design Process consisted of several iterations. Inspired by the published literature described in Section 2.0 and heavily influenced by the consultations described in Section 3.0, the SDI Design Process evolved into a six-step process. Understanding this evolution is important since it enhances the clarity of the final result. Therefore, prior to discussing the final six-step process itself, this section opens with an account of that evolution.

4.1.1
Evolution of the SDI Design Process

The evolution of the SDI Design Process is depicted in Figure 4.1.

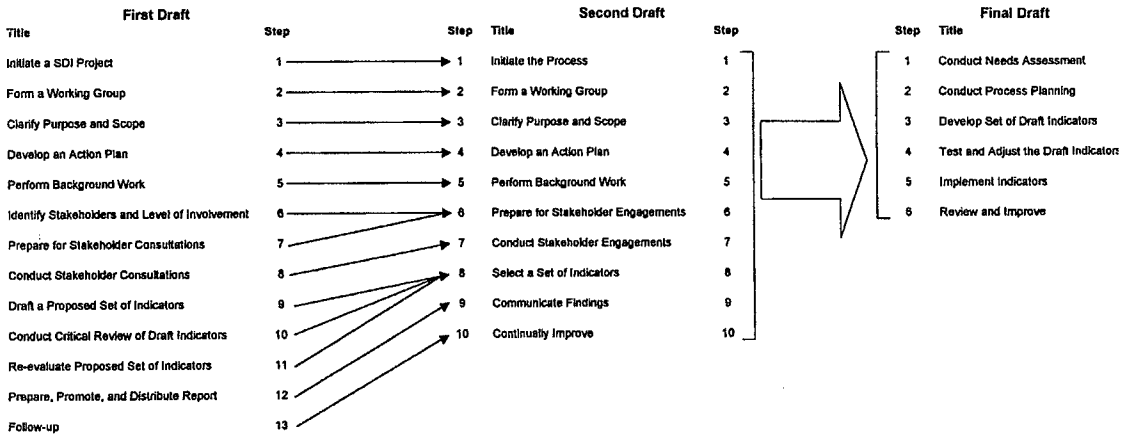

FIGURE 4.1
EVOLUTION OF THE SDI DESIGN PROCESS

As illustrated in Figure 4.1, two drafts of the SDI Design Process were critically reviewed prior to the selection of the final six-step process. To gain an appreciation for how and why this evolution occurred, it is important to consider the key comments gathered from participants in the two Phase 1 consultations. To provide some structure, these comments are presented with the draft process on which they are most relevant.

4.1.1.1 First Draft

As depicted in Figure 4.1, the first draft of the SDI Design Process was organized around thirteen key steps. These steps provided the basis for discussion and debate during both the expert consultations and the first part of the critical review, as described in Section 3.0. Key comments obtained during these consultations are summarized in Table 4.1.

TABLE 4.1
KEY COMMENTS ON THE FIRST DRAFT OF THE SDI DESIGN PROCESS

Category	Key Comments
General Comments	• Throughout the SDI Design Process, there must be clear feedback loops • A clear "trigger" mechanism needs to be added highlighting the need to initiate the process • Emphasize it is the process that is transferable, not the indicators • Alignment with existing organizational initiatives must always be kept in mind • A sense of practicality must be maintained throughout the process • Particular effort must be devoted to understanding the audience and their needs • Though it is certainly important, be careful not to overemphasize stakeholder consultation to the detriment of other steps • The use of experts throughout the entire process is critical • The communication strategy must be clear up front at every stage of the process • Since the first draft was far too long, consider using process diagrams in place of extensive narration
Step 1	• A mandate is needed from the very beginning of the project • Emphasize business reasons when discussing possible benefits • Buy-in is important from all areas of the company, not just senior management • Consider renaming this step to reflect the fact the SDI Design Process is more than a "project"
Step 2	• Roles and responsibilities of all involved must be clear up front • At least one member of the working group should be a professional facilitator • Consider supplementing the "core" working group with an "extended" working group
Step 3	• Having a clear purpose and scope is one of the most important elements in the entire process • Emphasize the need to stay on track and focused throughout the entire process • System boundaries must be very carefully defined
Step 4	• While planning is important, try not to get too far ahead of yourselves • Be prepared for unexpected events
Step 5	• Emphasize the purpose of this step is to ensure that the working group is prepared to move forward with the consultations • Consider researching the types of data that are available early in the process
Step 6	• Clarify how comments are going to be utilized up front • Consider combining Steps 6, 7, and 8 since they all focus on stakeholder consultation

TABLE 4.1 (CONTINUED)
KEY COMMENTS ON THE FIRST DRAFT OF THE SDI DESIGN PROCESS

Category	Key Comments
Step 7	• Consider utilizing the word "engagement" rather than "consultation" in the title of this step and the next • Special attention should be paid to designing consultation strategies appropriate for groups with unique needs • Consider involving local community organizations in the consultations • Remember that the material provided to stakeholders must be in line with how they are to be consulted • Attempt to reach as many stakeholders as possible with the information to minimize the need to create unique documents • Consider having the stakeholders sign confidentiality agreements

Step 8	• Though stakeholder input is important, focus should always be kept on the working group
	• Though it is important not to engineer the outcomes, the consultation needs to be tightly managed
	• Attempt to anticipate the range of answers that will be received in advance
	• Where possible, attempt to address issues prior to any meetings
	• Strategies for identifying priorities should be clear up front
	• Any process for creating indicators should include:
	  o Agreeing on general issues
	  o Selecting a conceptual framework
	  o Determining key issues
	  o Selecting indicator selection criteria
	  o Developing indicators
	• It will be necessary to filter the list of key issues generated initially since the indicator set must ultimately be focused and limited
	• Indicator selection criteria must be clear up front and be specific to the project
	• Displaying indicators as ratios helps to normalize the data

Step 9	• Developing a draft set of indicators is one of the most time intensive steps in the process • Since data analysis is such a time intensive effort, consider leaving it until after a final set of indicators has been confirmed • The output of this step is not entirely clear and the process for completing it is confusing
Step 10 and Step 11	• Consider combining these steps with Step 9 to clarify the process of confirming the final set of indicators
Step 12	• The title of this step should emphasize communication of results rather than the limiting "prepare a report" • Ideally, there should be some links between the findings of this project and existing corporate reporting protocols • Note the possibility of establishing an integrated reporting system • Be clear on the reporting period

TABLE 4.1 (CONTINUED)
KEY COMMENTS ON THE FIRST DRAFT OF THE SDI DESIGN PROCESS

Category	Key Comments
Step 13	• Note the SDI Design Process can be applicable for both one-time and ongoing projects • The necessary human and financial resources must be allocated to monitor the output of this project • A cycle for periodic review and updating of the indicators should be established • Keep in mind changing indicators too often could be confusing • Motivation for changing the indicators must be transparent

The comments illustrated in Table 4.1 provided a starting point on which to base improvements to each of the thirteen steps. The points raised covered a wide variety of issues including suggestions on specific action items, use of language, and possible consolidation of those steps. Furthermore, while considering issues pertaining to each of the individual steps, several underlying themes emerged providing valuable guidance on the overall SDI Design Process.

4.1.1.2 Second Draft

In an effort to address the comments received on the first draft, the SDI Design Process was reviewed and updated. This process resulted in the creation of a second draft organized around the ten key steps depicted in Table 4.1. Unlike the first draft, this process was depicted visually through a series of flow charts rather than through extensive narration. This was an effort to address one of the most important comments illustrated in Table 4.1: that the first draft of the SDI Design Process was far too long. Out of the necessity of keeping the process itself concise, the majority of the written explanations in the first draft were converted into sections currently located in the literature review.

The primary flow chart used to illustrate the second draft of the SDI Design Process is presented in Figure 4.2. This figure illustrates a "bottom-up" approach similar to that found in some EMS flow charts.

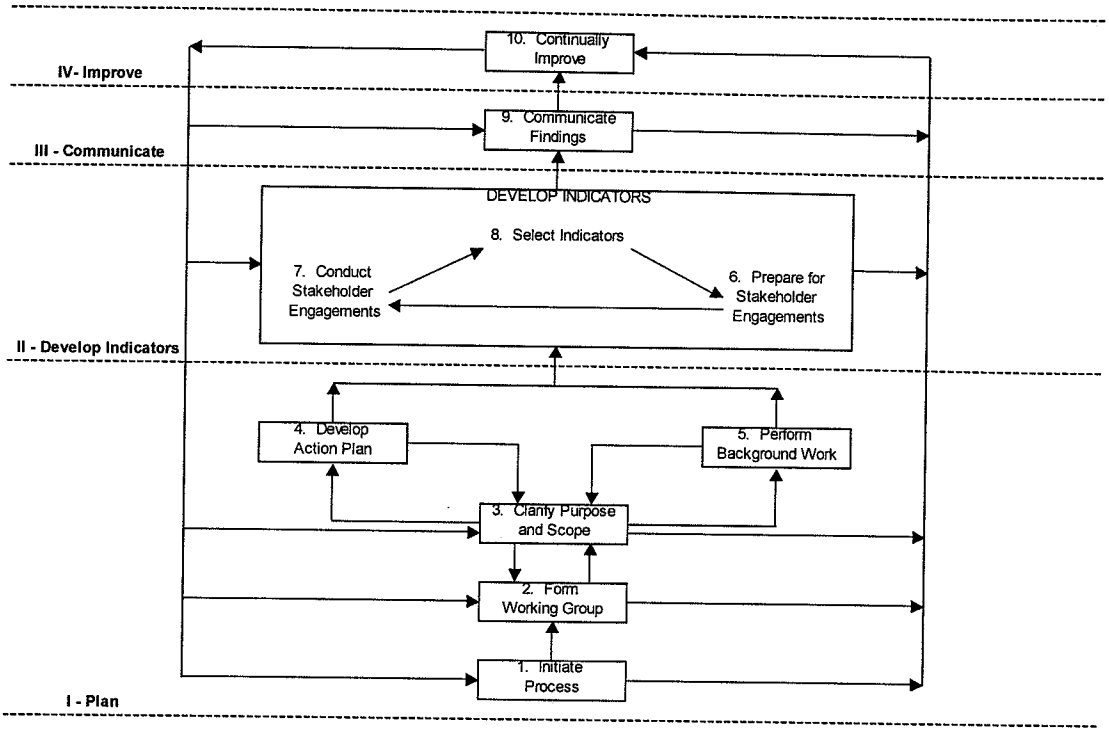

FIGURE 4.2
SECOND DRAFT OF THE SDI DESIGN PROCESS

As can be seen from Figure 4.2, the second draft explicitly addressed many of the comments provided on the first draft. For example, all feedback loops were clearly articulated and several steps were merged or renamed. However, while this draft did address many of the comments previously raised, the critical review did identify further opportunities for improvement. Building on that premise, the key comments received on the second draft of the SDI Design Process are contained in Table 4.2. These comments helped form the basis for creating the final draft of the SDI Design Process.

TABLE 4.2
KEY COMMENTS ON THE SECOND DRAFT OF THE SDI DESIGN PROCESS

Category	Key Comments
General Comments	• It would be more appropriate to consider stakeholders an input into each step of the process rather than their own unique step • Since they both focus on stakeholder engagement, Steps 6 and 7 could be combined and considered as a process input • Background research should be considered an ongoing process that is an input to each relevant step rather than its own unique step • The planning elements (i.e. Steps 1-5) could all be combined into one step • The process still does not clearly include the required "trigger" to see if the process should be undertaken or not • The process for developing the indicators (i.e. Steps 6-8) is confusing • There is no way directly into or out of the loop focusing on developing the indicators (i.e. Steps 6-8) • There should be a step explicitly focusing on implementation • Communication of findings could be considered a sub-section of implementation • Using generally accepted flow charting formats, decision points, inputs, outputs, and process elements should be made more clear

4.1.2
A Six-Step SDI Design Process

Addressing the comments raised on the first two drafts, the SDI Design Process provides a six-step, systematic guide for the establishment of sustainable development indicators at Manitoba Hydro. Filling an identified need within the company, each of these steps is equipped with enough flexibility that it may be applied to any of Manitoba Hydro's business units. As noted in Figure 4.1, the six steps are:

Step 1: Conduct needs assessment

Step 2: Conduct process planning

Step 3: Develop a draft set of sustainable development indicators

Step 4: Test and adjust the indicators

Step 5: Implement the indicators

Step 6: Review and improve

Further detail on the general relationship between these steps, their inputs, and their outputs, is provided in Figure 4.3.

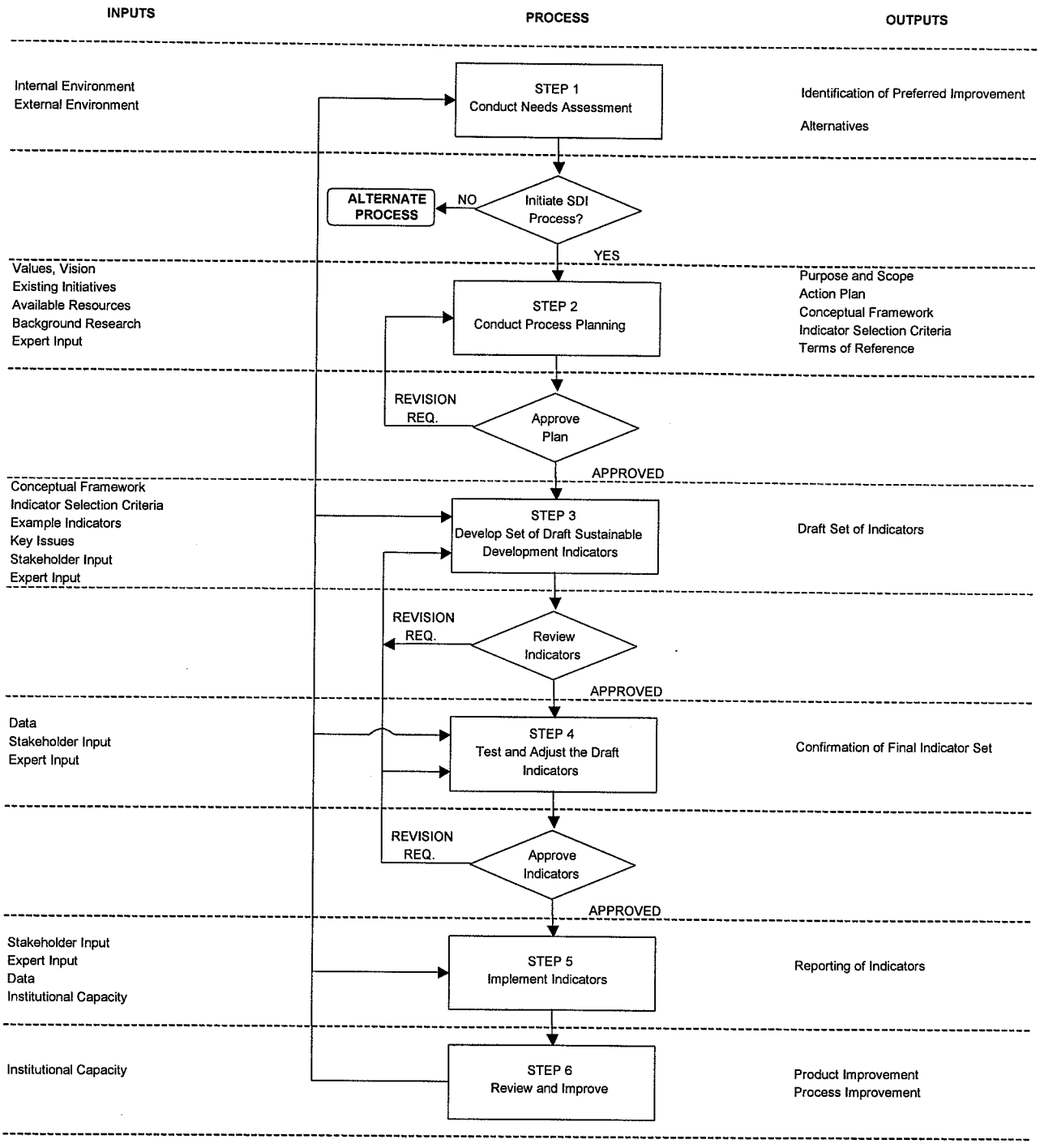

FIGURE 4.3
OVERVIEW OF THE SDI DESIGN PROCESS

Representing a consensus amongst the consultation participants, Figure 4.3 provided the basis for more detailed descriptions of the specific steps. Based on information and insight gathered from the literature review as well as the Phase 1 and Phase 2 consultations, these descriptions are presented in the sections that follow. However, before the SDI Design Process is described in further detail, there are several issues that require mention in order to ensure the limitations of it are fully understood. These points should be kept in mind throughout the entire process of developing indicators.

Key Points in Applying the SDI Design Process

Prior to applying the SDI Design Process to any system, it is important to carefully consider each of the following points:

1. The steps in the protocol are as they would appear under ideal conditions
2. Designing a set of sustainable development indicators will take time
3. The manner in which the indicators are produced is just as important as the indicators themselves
4. At every step actions, results, and evaluations should emerge
5. It is the process that is transferable, not the indicators

1. The steps followed in the protocol are as they would appear under ideal conditions. It must be recognized there is some inherent uncertainty in the development of indicators. One consequence of this fact is that an actual process for creating sustainable development indicators will not always follow the steps exactly as they are described. In practice, any process will often be iterative and flexibility must therefore be allowed so adaptations can be made where necessary.

2. Designing a set of sustainable development indicators for any part of the company will take time. An effective set of indicators cannot be created over night. Their development is a learning process requiring a significant investment of resources – not the least of which is time. It should be kept in mind each set of sustainable development indicators must be designed according to the system they will reflect and the

context in which they will be used. This means that indicators will need to be developed for each major business unit of the company following the complete protocol.

3. The manner in which the indicators are produced is just as important as the indicators themselves. 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. It should be remembered that much of the value of any indicator set resides in the actual assessment and development of the indicators themselves (Walter and Wilkerson, 1998a). For example, the reason stakeholder participation is emphasized so heavily throughout the SDI Design Process is that active participation will help to ensure the indicators become a part of the participants' system of knowledge.

4. At every step actions, results, and evaluations should emerge (Bryson, 1995). Each step should have some deliverable(s) that helps guide the remaining steps in the process. Furthermore, each deliverable should be subject to continuous evaluation, and where correction is necessary, it need not wait until "the end" of the process.

5. It is the process that is transferable, not the indicators. While the SDI Design Process allows for the development of indicators for a diverse set of business units, the indicators developed for any one particular unit will not necessarily be transferable without customization to any other unit. This protocol provides a common structure for the development of indicators, not common indicators.

* * *

The six steps in the SDI Design Process are described further on the following pages. Several of the steps include a process flow chart and a brief explanation of key points related to the flow charts. Though Figure 4.3 explicitly separates inputs and outputs from the process elements, these items are considered to be implicit in the descriptions of the individual steps described in this section.

Step 1: Conduct Needs Assessment

The purpose of the first step is to establish a need to undertake a SDI Design Process. In other words, this step does not deal with specific sustainable development indicators for any particular system, but rather provides the justification needed for

creating indicators in the first place. A generic process for completing this step is illustrated in Figure 4.4.

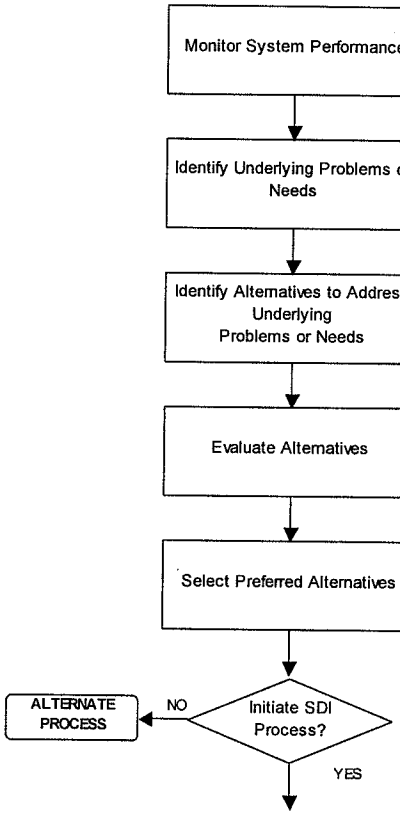

FIGURE 4.4
THE SDI DESIGN PROCESS STEP 1: CONDUCT NEEDS ASSESSMENT

Monitor system performance. In this context, "system" refers to any system the organization feels could potentially be improved or better understood were sustainable development indicators available. Though the level of sophistication may vary, most organizations have some protocols in place to monitor parts of these systems. In turn, the ongoing monitoring and assessment of the current system should provide a starting point to consider how the organization could address its underlying problems or needs.

Identify underlying problems or needs. Since needs are implicitly linked to people, this process should involve consultation with key stakeholders. Though the specific situation may lead the organization to focus on the needs of internal stakeholders, additional perspective may be gained by involving key external stakeholders as well. In any case, this step is critical since it will essentially form the basis for the remaining steps in any project.

Identify alternatives to address underlying problems or needs. For each of the potential underlying needs or problems, there are likely to be a number of different possible solutions. For example, if those consulted felt improved performance or understanding of the system's sustainability was necessary, one possible alternative could be the creation of sustainable development indicators for that system. Whatever the underlying needs may be, the most important point to emphasize is that the organization must remain open to any possible means of addressing those needs and thinking must not be confined to the existing solution. Doing otherwise could eliminate potential alternatives too early in the process. It should be remembered improvements to any system may be made incrementally, but improvement by innovation will ultimately be necessary as well.

Evaluate alternatives. Guided by some predefined criteria, the organization will need to weigh the various costs and benefits associated with each choice. Like the previous steps, this will necessitate the consideration of both internal and external factors ultimately leading to some ranking of the available alternatives.

Select preferred alternative(s). Part of this process involves fleshing out the selected alternative(s) so that senior management has the information they require to make a decision. To maximize the chance of the preferred alternative being accepted, it will be useful to consider preparing a brief summary of why the alternative should be implemented, what needs it will address, how much it's going to cost, how long will it take, and who is going to be involved.

Obtain approval of senior management. The remainder of the SDI Design Process will only be activated if the approved alternative involves the creation or refinement of sustainable development indicators. If it does not, some alternate process will need to be employed. In any case, the support and commitment from key decision-makers is necessary if it is to succeed in the long run. One way in which this may be tangibly demonstrated is through the appointment of a process sponsor. A member of senior management, this person will help get the process going – primarily through the selection of the process proponent (or leader) – but may not necessarily be directly involved in the day-to-day operation of the process.

Step 2: Conduct Process Planning

Having established the need to undertake the SDI Design Process, the purpose of Step 2 is to ensure that the process has a good chance of succeeding. As illustrated in Figure 4.5, this means that several sub-steps must be completed.

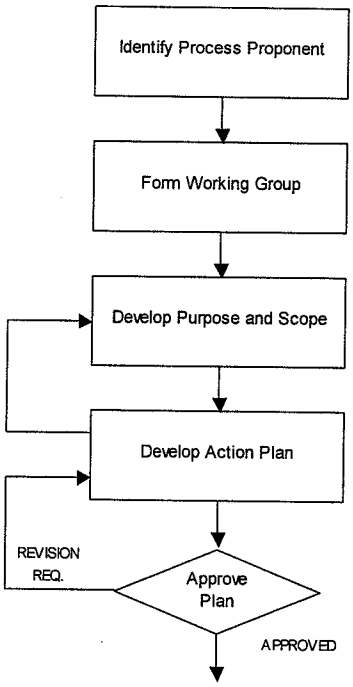

FIGURE 4.5
THE SDI DESIGN PROCESS STEP 2: CONDUCT PROCESS PLANNING

Identify the process proponent. Initially, this will be the person who is responsible for serving as the process advocate and taking the necessary steps to get the process off the ground. Part of these initial activities will involve clarifying what the process is about, why it is being done, how long it will take, and who should be involved.

Form a working group. Initially brought together by the process proponent, this group of people must be capable of providing guidance through all of the subsequent steps in the process and, in doing so, ensure that a useful, relevant, and clear set of sustainable development indicators is created for the system under examination. Therefore, to maximize the chance of the process succeeding, the working group should include the necessary expertise, experience, and open-mindedness. One of the early challenges of the project will be to incorporate these characteristics while keeping

membership between 4 and 12 people. How the group will work together and come to decisions should be clearly documented in a Team Charter.

Develop purpose and scope. While a preliminary statement of purpose should have been defined early on by the process proponent, it is necessary to clarify and perhaps refine the purpose and scope of the process to ensure that everyone in the working group is on the same page from the very beginning. A proper purpose should be specific, measurable, agreed upon, realistic, and time framed (SMART) while the scope should carefully describe the boundaries to which the process will be subjected.

Develop action plan. The action plan requires consideration of several key components including objectives, activities, task relationships, task assignments, time estimates, deliverables, and costs. Although potentially time consuming, the development of an action plan is an essential piece of any process since good planning will facilitate "going faster later" (Randolph and Posner, 1992).

One component of the action plan particularly important to highlight is the development of a conceptual framework. All processes of this nature require a starting point to help guide the development of the indicators and provide a template for communicating the results. In most cases, this starting point is provided through the selection or design of a conceptual framework. Specifically, the conceptual framework should help prompt the selection of key issues and provide a means for organizing and communicating the indicators. While the working group may wish to use one of the many existing methods or a combination thereof, they are also free to develop their own.

Obtain approval and commitment from top management. Though it is certainly possible the first iteration of the action plan will be approved, it is also possible revisions will be required. As illustrated in Figure 4.3, this could involve refinements to the action plan or perhaps even the purpose and scope by the working group.

Step 3: Develop a Set of Draft SDI

Step 3 is the stage where the initial set of sustainable development indicators is developed. Therefore, the purpose of this step is to apply all of the work performed in the previous step towards the development of a set of indicators providing a valid representation of the system in question. While there is no universally accepted formula

for creating indicators, the key components associated with the completion of Step 3 are identified in Figure 4.6. It should be kept in mind that, guided by expert input, all of these tasks should involve consultation with the key internal and external stakeholders.

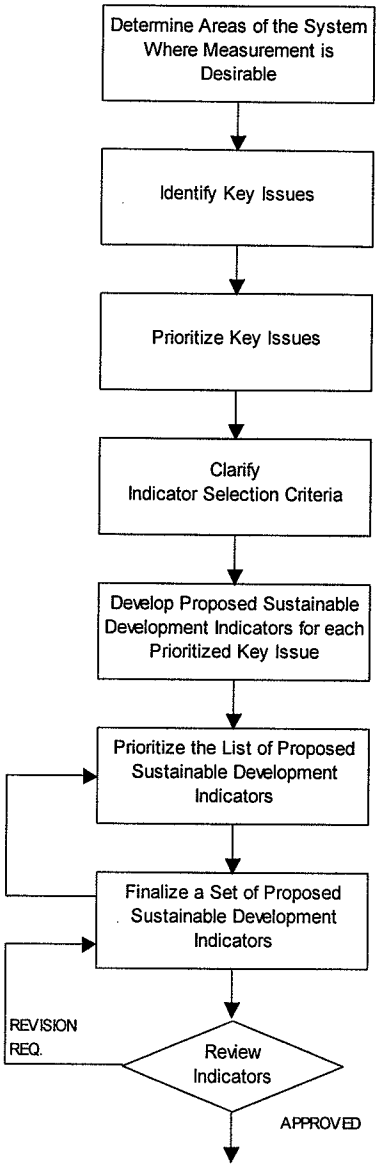

FIGURE 4.6
THE SDI DESIGN PROCESS STEP 3: DEVELOP A SET OF DRAFT INDICATORS

Determine the areas of the system where measurement is desirable. Though brainstorming is one common method of identifying these points, the exact process for doing so is at the discretion of the working group. Whatever method is selected, it is important an open mind is retained throughout the entire process since a wide variety of

input must be accommodated. These initial discussions will likely produce a list containing a number of considerations including key issues, symptoms of key issues, impacts, operational concerns, possible indicators, and points best categorized under a number of different headings.

Identify key issues. Once the participants have had the opportunity to share the things important to them, the task of identifying the key issues to be addressed by the sustainable development indicators may begin. This is a process involving several iterations. The first sub-step in this process will be to extract the key issues from the list of items generated previously, while subsequent stages could involve the consolidation of key issues into a more concise list. Whatever the case, it is important the key issues attempt to provide a balanced representation of the entire system.

Prioritize key issues. Even though there could have been some consolidation of the initial list of key issues in the previous sub-step, it will likely still be necessary to subject the consolidated list to some form of prioritization. Note that prioritizing the key issues doesn't imply that those of lower priority will be minimized or ignored. The fact a key issue has made it to this point means it needs to be considered. Rather, the process of prioritizing the key issues is a recognition the organization will only be able to address certain issues at a certain time. Though these issues may change over time, the organization needs a manageable list of key issues so it may move ahead.

That being said, in establishing these priorities, it is again possible to employ many different strategies. Regardless of whom the working group chooses to involve in this process, one tool that should assist in making it more transparent is the creation of a set of key issue prioritization criteria. Though there is still an element of subjectivity in determining the relationship between the key issue and the criteria, this will help demonstrate each issue was given fair consideration against comparable criteria. Whatever the case, it is critical the selected strategy is clear for all involved and there is agreement on how that process will proceed.

Clarify indicator selection criteria. This helps to guide the indicator development process and will provide the working group with a means to assess each of the proposed indicators. After all, there must be some means to help determine the relative desirability of the possible indicators. While the identification of the specific

criteria for any one project is always at the discretion of those involved, a starting point is provided by the many existing examples. Whatever criteria are ultimately selected, it is important to remember it is rare for any one indicator to satisfy all criteria. While the working group may wish to establish a threshold requiring any indicator to meet a minimum number of criteria, requiring all indicators to meet every criterion could lead to the exclusion of some important issues.

Develop proposed sustainable development indicators for each prioritized key issue. Like many other tasks described in this protocol, there are many ways in which the group may choose to go about accomplishing this. The important thing is the choices are consistent with the key issues and indicator selection criteria previously identified so the rationale for their inclusion (or as the case may be, exclusion) is clear. Although nothing will guarantee the indicators ultimately selected are optimal, maintaining transparency throughout the entire process will go a long way to enhancing their credibility.

Prioritize the list of proposed sustainable development indicators. Though there is no ideal number of indicators, the number of indicators should be as small as possible but as large as essential (Bossel, 1999). Therefore, where possible the initial list of proposed indicators should be subjected to a careful process of consolidation. Again, this doesn't necessarily mean that the indicators are eliminated as possibilities, but ensures only the most illuminating indicators are explicitly listed.

Finalize a set of proposed sustainable development indicators. With the list of prioritized indicators complete, the primary purpose of this sub-step is to ensure each of the prioritized key issues have been sufficiently addressed and the indicators present an integrated representation of the three pillars of sustainable development (i.e. the environment, the economy, and society). If either of these considerations have not been met, the working group may wish to return to the previous sub-step.

Review indicators. Once there is agreement on a set of proposed indicators, the working group will need to present these indicators to top management for review. As in other steps in the SDI Design Process, this review should lead to either directions for further research or approval to move on to the next step in the process.

Step 4: Test and Adjust Indicators

After a set of proposed indicators has been identified, it is necessary to review these choices. Given the diversity of opinion expressed by the stakeholders participating in Step 3, it is possible some revisions to the list of proposed indicators will be necessary. Therefore, the next step in the process is to test and adjust that list of proposed indicators. Ultimately, this update should lead to the selection of a working set of indicators forming the basis for the completion of the remaining steps in the SDI Design Process. A step that is in itself an iterative process, Step 4 is illustrated in Figure 4.7.

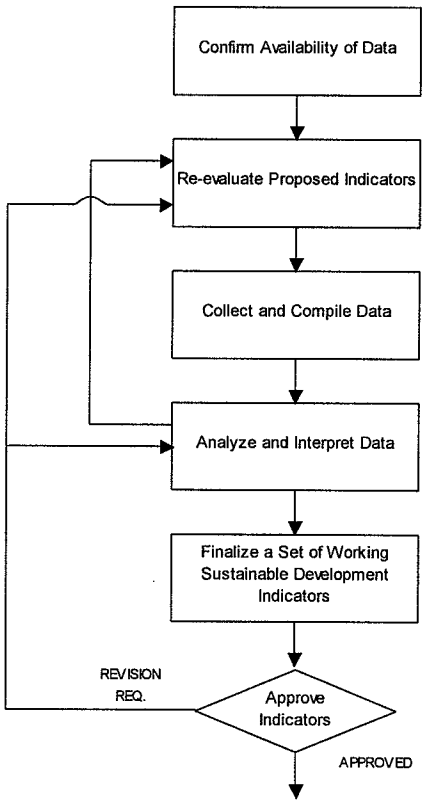

FIGURE 4.7
THE SDI DESIGN PROCESS STEP 4: TEST AND ADJUST THE DRAFT INDICATORS

Confirm availability of data. Any indicator will need to be based on some form of scientific, traditional, or community knowledge (Walter and Wilkerson, 1998b). Therefore, the first task in reviewing a potential indicator is to confirm whether data is available to support its inclusion in the working set of indicators. In particular, throughout the investigations data characteristics such as precision, accuracy, representativeness, consistency, and reproducibility should be considered. Furthermore,

take into account whether the data is available for a number of years since this factor will influence the effectiveness of any trend analysis that may be conducted later on. This research should be documented to a degree of rigor so that any similarly trained person or group of people could retrace all of the steps taken.

Re-evaluate proposed indicators. In addition to determining which of the potential indicators to revise or discard, this re-evaluation could include the identification of new possibilities. Involving the necessary stakeholders and experts, the re-evaluation of the potential set of indicators should lead to one of two results: directions for further research or a validation of a working set of indicators. This illustrates the process of validating the working set of indicators may be one that is itself iterative.

Collect and compile data. In the event it is necessary to generate primary data, the working group should be prepared for a potentially time consuming and expensive undertaking. In terms of compiling the data, there are many options available to the working group. Whatever method is used however, it is necessary to combine and compile all of the relevant data for each indicator in a clear and easy to understand format. Each category should be clearly defined, stating what is included and (in the applicable cases) what is not included in the tabulation.

Analyze and interpret data. Like the other sub-steps in Step 4, the time required to conduct the analysis of data is an activity not to be underestimated. In addition, as in the previous steps, it is a task where the working group may wish to involve experts to ensure the analysis is scientifically defensible. That, however, doesn't mean the data analysis should be overly complicated. This comes back to the point that the indicators are supposed to help simplify the complex issues related to the system under study. If the analysis itself is difficult to follow, the risk of losing or confusing those who will actually make use of the findings is increased.

Finalize a set of working sustainable development indicators. A primary consideration at this point should be to ensure the analysis conducted was appropriate and understandable. As in all other stages of the project, it is important the working group document the decisions it makes in this stage.

Approve indicators. Like all of the other previous steps in the process, the final stage of Step 4 explicitly focuses on the involvement of top management. At this point,

obtaining commitment and buy-in from top management is particularly critical since the set of indicators considered here will form the basis for the most time-consuming and challenging aspect of the SDI Design Process, implementation of the indicators.

Step 5: Implement Indicators

While developing and analyzing a set of sustainable development indicators is a noteworthy achievement, it is only part of the work that needs to be done by the working group. If they are to be of any further use, the indicators must be implemented in a manner that strives to address the specific needs of potential audiences. To ensure this process is successful, careful planning and preparation will be required. Keeping in mind Step 5 will likely be the most time consuming of all steps in the SDI Design Process by a significant margin, Figure 4.8 depicts a generic process to help structure the implementation of the indicators.

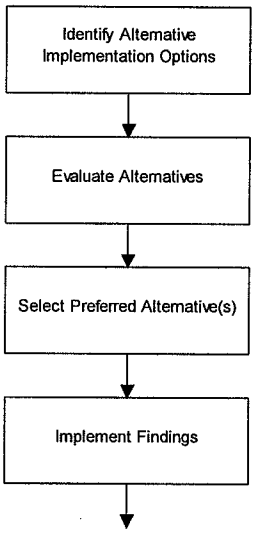

FIGURE 4.8
THE SDI DESIGN PROCESS STEP 5: IMPLEMENT INDICATORS

Identify alternative implementation options. Some example alternatives to consider include presenting the indicators as a stand-alone report, as a part of an integrated reporting system, or using some combination of those two options. Depending on the specific situation, the working group may be able to identify additional alternatives. In any case, one of the most important considerations associated with any

alternative should be the need to clearly establish links between the indicators and the relevant existing initiatives. These links will be critical in the effort to gain acceptance for the indicators and, as such, they must play a significant role in any alternative considered by the working group.

Evaluate alternatives. As in many of the other steps in the SDI Design Process, it may be helpful at this point to create a set of criteria to assess the available alternatives. Even if formal criteria are not utilized, the working group will need to carefully balance the desired against the possible since any alternative ultimately selected must be one that can be put into practice. Since implementation is a process explicitly dealing with the "real-world," an alternative should only be considered valid if it can realistically be expected to work in the environment within which the indicators will be used.

Select preferred alternative(s). Once the various strengths and weaknesses of each option have been considered and one has been selected as the preferred alternative, detailed preparation for the implementation of that option may begin. Though there are numerous things that will need to be considered here, one of the most important strategic decisions will be whether the alternative should be immediately implemented in full or whether its implementation should be staggered over time. In any case, considering an unsuccessful implementation will undermine the effectiveness of the indicators, this planning process may well be the most important step in the entire SDI Design Process.

Implement findings. Throughout this process, it is imperative the working group communicates with the affected and interested parties so that everyone is clear on the indicators, how they can be used, and what types of targets are associated with their use. All of these tasks are directly related to the ultimate goal of this step: effective reporting of the indicators so they may be constructively used in decision-making. Achieving this goal will require ongoing, dedicated effort.

Step 6: Review and Improve

Sustainability is not a static state of affairs; it is a process, and achieving it will require ongoing monitoring and assessment (Walter and Wilkerson, 1998a). Therefore, it must not be forgotten the indicators developed over the course of any SDI Design Process are merely a starting point. No set of sustainable development indicators is going to be

absolutely perfect the first time and they are unlikely to be implemented without difficulty. Fortunately, the indicators and the methods through which they are communicated can always be changed if need be and, in fact, they must continue to be updated where necessary over time.

In order to support the required process of continuous improvement, a system of governance is needed to monitor the indicators and identify when and how these improvements should be undertaken. Considering the original working group is unlikely to be a permanent entity, it is critical the necessary financial and human resources are assigned to address these challenges and ensure the indicators remain current and relevant to the system they are intended to represent. Since the development of sustainable development indicators for any particular system is an evolutionary process (Meadows, 1998), it is crucial to recognize the work associated with those indicators does not end with the completion of any one particular project.

The iterative nature of the process is represented in the SDI Design Process by the feedback loops connecting Step 6 to the others (see Figure 4.3). At a minimum, the organization should periodically repeat Step 5 to ensure the indicators are being effectively communicated. Given the changes that are likely to occur over time, protocols for regular updates to the data used in the analysis of the indicators should also be established. Though reviews of the first three steps in the SDI Design Process are likely to be undertaken less frequently than those for Steps 4 and 5, they should periodically be reconsidered as well. The point to make is the SDI Design Process can be used for both first-time and ongoing assessments. While the first time assessment helps establish the indicators, subsequent assessments are required to ensure the indicators are effectively meeting the needs they are intended to address.

However, while the protocol can be used as a guide for ongoing assessments, it must also be recognized this version of the SDI Design Process is itself a starting point. As is the case with the actual indicators, the protocol must be continuously improved as more experience and knowledge is accumulated. Nothing in any set of indicators, or this protocol for that matter, should be seen as being carved in stone.

4.2

Phase 2 – SDI Design Process for Manitoba Hydro's Transmission System

Phase 1 identified a generic SDI Design Process that could be applied to Manitoba Hydro and other corporations. That protocol outlined not only the specific process elements needed to create a set of sustainable development indicators, but also the key inputs and outputs of each step. However, given that the SDI Design Process outlined in Phase 1 was explicitly created as a generic protocol, some tests were necessary to ensure the process was applicable to Manitoba Hydro's Transmission System.

With that in mind, consultations were undertaken to consider selected steps in the SDI Design Process from the perspective of Manitoba Hydro's Transmission System. In the interests of time, this effort focused on Steps 2 and 3. As noted in Section 3.0, two primary objectives guided the completion of these tests. The first was to provide an example of how one step in the SDI Design Process might be tailored to the Transmission System while the second was to provide ideas on how to improve the output of Phase 1. Described on the following pages, these tests were the basis of Phase 2.

4.2.1
Step 2 – Conduct Process Planning

As noted in Section 3.3.2, this stage of Phase 2 focused on providing an example of how to tailor a step in the SDI Design Process to Manitoba Hydro's Transmission System. Therefore, assuming a full-fledged SDI Design Process for that system would be undertaken in the future, each of the process elements, inputs, and outputs constituting Step 2 were considered by groups of internal and external experts. These consultations resulted in a number of suggested enhancements to the SDI Design Process. These enhancements are described on the following pages.

4.2.1.1
Process-Related Elements

The first task undertaken by the participating internal experts was to clarify the specific process elements making up Step 2. Starting with a model provided by the graduate student, this process was refined until a consensus emerged on the generic process illustrated in Figure 4.9. However, while the elements depicted in Figure 4.9 provide general guidance on the completion of Step 2 for Manitoba Hydro's Transmission System, the participant group felt each of those elements could be refined so further details are available to guide their completion. Further explanations on each element are described on the following pages.

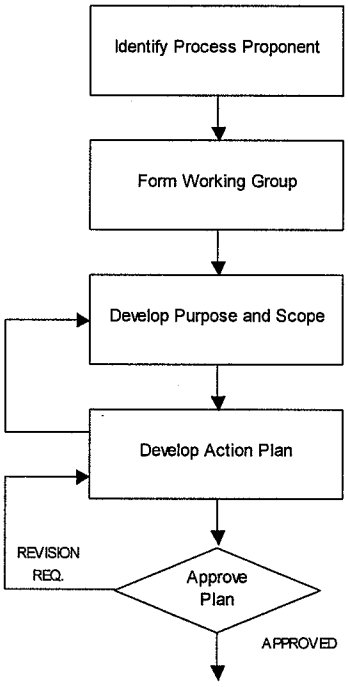

FIGURE 4.9
FACE VALIDITY TEST – STEP 2: CONDUCT PROCESS PLANNING

Identify Process Proponent

The process proponent (or leader) will be selected by the process sponsor. The internal experts consulted felt that, under most circumstances, the process proponent will be selected from amongst the division or department managers reporting to the process

sponsor. In any case, the process proponent will be responsible for the day-to-day operation of the SDI Design Process.

Form a Working Group

Though the exact composition of any working group will vary somewhat depending on a number of factors, any working group developing sustainable development indicators for Manitoba Hydro's Transmission System will include:

- Process Proponent/Leader
- Professional Facilitator/Process Improvement Advisor
- Relevant Technical Expertise
- Recorder/Secretary

Deciding how the working group will work together will be one of its first tasks. Involving all members of the working group, these decisions will be manifested in a Team Charter prepared based on the guidance of the facilitator.

Develop Purpose, Scope, and Action Plan

There are currently no documented protocols for preparing a purpose or action plan at Manitoba Hydro. In most cases, the internal experts consulted believed members of the working group will be able to determine the most appropriate format and content based on their previous experience. However, where the working group feels some guidance is required in these areas, the internal experts noted in-house training courses are available to address any deficiencies.

In any case, the action plan will identify the key tasks necessary to complete the process along with target dates. At a minimum, these tasks will include subsequent steps in the SDI Design Process, the identification of stakeholders, the development of a communication plan, the development of a conceptual framework, and the identification of indicator selection criteria.

Approve Plan

At Manitoba Hydro, approval of the process plan will be required from the process sponsor. Depending on the nature of the plan, decisions made by the process sponsor may in some cases need to be approved by the Manitoba Hydro's Executive Committee.

4.2.1.2 Input-Related Elements

Figure 4.3 identified five generic input categories for Step 2. These include:

- Values and Vision
- Existing Initiatives
- Available Resources
- Background Research
- Expert Input

Further details on each of these inputs applicable to Manitoba Hydro's Transmission System are provided below.

Values and Vision

In order to determine the values and vision that will help guide the creation of sustainable development indicators, the internal experts consulted felt that at least three internal documents will need to be examined: the Corporate Strategic Plan, the Transmission and Distribution Business Unit Strategic Plan, and the Sustainable Development Policy and Principles.

The Corporate Strategic Plan outlines Manitoba Hydro's vision of the future. Its key contents include the overall company vision, mission, goals, and operating principles as well as rationale for each of those points. To provide a further breakdown of each goal, specific measures, targets, and strategic actions are noted.

The Transmission and Distribution Strategic Plan builds on the base provided by the Corporate Strategic Plan to provide details specific to that business unit. Like the corporate strategic plan, its key contents include a vision statement, a mission statement,

goals, and rationale for each of those points. Measures, targets, and strategic actions are also provided for each of the goals with all of these points focusing on their application to the Transmission System rather than the entire company.

Finally, the Sustainable Development Policy and Principles is another internal document that needs to be understood to gain an appreciation for the values and vision. This document outlines the corporate sustainable development policy to be applied to each of the company's four business units. To provide further guidance on the implementation of that policy, thirteen key sustainable development principles are listed and briefly described. The complete Sustainable Development Policy and Principles is available in Appendix A.

Existing Initiatives

There are a number of existing initiatives both inside and outside of the company that have relevance to any sustainable development indicator process.

Key internal initiatives to be considered include the Canadian Electricity Association's Environmental Commitment and Responsibility Program (CEA ECR), the ISO 14001 environmental management system (EMS), various environmental protection plans, and ongoing monitoring programs throughout the company. Documents detailed in the values and vision discussion may also warrant re-consideration here.

Some of the many external initiatives that should be scrutinized as a part of Step 2 include federal and provincial legislation, national and international sustainability indicator programs, the Manitoba Provincial Sustainability Indicator Program, and the Provincial Strategic Plans in relevant areas such as water and wildlife. Furthermore, it will be important to consider updates made to any externally created programs that are already in place at Manitoba Hydro. Programs to consider under this category include the CEA ECR program and the ISO 14001 EMS.

Available Resources

There are two key categories to consider as sub-components of this input: financial resources and human resources. These are the resources necessary to ensure that a SDI Design Process is successful. Financial resources will need to be assigned and

may not already exist in existing budgets. Human resources will, for the most part, be the amount of time existing employees are designated to work on this process. The involvement of any external human resources will depend on the financial resources available.

At Manitoba Hydro, the specific resources allocated to the process will be determined by the process sponsor. Depending on the resources assigned, decisions made by the process sponsor may in some cases need to be approved by the Executive Committee.

Background Research

One convenient method of classifying the background research is a review of internal and external literature.

As a part of the internal literature review, the internal experts felt some of the critical inputs will include environmental impact statements and site selection environmental assessments (SSEA); applicable policies and procedures; EMS manuals, including the EMSL4-003a Guide to Environmental Legislation; transmission line data and history sheets; transmission line maintenance and information systems; planning criteria documents; process flow charts; facts and figures manuals; and corporate reports such as the Sustainable Development Report. Furthermore, any indicator programs either in existence or under development at the time of the undertaking must be examined. A review of these documents should help the working group gain a greater appreciation and understanding for how this process fits within the rest of the organizational infrastructure.

In terms of external literature, the working group will need to review material related to items such as sustainable development, indicators, corporate sustainability reporting, conceptual frameworks, indicator selection criteria, project management, and stakeholder consultation. As a part of this review, it would also be critical for the group to examine past sustainable development indicator projects.

Expert Input

Based on the consultations with internal expertise, it was determined that conducting a SDI Design Process for Manitoba Hydro's Transmission System will

require the involvement of people possessing a diverse set of expertise. Details are provided in sections organized around the internal and external expert classifications.

Internal Expert Input

From an organizational perspective, the internal experts consulted felt expertise will likely be required from each of the company's four business units, namely Transmission and Distribution; Power Supply; Customer Service and Marketing; and Corporate, Finance, and Administration. Within each of these units, expertise from specific divisions and departments will need to be involved in the SDI Design Process. Further details regarding the involvement of each of these business units is provided in Table 4.3.

External Expert Input

Though internal personnel will be able to provide much of the needed expertise, it will likely be necessary to supplement this knowledge base with the involvement of external experts. Some of the general types of expertise the working group may find useful to involve include a professional facilitator, experienced practitioners of sustainable development (i.e. specific process expertise), and peer groups. Although peer groups would not be directly involved in the process, they could act as a resource for perspective and review.

TABLE 4.3
KEY EXPERTS AT MANITOBA HYDRO

Business Unit	Division	Department	Rationale
Transmission and Distribution	Transmission Planning and Design	Licensing and Environmental Assessment	Expertise regarding sustainable development principles, SSEA, legislation, transmission line impacts, environmental protection and monitoring, ENGOs, and public consultation
		Transmission System Planning	Involved in establishing 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 the areas of land use policies, water use policies, and legislation
	Transmission Construction and Line Maintenance	Transmission Line Maintenance (North & South)	Applicable duties include long term rights of way management, setting of field practices, monitoring, information system input, and public contact
		Transmission Construction	In addition to developing construction practices, this department has had extensive public contact – particularly through the aboriginal liaison
Power Supply	Power Planning and Development	Environmental and Land Use Planning	Involved in several relevant areas including legislation, environmental policy, resource planning, externalities, export policies, and GHG/climate change, and contact with ENGOs
Customer Service and Marketing	Customer Service Operations	N/A	Expertise in the areas of forestry, vegetation management, wood poles and preservative use, field practices, legislation, and public contact - with the municipal liaison being of particular importance

TABLE 4.3 (CONTINUED)
KEY EXPERTS AT MANITOBA HYDRO

Business Unit	Division	Department	Rationale
Corporate, Finance, and Administration	N/A	Environmental Management System	Expertise in several relevant areas including the EMS, the CEA ECR program, sustainable development reporting, and environmental processes

4.2.1.3 Output-Related Elements

As was the case for the inputs, Figure 4.3 identified the various outputs expected from Step 2. These include:

- Purpose
- Action Plan
- Conceptual Framework
- Indicator Selection Criteria
- Terms of Reference

Further details on each of these items are provided below.

Purpose and Action Plan

All relevant issues related to these outputs were previously addressed in Section 4.2.1.1.

Conceptual Framework

Several example conceptual framework options were considered by a group of external experts. These included the environment-economy-society, ethics-conservation-cooperation-competition, effectiveness-thrift-margin, pressure-state-response, and capital stocks frameworks. To provide some guidance in the selection of the most appropriate framework for Manitoba Hydro's Transmission System, the following set of evaluation criteria was generated by the graduate student to determine whether the framework was:

- Relevant to the system under examination

- Understandable and easy to interpret
- Credible and acceptable
- Flexible and adaptable
- Holistic
- Effective as a communication tool
- Clearly connected to the final product (i.e. indicators)
- Capable of illuminating linkages between the environment, economy, and society
- Transparent
- Comparable
- Able to focus action on issues critical to sustainable development
- Good at motivating people to act

To provide more focused discussion, the expert group condensed those initial criteria into a more concise set of evaluation criteria which considers frameworks based on the following characteristics:

- Communication
- Practicality
- Compatibility
- Holistic

Using those criteria as a starting point, discussions quickly resulted in a consensus that the environment-economy-society framework was most appropriate for use by Manitoba Hydro's Transmission System. This selection was made for five primary reasons, which cut across all four of the categories listed above:

- Simple
- Widely accepted
- Directly linked to the three pillars of sustainable development
- Directly tied to relevant initiatives
- Previously used by local experts

Simple. In the opinion of the participants, the environment-economy-society framework is the easiest of the available options to understand. The rationale underlying this belief is this framework is more intuitive than the others and therefore doesn't require a lot of explanation. The relatively small learning curve associated with this framework is an important characteristic in terms of both the communication and practicality aspects.

Widely accepted. As stated in Section 2.2.2.1, the environment-economy-society framework is the most common of the conceptual frameworks. Therefore, one benefit of using this framework is it offers more examples than the others.

Directly linked to the three pillars of sustainable development. Sustainable development is a concept seeking to balance and integrate issues associated with the environment, the economy, and society. Since those are the categories in which this framework is itself organized, there is a very clear link between the indicators generated under this framework and the overall concept of sustainable development.

Directly tied to relevant initiatives. One of the most significant advantages of this framework is it is directly tied to relevant initiatives both at Manitoba Hydro and elsewhere in the Province. Internally, both the Sustainable Development Policy and the Corporate Strategic Plan make explicit reference to the environment, the economy, and society. Furthermore, the recent Provincial Sustainability Indicators program in Manitoba utilized this framework. As that program becomes integrated with other Provincial initiatives over time, it may be important for Crown corporations (such as Manitoba Hydro) to link their indicator programs to the Province's.

Previously used by local experts. An essential consideration in the selection of any framework is whether or not expertise is readily accessible to help guide the working group through its application. This will reduce the risk of confusion throughout the stakeholder consultations, which is important given the time constraints any consultation will be subjected to.

Indicator Selection Criteria

Based on the consultations with internal and external expertise, a set of indicator selection criteria appropriate for Manitoba Hydro suggests that the indicators be:

- Understandable

- Actionable
- Relevant
- Credible
- Illustrative
- Provide linkages

Understandable. It should be remembered that the purpose of the indicators is to help simplify complex issues. Therefore, it makes sense to keep the indicators simple so that they may be easily understood by the wide variety of stakeholders who will be using them in some way. If the indicator is ambiguous, it won't help. Every effort should be made to make the indicator as clear and as transparent as possible so misunderstandings are minimized.

Actionable. Any sustainable development indicator for an electric utility should ideally satisfy the requirement that improvement is reasonably within the control of the utility. Part of being actionable requires the necessary data is available in the appropriate quality, at a reasonable cost, and within a reasonable amount of time.

Relevant. The indicator must focus attention on issues relevant to the system under examination. Where possible, it should be strongly related to policies and goals already in place. It should be remembered that a sustainable development indicator should address issues important to sustainability.

Credible. It should be recognized that only those indicators possessing reasonable grounds for belief should be included. Therefore, all indicators must be relevant to the system under examination and must be measurable based on scientific, traditional, or community knowledge. This means both qualitative and quantitative information can be seen as valid in the development of indicators. Furthermore, the data obtained from these sources should be collected using accepted methods. Where collection of information has not been consistent from year-to-year, this must be noted and considered.

Illustrative. Since the situation measured by indicators is likely to be subject to change over time, any indicator should be sensitive to that change and therefore be capable of illustrating those changes. This versatility will be necessary if the indicator is

to provide any information regarding whether the situation is getting closer or further away from sustainable development.

Provide Linkages. Since sustainable development is a concept attempting to integrate environmental, economic, and social concerns, the indicators should reveal the companies' progress towards this goal. The indicators should ideally highlight the relationships between these three areas and illustrate how decisions made to influence one area can have an impact on the others as well.

Terms of Reference

As a part of the action plan, the working group will need to establish who should be a part of the process, why they should be involved, how those people should be included, and when they should become involved. One method of documenting these decisions is to create a terms of reference.

Though there are many different ways the working group may choose to organize the terms of reference (with guidance to be provided by the professional facilitator), it should concisely explain who is being consulted, why they are being consulted, what the level of consultation is, how long the consultations will last, and how the stakeholder input will be used. Documenting all of this information up front is necessary to ensure the stakeholders clearly understand what is open for debate and what is not.

4.2.2
Step 3 – Develop a Draft Set of SDI

As noted in Section 3.3.2, this step of Phase 2 was conducted as a face validity test of the SDI Design Process. Stated another way, these consultations were essentially a trial run of Step 3 with the intent being to better understand how this step may unfold in a full-fledged SDI Design Process. To accomplish this goal, facilitated consultations were organized with a group of internal and external experts to go through each of the sub-steps in this process. The outcomes of those consultations are identified in the following pages.

4.2.2.1
Process-Related Elements

Figure 4.10 illustrates the generic process followed during the face validity test of Step 3 in the SDI Design Process. As identified in the Figure, the three key sub-steps in that process included:

- Identify key issues to be addressed by the SDI Design Process
- Prioritize the key issues
- Develop a set of draft sustainable development indicators

This process was confirmed by the internal experts as a part of the consultations with internal experts in Step 2.

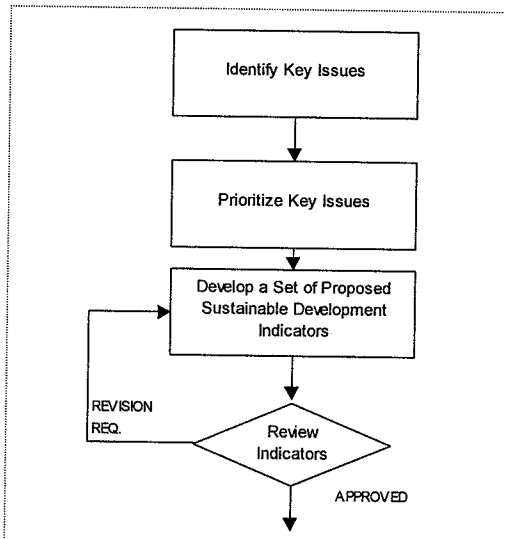

FIGURE 4.10
FACE VALIDITY TEST – STEP 3: DEVELOP A SET OF DRAFT SDI

Identify Key Issues

Though the initial intent of this step was to identify key issues, a number of different items emerged. In addition to key issues, it can be seen the initial list generated by the participating experts included symptoms of key issues, impacts, operational concerns, possible indicators, and points best categorized under a number of different headings. The results of this exercise are depicted in Table 4.4.

The fact that items other than key issues emerged in this step was significant because it underscored the fact that time and effort will often be necessary just to get everyone on the same page. Although beginning the process with the identification of key issues would appear to be ideal, this will likely not be possible in practice. For instance, time will be required for the participants to develop a common understanding of what the term "key issue" means in the context of their project.

Furthermore, since one of the early goals of Step 3 is to identify what is important to the participants and what they feel needs to be addressed, beginning with the immediate identification of key issues may inadvertently result in some key issues actually being overlooked. One solution to this potential problem is to add another step in Step 3 of the SDI Design Process. This is reflected in the SDI Design Process described in Phase 1.

TABLE 4.4
SUMMARY OF INITIAL BRAINSTORMING SESSION ON KEY ISSUES

Land Use

- Fragmentation
- Impact on Habitat
- Increased Access
- Infringement on Private Property
- Loss of Use
    - Existing
    - Future
- Residential Values
    - Effect on Property Values
- Public Safety
- Local Economic Impact
- Secondary Land Uses
- Impact on Individual Economics

Aesthetics

- Aesthetics

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)
    - Herbicides vs. Mechanical
    - Mechanical vs. Hand Cutting

Safety and Health

- Electromagnetic Field (EMF)
    - Public Perception vs. Reality
- Climbing of Towers
- Tower Stability
- Noise
    - 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

TABLE 4.4 (CONTINUED)
SUMMARY OF INITIAL BRAINSTORMING SESSION ON KEY ISSUES

Water

- Pole Treatment Chemicals
- Stream Crossing
  - Construction Processes
- Distance Between Structures and Streams
- Erosion
  - Fish Habitat
- Use of Pesticides
  - Impact on Fish
- Disposal of Hazardous Wastes
  - Product
  - Containers

Economy

- Timing of Expenditure
  - Delaying Until Absolutely Necessary
- Impacts to Enable Export Products
- Revenue Sharing with First Nations
- Reliability of the System
- Attracting Industry
  - Competitive Pricing
  - Reliability
- Interruptance Energy Rates
- Supporting Efficiencies in Industry
  - Power Smart
- System Capacity to Meet Needs
- Salvage from Decommissioning
- Maintenance Costs
  - Durability
- Need to Borrow
  - Size of Project
  - Debt
  - On Speculation for Export
- Percent of Energy Exported
- Affordability to Manitoba Customers

Social

- Public Attitude Indices
  - Public Perception of Transmission
- Right to Share in Benefits when Sharing Costs
- Employment
  - Types of Employment
  - 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

TABLE 4.4 (CONTINUED)
SUMMARY OF INITIAL BRAINSTORMING SESSION ON KEY ISSUES

- Is there Proper Management of the Transmission System
  - Governance
  - Reliable System Internally
  - Public Trust
- Community Involvement
  - Corporate Citizenship (Extent to Which Practiced)

Given the variety of items appearing in Table 4.4, the participating experts felt it was necessary to filter the contents so a more manageable set of key issues was available. Led by the facilitator, the participants considered each of the items listed in Table 4.4 with the discussions ultimately leading to an agreement on a more concise list of key issues organized around the three categories provided by the conceptual framework, namely the environment, the economy, and society. The results of that filtering process are provided in Table 4.5.

TABLE 4.5
SUMMARY OF KEY ISSUES

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

It should be noted that many of the key issues appearing in Table 4.5 incorporate several of the points listed in Table 4.4. For example, the key issue "Public Safety" includes points such as climbing of towers, tower stability, ease of access, construction

operations, and proximity to recreation areas. As a second example, consider that the key issue "Vegetation Management" includes points such as damage from pesticides, weed control issues, use of pesticides, and anxiety related to the types of vegetation management. However, while some of the key issues were relatively clear in terms of what items they incorporated and what items they didn't, some were less well defined. The key issue "Equity" falls into this category.

Furthermore, bear in mind some of the key issues listed in Table 4.5 could have been listed in categories different to that in which they appear. For instance, there was considerable debate amongst the participants as to whether the key issue "Public Involvement" should appear under the umbrella of the Environment category or within the Society category. Likewise, debate suggested that the key issue "Electromagnetic Field (EMF)" could have been listed in the Environment classification rather than the Society classification in which it appears. These debates underscore the fact that many of the key issues selected inherently highlight the interrelationships between the three categories of sustainable development as it relates to Manitoba Hydro's Transmission System.

Prioritize Key Issues

The first task in prioritizing key issues was to develop the criteria needed to conduct that assessment. However, it is significant to note that during this exercise one of the questions raised was whether or not the indicators should even be subject to prioritization at all. The expert group felt it was important to note prioritizing the key issues doesn't necessarily mean those of relatively low priority are forgotten or nothing is ever going to being done about them. They felt the fact a key issue was identified means it needs to be considered. Therefore, it was clarified the process of prioritizing the key issues was a recognition the organization will only be able to address certain issues at a certain time. Though these issues may change over time, the organization needs a manageable list of key issues so it may move ahead.

Keeping those points in mind, the expert group felt that one set of criteria could consider the key issues on the basis of:

- Level of public interest

- Need to comply with regulatory requirements
- Need for management to have information on
- How related to mission, vision, values, goals, and policy
- Ease of identifying an indicator
- Future liability implications

It should be noted that the criteria "future liability implications" was defined to include the ability of Manitoba Hydro to build other infrastructure in the future. The other criteria were considered by the participant group to be self-explanatory.

Once the identification of prioritization criteria was complete, the relationship between each key issue and each criteria was assessed by a group of internal experts. As noted in Section 3.3.2, the scale used to represent this relationship was high, medium, and low. The results of this exercise are illustrated in Table 4.6.

TABLE 4.6
PRIORITIZATION OF KEY ISSUES

Category	Issue	Public Interest	Need to Comply with Regs	Need for Mgmt. Info	Relation to Existing Initiatives	Ease of developing an Indicator	Future Liability Implications
Environment	Habitat	High	Medium	Low	High	High	Medium
	Increased Access	Low	Low	Low	Medium	Low	Medium
	Vegetation Practices	High	High	High	High	High	High
	Loss of Forest Cover	High	Low	Low	High	High	High
	Potential Contamination	Low	High	High	High	High	High
	Public Involvement	High	High	High	High	High	High
Economy	Risk to Livestock	Low	High	Low	Low	Low	Medium
	Cost Issues	Medium	Low	High	High	High	High
	Benefits	High	Low	High	High	High	High
	Governance	Low	Low	High	Medium	High	High
Society	Private Property and Land Use	High	High	Medium	High	Low	High
	Aesthetics	High	Low	High	High	Low	High
	EMF	High	Low	High	High	High	High
	Public Safety	High	High	High	High	High	High
	Education	Low	Low	High	High	High	High
	Equity						
	Community Relations	High	Low	High	High	High	High

To help better separate the most important issues from the others, a second table was created assigning issues with a rating of "high" a score of 3, "medium" a score of 2, and "low" a score of 1. For each key issue, these scores were then multiplied using each of the six criteria. The rationale underlying the use of multiplication of the criteria rankings was that it provided greater separation between "low" and "high" priority issues than would have been shown by addition of the scores. The results of this exercise are illustrated in Table 4.7.

TABLE 4.7
RANKING OF KEY ISSUES

Category	Issue	Public Interest	Need to Comply with Regs	Need for Mgmt. Info	Relation to Existing Initiatives	Ease of developing an Indicator	Future Liability Implications	TOTALS
Environment	Habitat	3	2	1	3	3	2	**108**
	Increased Access	1	1	1	2	1	2	**4**
	Vegetation Practices	3	3	3	3	3	3	**729**
	Loss of Forest Cover	3	1	1	3	3	3	**81**
	Potential Contamination	1	3	3	3	3	3	**243**
	Public Involvement	3	3	3	3	3	3	**729**
Economy	Risk to Livestock	1	3	1	1	1	2	**6**
	Cost Issues	2	1	3	3	3	3	**162**
	Benefits	3	1	3	3	3	3	**243**
	Governance	1	1	3	2	3	3	**54**
Society	Private Property and Land Use	3	3	2	3	1	3	**162**
	Aesthetics	3	1	3	3	1	3	**81**
	EMF	3	1	3	3	3	3	**243**
	Public Safety	3	3	3	3	3	3	**729**
	Education	1	1	3	3	3	3	**81**
	Equity							
	Community Relations	3	1	3	3	3	3	**243**

In the case of both Table 4.6 and Table 4.7, it should be highlighted the key issue "equity" was left unranked. Due to the absence of one key expert, the definition of that issue initially proved to be a challenge and it was still unclear at the time of the assignment of rankings. However, the participant group also felt equity was a significant key issue and that it should remain on the list even though it was not assigned a ranking. Furthermore, it was resolved that since equity was an issue potentially providing links between many of the other key issues, it is one that should merit special attention in any full-fledged SDI Design Process.

Develop a Set of Draft SDI

Though the original intent of the participant group was to develop indicators for several of the key issues identified in the previous step, time considerations resulted in the selection of only one key issue to be considered in this step. This is significant because it provided a practical example of one of the points highlighted in the literature review and the Phase 1 consultations: that developing sustainable development indicators is a time-consuming endeavor and will probably take longer than initially thought.

With those points in mind, and based on the rankings assigned in Table 4.7 and discussions amongst the members of the participant group, vegetation management practices was selected as the key issue for which sample indicators would be created. Developed through a process of brainstorming guided by the facilitator, these sample indicators are presented in Table 4.8. It should be noted that the sample indicators were developed using the indicator selection criteria described in Section 4.2.2.3.

TABLE 4.8
SAMPLE INDICATORS FOR VEGETATION MANAGEMENT PRACTICES

- Kg Chemicals Used/Land Area
- Percent of Right of Way (ROW) Treated with Chemicals
- Ratio of Soil Residual Herbicides vs. Non-Residual
- Hectares Contracted with Chemical Treatment vs. Hectares Contracted with using Mechanical or Hand Clearing
- Cycle Time for Vegetation Management
- ROW Cleared vs. ROW Width
- Hectares of ROW Maintained/Total Hectares of ROW
- Cost per Year of Chemical Treatment vs. Cost per Year of Non-Chemical Treatment
- Hectares Treated Biologically
- Total Research Dollars Spent on Non-Chemical Vegetation Management Practices per Year/Total Dollars Spent on Vegetation Management Practices per Year
- Hectares/Treatment Practices
- Opportunities for Aboriginals
- Total Area ROW/Total Electricity Transmitted
- Total Area ROW/Design Capacity of Transmission System
- Minutes of Outages Caused by Trees
- Number of Complaints per Year (Re: Vegetation Management)
- Public Responses to Herbicides Announcements
- Hectares of Secondary Land Use

Recognizing the fact that many of the indicators in Table 4.8 could be combined or did not meet certain critical selection criteria, those indicators were then consolidated

into five indicators representing the key issue vegetation management. The set of consolidated sustainable development indicators for that issue are depicted in Table 4.9.

TABLE 4.9
CONSOLIDATED INDICATORS FOR VEGETATION MANAGEMENT PRACTICES

- Hectares Managed per Total Land Base by Practice
- Cycle Time by Method of Vegetation Management
- Minutes of Outages Caused by Trees
- Public Responses to Herbicide Program Announcements
- Total Research Dollars Spent on Non-Chemical Vegetation Management Practices per Year/Total Dollars Spent on Vegetation Management Practices per Year

The first indicator listed in Table 4.9, "Hectares Managed per Total Land Base by Practice" incorporated several of the examples listed in Table 4.8. Specifically, "Hectares Contracted with Chemical Treatment vs. Hectares Contracted using Mechanical or Hand Clearing", "Percent of Right of Way (ROW) Treated with Chemicals", "Hectares Treated Biologically", "Hectares/Treatment Practices", and "Hectares of Secondary Land Use" were all considered to be sub-categories of this indicator. In other words, those sample indicators were considered to be implicit in the definition of this indicator or to be potentially helpful in explaining this indicator as a part of the analysis. With those points in mind, the first indicator can then be defined as:

- **Hectares Managed**: Number of hectares of ROW owned by Manitoba Hydro which are managed by the company through chemical, biological, mechanical, or manual means (i.e. hand cutting)
- **Total Land Base**: Total hectares of ROW owned by Manitoba Hydro
- **Practice**: Method used in the management of the land (i.e. chemical treatment, biological treatment, mechanical clearing, or hand cutting)

As is the case with the other indicators listed in Table 4.9, the second indicator "Cycle Time by Method of Vegetation Management", was taken directly from the list of sample indicators in Table 4.8. Essentially, this indicator illustrates how much time is required between treatments for each method of vegetation management. For example, ROW treated chemically may require chemical application every 4 years while ROW treated through mechanical means may require treatment every 5 years.

"Minutes of Outages Caused by Trees" is the third indicator listed in Table 4.9. As implied by the terms utilized, this indicator measures the number of minutes per year a part of the Transmission System is disrupted due to interference from trees. This indicator is particularly important since one of the primary purposes of vegetation management is to prevent this scenario.

The fourth indicator is "Public Responses to Herbicide Program Announcements". It should be noted this was one indicator the participant group felt required further clarification. For example, one of the points raised was that it may prove to be problematic to measure this indicator at the present time. "Herbicides Announcements" is a broad term that requires a more precise definition and public responses to those announcements are difficult to measure since they are fielded by a wide-variety of personnel. However, the participating experts also felt some indicator measuring public perception regarding vegetation management was important and this indicator should therefore remain as at least a reminder of that point.

The final indicator listed in Table 4.9 is "Total Research Dollars Spent on Non-Chemical Vegetation Management Practices per Year/Total Dollars Spent on Vegetation Management Practices per Year". As noted in the definition of the first indicator, the current methods of vegetation management at Manitoba Hydro include chemical, biological, mechanical, and manual means. Since chemical treatment is perceived in many quarters to be the most environmentally harmful of the available options, the expert group felt one of the indicators should quantify the effort to move to methods perceived to be more environmentally benign. This indicator accomplishes that goal by measuring the percentage of research dollars spent on non-chemical methods.

* * *

It should be explicitly noted that even though the indicators listed in Table 4.9 represent a consolidation of the initial list of indicators, those indicators would likely have been refined further had time allowed. For example, the uncertainty surrounding the fourth indicator in Table 4.9 illustrates how important the language used in any indicator really is and that merely attaining a common understanding of that language could require significant time. Furthermore, note that, in addition to issues associated with the use of

language, the possibility of further consolidation (or expansion) of the indicator set was not ruled out.

For those interested in sample indicators for other key issues listed in Table 4.5, please see Appendix B. It should be noted however, those sample indicators were not tested by the participant group and were meant merely as a starting point to provoke further discussions.

4.2.2.2 Input-Related Elements

The inputs into Step 3 include:

- Conceptual Framework
- Indicator Selection Criteria
- Example Indicators
- Stakeholder Input
- Expert Input

Conceptual Framework

The conceptual framework to be used in the selection of a draft set of sustainable development indicators was previously selected as a part of Step 2. Further details on the conceptual framework to be applied to Manitoba Hydro's Transmission System are available in Section 4.2.1.3.

Indicator Selection Criteria

As with the conceptual framework, the identification of indicator selection criteria should be completed as a part of the action plan in Step 2. Though these criteria may be modified during a future SDI Design Process, six indicator selection criteria appropriate for Manitoba Hydro were described in Section 4.2.1.3.

Example Indicators

As previously noted, there are currently few full-fledged efforts to create sustainable development indicators for a Transmission System. One relevant example

those consulted felt should be considered an input here are the environmental performance indicators created as a part of the CEA ECR program. Though they are not a complete set of sustainable development indicators, they do provide a starting point. The other most relevant examples to consider are the ones provided in Section 4.2.2.1 and Appendix B. Although the indicators generated in this thesis project were done as a face validity test of the SDI Design Process and did not involve external stakeholders, they could prove to be a useful input into a full-fledged process conducted at a later date.

With so few examples available in this direct area, it may be necessary to look to other areas for examples. Though indicators generated for corporations and industry will probably be most applicable, it may still be useful to consider indicators created for communities as well.

Stakeholder Input

Figure 4.11 depicts some of the key steps a working group will need to go through wherever stakeholders are involved. Though this process was developed through consultation with the internal experts identified in Section 3.3.2, it must be emphasized that it is meant only as an overview of some of the major decisions the working group will need to consider and that further research will be necessary. As a starting point, it should be useful to consider the material presented in Section 2.3.3.

Engage stakeholders? The first step in the process of stakeholder consultation is to determine whether or not there is a need to engage stakeholders. This will depend on a number of factors that must be carefully considered by the working group. These include:

- the decisions at stake
- the goals and objectives of the process
- the time available
- the impact of decisions on stakeholder groups
- and the available resources.

In any case, given the nature of Step 3 in the SDI Design Process, the involvement of key stakeholders will almost certainly be viewed as a necessity.

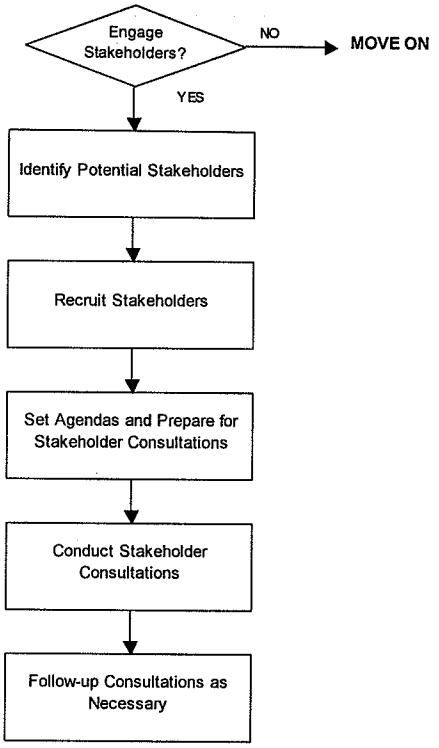

FIGURE 4.11
STAKEHOLDER CONSULTATION PROCESS FOR MANITOBA HYDRO

Identify potential stakeholders. Having decided there is a need to consult with stakeholders, the next step is to identify the specific stakeholders that should be involved as well as when they should become involved. To do so, it will be necessary to consider exactly why any particular stakeholder should be consulted. Keeping that in mind, a generic list of external stakeholders who have an interest in Manitoba Hydro's Transmission System is presented in Table 4.10.

The specific stakeholders the working group chooses to involve in the process, and the reasons for their involvement, will have a heavy influence on the stakeholder consultation process. For example, methods of consultation could include focus groups, workshops, or the submission of written comments. Preliminary strategies for the consultations will therefore need to be considered as a part of this step to ensure it is possible to have a successful consultation with the identified stakeholders.

TABLE 4.10
POSSIBLE STAKEHOLDERS FOR MANITOBA HYDRO'S TRANSMISSION SYSTEM

Stakeholder Category	Possible Interest
Federal and Provincial Government Technical Advisors	Interested in keeping up to date on the happenings in their respective areas throughout the country/province
Federal and Provincial Regulators	In addition to ensuring existing regulations are being followed, have an interest in monitoring new developments in the field so that future regulations may be developed
Aboriginals (First Nations, Inuit, and Metis)	Interest may vary substantially depending on the group involved though possibilities could include effects on traditional ways of life, employment opportunities, and interests similar to those of other stakeholders
Landowners	Interested in the placement of transmission lines either on or in the vicinity of their land and what impacts this will have on them and their property
Rate Payers	Demand accountability from all government divisions since they will ultimately have to pay for any decision
Public Interest Representatives	Want to ensure issues important to the public are heard, considered, and addressed in a reasonable manner
Environmental and Public Interest Groups	Want recognition of, and action related to, issues they see as important
Industry Associations and Groups	Want a level playing field and each of its members providing the best service possible

Recruit stakeholders. Before consultation, groups must indicate they are willing to participate. Therefore, the next step in the process of consulting stakeholders is to actually recruit the desired participants. Though the working group has some flexibility in how they approach potential participants, the input of a professional facilitator skilled in external consultation will be critical.

Set agendas and prepare for stakeholder consultations. Preparation is the key to a successful consultation (Sterne, 1997). Therefore, it is critical that the working group carefully:

- defines the specific objectives of each consultation
- plans the detailed activities to achieve those objectives
- determines the information requirements of the stakeholders
- develops a communication plan

- determines the skills needed by the consultation team
- identifies potential problems in advance and develops strategies to deal with those problems
- prepares meeting agendas and shares them with stakeholders in advance
- and plans the logistics.

As in all steps associated with consultation, the involvement of a professional facilitator having experience consulting external stakeholders will be a key input to these activities.

Conduct stakeholder consultations. The first steps in any consultation will be to provide clarification of the consultation process itself, any necessary background information, and how the stakeholder input will be used. This is an absolute necessity to ensure everyone has a clear understanding of their roles and responsibilities. Having done that it is at this point (in the context of Step 3) where stakeholders will now be given the opportunity to provide input into key issues any indicators must address as well as the indicators themselves. This is a process that must be attentively managed by the consultation team so that a useful outcome is achieved.

Follow-up consultations as necessary. The final step in the consultation process will be to "close the loop" with the participants through the completion of the necessary follow-up activities. This includes preparing a summary of the consultation outcomes and clearly articulating how those outcomes will be used throughout the rest of the process. In addition, this step could include an evaluation of the (now completed) stakeholder consultations by both the participants and the working group.

Expert Input

The specific individuals to include during this step may vary but they will be drawn from the same types of areas as those described in Section 4.2.1.2.

4.2.2.3 Output-Related Elements

As illustrated in Figure 4.3, the primary output of Step 3 in a full-fledged SDI Design Process will be a draft set of sustainable development indicators.

SECTION 5.0
Summary and Conclusions

Since the publication of *Our Common Future* in 1987, the pursuit of sustainable development has become an increasingly important goal for industry. In response to this challenge, the last decade has seen many industry associations and individual organizations initiate programs to help facilitate the transition towards more sustainable ways of doing business. One such organization is Manitoba Hydro, a major Canadian electricity and natural gas utility.

Manitoba Hydro's sustainable development policy states it "will apply the principles of sustainable development in all aspects of its operations to achieve environmentally sound and sustainable economic development." However, like many other organizations, the company is in need of additional feedback mechanisms to effectively measure progress towards these goals. One method it has identified to address these challenges is the creation and implementation of sustainable development indicators. However, before undertaking any indicator development project, Manitoba Hydro feels it is necessary to create a plan for doing so.

With that in mind, the purpose of this research was to develop a Sustainable Development Indicator (SDI) Design Process for Manitoba Hydro. Recognizing the context of every project is unique, the protocol articulates a methodology for the development of indicators at Manitoba Hydro. Although effort was devoted to creating a process suitable for application to all aspects of the company's operations, particular emphasis was devoted to ensuring the process is relevant to the Transmission System.

Building on those concepts, the project was divided into two fundamental phases:

Phase 1: Develop a generic SDI Design Process.

Phase 2: Apply selected steps of the SDI Design Process to Manitoba Hydro's Transmission System.

To ensure those goals were met, a steering committee was formed at the outset of the project. This committee included experts having a diverse set of expertise including experience working with sustainable development, sustainable development indicators,

stakeholder consultation, project management, process improvement, and Manitoba Hydro. The members of the committee were:

- Mr. John Fjeldsted, Manitoba Hydro
- Ms. Tammy Gibson, Manitoba Conservation
- Dr. Daryl McCartney, University of Manitoba
- Mr. Sheldon McLeod, SLMcLeod Consulting
- Mr. Wade Munro, Manitoba Hydro
- Dr. Laszlo Pinter, International Institute for Sustainable Development
- Dr. Caroline Piotrowski, University of Manitoba

Once the steering committee was in place, activities to complete each phase were undertaken. Since there were no known methodologies for the creation of sustainable development indicators particularly suited to the needs of electric utilities, Phase 1 followed a systematic approach to develop a generic process that could be applied to Manitoba Hydro. This included an extensive review of published literature, consultation with the experts identified above, and several critical reviews of draft processes.

Phase 2 focused on applying selected steps of the SDI Design Process created in Phase 1 to the Transmission System at Manitoba Hydro. The completion of this phase involved a review of internal literature and facilitated consultations with internal and external expertise. This not only provided a practical example of how to apply the generic SDI Design Process, but also helped improve the output of Phase 1.

Those procedures ultimately lead to the development of a flexible, six-step SDI Design Process that could be applied to the Transmission System at Manitoba Hydro:

Step 1: Conduct needs assessment.

Step 2: Conduct process planning.

Step 3: Develop a draft set of sustainable development indicators.

Step 4: Test and adjust the indicators.

Step 5: Implement the indicators.

Step 6: Review and improve the indicators.

These steps incorporated the lessons learned from both Phase 1 and Phase 2. Though the relationship between the six steps in the SDI Design Process was illustrated in Figure 4.3, some of the key details are presented below.

Conduct needs assessment. Like all of the subsequent steps in the protocol, this step is itself a process. Activities include monitoring system performance, identifying underlying problems or needs, identifying alternatives to address those needs, evaluating the alternatives, and selecting the preferred alternatives. Should one of the preferred alternatives require the creation or refinement of sustainable development indicators, the rest of the SDI Design Process would be activated.

Conduct process planning. Key sub-steps associated with Step 2 include the identification of the process leader, the formation of a working group, the development of the purpose and scope, and the development of an action plan. Completion of these tasks should prepare the working group to undertake the rest of the SDI Design Process.

Develop a draft set of sustainable development indicators. Some of key components of this step include the identification of key issues, the prioritization of those issues, and the development of the indicators. The involvement of key internal and external stakeholders will be particularly important in this step since the indicators must ultimately address the needs of those who will use them.

Test and adjust indicators. Step 4 includes the confirmation of data availability, the re-evaluation of the proposed set of indicators, the collection and compilation of the relevant data, the analysis and interpretation of that data, and the finalization of a working set of sustainable development indicators. Only after top management has approved the working set of indicators can the next step in the process begin.

Implement indicators. Likely to be the most time consuming aspect of the entire process, this step will require modification so it is appropriate to the specific situation. Nonetheless, some of the decisions to be made here include determining how to communicate the indicators to the interested parties, whether the implementation of the indicators should be immediate or staggered over time, and how to address the challenges to be faced throughout the actual implementation itself.

Review and improve. Finally, this step is an explicit recognition of the fact that no set of sustainable development indicators should be considered permanent. They must

continuously be improved over time to reflect changes in the system they represent as well as changes in the organization's understanding of that system.

Accepting the process outlined above offers Manitoba Hydro a number of potential benefits. These include:

- Providing a framework for the creation of sustainable development indicators at Manitoba Hydro
- Further demonstrating Manitoba Hydro's commitment to the Canadian Electricity Association's Environmental Commitment and Responsibility Program and its own Sustainable Development Policy and Principles

In addition to the direct benefits to Manitoba Hydro, the project offered several academic contributions as well. The most significant of these contributions is providing an example SDI Design Process in the corporate context.

In any case, the creation and implementation of sustainable development indicators at Manitoba Hydro could be achieved by implementing the SDI Design Process detailed in this report. However, to ensure the greatest chance of success for any indicator project, Manitoba Hydro should consider:

- Conducting face validity tests of Steps 1, 4, 5, and 6 of the SDI Design Process
- Revisiting Steps 2 and 3 of the SDI Design Process

Conduct face validity tests of Steps 1, 4, 5, and 6. To prepare for the implementation of the SDI Design Process, Manitoba Hydro will likely find it useful to undertake a face validity test of all steps in the SDI Design Process. Though consultation with internal and external expertise played an important role in the development of the process, the face validity tests would provide Manitoba Hydro with valuable experience in conducting each step. Moreover, as demonstrated in Phase 2, these additional tests may reveal further opportunities to improve the SDI Design Process.

Revisit Steps 2 and 3. Though useful examples of how to apply these steps were presented throughout Section 4.2, broader consultations with internal, and possibly external, expertise should be considered. Since a relatively limited number of Manitoba

Hydro personnel were directly involved in the thesis project, these consultations will help promote understanding of the SDI Design Process and may also lead to the identification of further improvements to the process. As a starting point, Manitoba Hydro should consider the list of internal stakeholders in Table 4.3.

If Manitoba Hydro elects to implement these suggestions, it is important to emphasize that significant time and effort will be required in both the updates to the process and the actual development of the indicators. This was demonstrated in the development of the generic SDI Design Process in Phase 1 and the tests conducted in Phase 2. Furthermore, broad consultations with external stakeholders will be necessary to ensure any set of indicators addresses the issues important to them. A preliminary list of external stakeholders to consider was presented in Table 4.10.

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APPENDIX A

Manitoba Hydro's Sustainable Development Policy and Principles

Manitoba Hydro recognizes that the economy and the environment are mutually dependent. Without a healthy environment, a healthy economy cannot be sustained. And without a healthy economy, there is less wealth to channel into the protection, maintenance, restoration, and rehabilitation of the environment.

In 1993, the Corporation adopted a sustainable development policy to link its responsibilities for supplying electricity, protecting the environment and human health, and contributing to the competitiveness of Manitoba's economy.

The policy and 13 complementary guiding principles are based on the principles and guidelines of sustainable development adopted by the Manitoba Round Table on Environment and Economy.

They represent a guiding influence for Hydro's decisions, actions, and day-to-day operations.

Sustainable Development Policy

Manitoba Hydro will apply the principles of sustainable development in all aspects of its operations to achieve environmentally sound and sustainable economic development. Through its decisions and actions to provide electrical services, the Corporation will endeavour to meet the needs of the present without compromising the ability of future generations to meet their needs.

Sustainable Development Principles

Manitoba Hydro will:

1. Stewardship of the economy and environment

Recognize its responsibility as a caretaker of the economy and the environment for the benefit of present and future generations of Manitobans.

Meet the electricity needs of present and future Manitobans in a manner that ensures the long-term integrity and productivity of our economy, our environment, our natural resources and safeguards our human health.

2. Shared responsibility

Ensure that Manitoba Hydro's employees, contractors, and agents are aware of our sustainable development policies and guiding principles and encourage them to act accordingly.

Encourage the Corporation's employees to share their knowledge of the concepts and practical application of sustainable development.

3. Integration of environmental and economic decisions

Treat technical, economic and environmental factors on the same basis in all corporate decisions, from initial planning to construction to operations to decommissioning and disposal. To the extent practical, include environmental costs in economic and financial analysis.

4. Economic enhancement

Enhance the productive capability and quality of Manitoba's economy and the well-being of Manitobans by providing reliable electrical services at competitive rates.

5. Efficient use of resources

Encourage the development and application of programs and pricing mechanisms for efficient and economic use of electricity by our customers. As well, efficient and economic use of energy and materials will be encouraged throughout all our operations.

6. Prevention and remedy

To the extent practical, anticipate and prevent adverse environmental and economic effects that may be caused by Corporate policies, programs, projects and decisions rather than reacting to and remedying such effects after they have occurred.

Purchase, where practical, environmentally sound products taking into account the lifecycle of the products.

Address adverse environmental effects of Corporate activities that cannot be prevented by:

- First, endeavouring, wherever feasible, to restore the environment to pre-development conditions or developing other beneficial uses through rehabilitation and reclamation
- Second, striving to replace the loss with substitutes that would enhance the environment and/or associated resource uses while offsetting the type of damage experienced
- Third, making monetary payments for compensible damages on a fair, equitable and timely basis.

7. Conservation

To the extent practical, plan, design, build, operate, maintain and decommission Corporate facilities in a manner that protects essential ecological processes and biological diversity.

Give preference, where practical, to projects and operating decisions that use renewable resources or that extend the life of suppliers of nonrenewable resources.

8. Waste minimization

Manage all wastes arising from Corporate activities by:

- First, endeavouring to eliminate or reduce the amount generated
- Second, striving to fully utilize reuse and recycling opportunities
- Third, disposing of remaining wastes in an environmentally sound manner.

9. Access to adequate information

Share relevant information on a timely basis with employees, interested people and governments to promote a greater understanding of Manitoba Hydro's current and planned business activities and to identify impacts associated with the Corporation's plans and operations.

10. Public participation

Provide opportunities for input by potentially affected and interested parties when evaluating development and program alternatives and before deciding on a final course of action.

11. Understanding and respect

Strive to understand and respect differing social and economic views, values, traditions and aspirations when deciding upon or taking action.

12. Scientific and technological information

Research, develop, test and implement technologies, practices and institutions that will make electrical supply and services more efficient, economic and environmentally sound.

13. Global responsibility

Recognize there are no political and jurisdictional boundaries to our environment, and that there is ecological interdependence among provinces and nations.

Consider environmental effects that occur outside Manitoba when planning and deciding on new developments and major modifications to facilities and to methods of operation.

APPENDIX B
Sample Indicators

A copy of the original sample indicators suggested for consideration in the Phase 2 consultations are listed in this section. As noted in Section 4.2.2.1, these indicators were not tested by the participant group. They are presented here merely as an illustration of the types of indicators that might be used as a starting point in the development of sustainable development indicators for Manitoba Hydro's Transmission System.

The indicators are organized according to the conceptual framework of the environment, economy, and society and the key issues identified in Table 4.5.

Environmental Issues and Indicators

- Changes to Habitat
  - Fragmentation Ratios
  - Number of Endangered or Threatened Species with Habitat Effected
  - Fish (see work by the Canadian Electricity Association)

- Increased Access
  - ?

- Vegetation Management Practices
  - KG of Chemicals Used/Total Amount of Electricity Transmitted
  - Not Environmentally Hazardous Chemicals/Total Use of Chemicals
  - Environmentally Benign ROW Management/Total ROW

- Loss of Forest Cover
  - Area of Forest Depletion

- Potential Contamination
  - Discharges to Water
  - Emissions of Ozone Depleting Substances
  - Greenhouse Gas Emissions
  - Spills
  - Effect on Fish

- Public Involvement
  - Number of Customers that Perceive the Transmission System as Environmentally Adapted/Total Number of Customers
  - Degree of Stakeholder Participation in Design of Decision-Making Process
  - Degree of Stakeholder Participation in Decision-Making Process
  - Degree of Stakeholder Participation in Monitoring Progress towards Sustainable Development

- Extent of Aboriginal Participation

Economic Issues and Indicators

- Risk to Livestock

- Cost Issues
  - Profit/MW Transmitted, Total Customers
  - Average Return on Investment
  - Outstanding Debt/Total Value of the Business Unit
  - Trends in Market Share
  - Average Lifespan of Transmission Line
  - Maintenance $/Total Amount of Electricity Generated

- Benefits to Customers and Stakeholders
  - Pricing Relative to Competitors
  - Total Dollars Spent Per Year on Public Education
  - Total Dollars Spent Per Year on Customer Education
  - Compensation Paid to Owners of Expropriated Land (% Market Value)
  - Percentage of Revenue Shared with Effected Communities
  - Jobs Created in Communities Effected by Transmission System
  - Cost of Interruptance Rates/Cost of Regular Rates
  - Increase in Energy Efficiency in Industry
  - Percent Cost Increase Per Year for Manitoba Consumers
  - Contribution to Provincial Economy

- Governance and Management Issues
  - Total Amount of Electricity Transmitted/Labour Used
  - Monetary Value of Total Renumeration to Employees
  - Employee Classification (Temporary, Part-time, Full-time)/Total Employees
  - Number of Hours needed to work to meet Basic Needs by Employee Category
  - Average Income Growth per Employee Classification
  - Average Hours of Training Per Year Per Employee by Category of Employee
  - Investment in Staff Development (Training)/Total Number of Employees
  - Number of Employees Laid Off for Performance Issues/Total Number of Employees
  - Employee Turnover
  - Expenditure on Worker Health and Safety
  - Investment in Alternative Energy
  - Alternative Energy/Total Use of Energy
  - Total Cost of Wasted Product
  - Total Amount of Electricity Transmitted/Waste Generated
  - Waste Recycled/Total Amount of Waste
  - Percentage of Total Budget allocated to Research and Development
  - Expenditure on Environmental Protection
  - Demand/Capacity

- System Reliability
- Export/Total Capacity

Social Issues and Indicators

- Private Property and Land Uses
  - Number of Hectares under Secondary Use/Total Hectares of ROW
  - Number of Hectares of ROW/Number of KM of Transmission Line
  - Number of KM ROW Added Annually/Number of KM ROW Removed Annually
  - KM Multiple Circuit Lines/KM Total Lines
  - Total Amount of Electricity Transmitted/Amount of Land Required
  - Surface Area Reclaimed per Year/Total Surface Area
  - Reduction in Market Value of Property Adjacent to Transmission Lines

- Aesthetics
  - Anxiety
  - Noise Levels
  - Public Perception of Aesthetics

- EMF

- Public Safety
  - Number of Towers Collapsing per Year
  - Fenced Areas, Difficulty in Climbing Towers
  - Number of Public Injuries per Year

- Education
  - Number of Visits to Public Schools
  - Expenditure on Public Education/Person
  - Average Level of Worker Education by Classification

- Equity
  - Average Income of Top 10 Percent/Average Income of Bottom 10 Percent
  - Employee Involvement in Decision-Making
  - Diversity and Opportunity
  - Job Satisfaction
  - Percentage of Revenue Shared with Effected Communities

- Community Relations
  - Corporate Stewardship
    - Participation in voluntary or above compliance level programs
      - EMS
      - Climate change conventions
  - Number of Complaints by Regulators for Violations/Year
  - Total Number of Schools Visited Per Year