

NRTEE Indicators Overview Paper Stakeholder Workshop

March 28, 2001

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1. Purpose and Process of the NRTEE Indicators Initiative

The purpose of the National Round Table on the Environment and the Economy (NRTEE)'s Environment and Sustainable Development Indicators (ESDI) Initiative is to design and test credible and understandable indicators that will track whether today's economic activity is threatening the ability of future generations of Canadians to create their own healthy economy. To accomplish this goal, the indicators will focus on trends related to the stocks of Canada's produced, natural and human capital. The target audience for these indicators is the informed public and decision makers in both the private and public sectors.

The indicators will provide:

- a sense of the overall state of, and trends in, a key set of capital stocks on which Canada's economy depends for future performance; and
- linkages between various types of capital stocks—are we running down one type of capital at the expense of another? And will this affect the long-term sustainability of the economy?

Observing that “we must come to grips with the fact that the current means of measuring progress are inadequate,” the Minister of Finance announced the ESDI Initiative in the 2000 spring budget, stating that these types of indicators “could well have a greater impact on public policy than any other single measure we could introduce.”

Through the ESDI Initiative, the NRTEE is attempting to create Canada's first set of well-recognized national indicators that will tell us about the long-term sustainability of current economic activity. So as to develop indicators that are as clear and credible as possible, the NRTEE suggests that the indicators possess the following characteristics:

- can be plausibly linked to current economic activity in order to help determine whether this activity is sustainable;
- are useful for decision makers, that is, relatively few in number, clear, concise and analytically robust;
- are ready for use in the short term;
- can be easily understood and accepted by a broad cross-section of Canadians;
- focus on tracking trends rather than simply illustrating the current state; and
- are widely available and can be reported on regularly.

The Initiative is being guided by a 30-member Steering Committee comprising representatives of organizations involved in developing indicators of sustainability, academics, government officials and representatives of business and financial organizations. From the outset, the NRTEE has collaborated closely with Statistics Canada, both to build on that department's substantial base of work in this area and to ensure, as much as possible, that the resulting indicators become part of its ongoing work.

A three-phase process has been planned, which will take place over three years:

- **Phase 1—Determine the approach for measuring progress toward sustainable development.** The Steering Committee, with input from stakeholders and the public, will define an overall framework for a national set of sustainable development indicators.
- **Phase 2—Develop specific indicators.** Specific indicators will be defined and gaps in methodology, analysis and data identified. Guided by the Steering Committee, groups of external experts will review proposed indicators and design pilot tests for them. These interdisciplinary groups will draw on the skills and knowledge of various relevant institutions and individuals.
- **Phase 3—Test proposed indicators.** Under the Steering Committee's direction, experts and organizations will test, refine and validate the indicators. Using the results of these pilot tests, they will assess their effectiveness. During this phase, the NRTEE will also raise public and stakeholder awareness about the proposed indicators through publications, workshops, and public events.

A final report will be released at the end of the three-year period that will include recommendations on specific, tested indicators. The report will also include options concerning next steps in promoting, reporting and using the indicators. The federal government has committed to respond to the Initiative's final recommendations regarding the chosen set of sustainable development indicators.

2. Context for the NRTEE's ESDI Initiative

2.1 Why We Need New Indicators

Determining whether society is on a desired course requires both a clear goal and a system that supplies decision makers with the signals they need to make realistic choices. Indicators represent an important part of such a measurement system since they summarize key information about complex systems.

There is widespread agreement that most of the measures society uses to judge success do not take into account the long-term implications of our current actions. In particular, many economic indicators fail to measure the sustainability of those factors on which we depend for continued quality of life, such as the services provided by the environment. For instance, the gross domestic product is simply an aggregate measure of certain types of activities in an economy. It was not designed to act as a summary indicator of the overall progress of a society, but that is often how it is used.

Agreement on the need for indicators that provide a broader picture has led to much groundbreaking work on how to measure progress toward sustainable development. While several of these initiatives are still in the experimental stages, the NRTEE believes that it is now possible to use some of this work to help develop a widely credible set of national indicators that will address the more straightforward aspects of sustainable development. The NRTEE hopes that the release of these indicators will initiate an ongoing discussion on the performance of the indicators, and fully expects this set to be expanded and improved over time.

2.2 Other Sustainable Development Indicator Initiatives

Some of the NRTEE's work on the ESDI Initiative has included surveying a range of international and national approaches to sustainable development indicators. The NRTEE has also engaged and supported a number of the key expert groups and organizations working on these indicators in Canada. The NRTEE's efforts have highlighted the fact that many communities, governments, businesses, international agencies and non-governmental organizations are attempting to develop new means to assess and report on progress toward various aspects of sustainable development. Their work is ongoing and is occurring in Canada and throughout the world.

Different sustainability indicators are designed to achieve different goals. For instance, some indicator initiatives, such as the one spearheaded by the Fraser Basin Council, focus at the regional or community level so as to track the links between the health of residents, the state of indigenous ecosystems and the state of the local economy.

Others are working to evaluate the impact of a wide range of social and environmental factors at the provincial level. This is the goal of two prominent Canadian initiatives—the Alberta Genuine Progress Indicator Accounting Project (Pembina Institute) and the Genuine Progress Index for Nova Scotia (GPI Atlantic).

Some initiatives are international in scope. The World Bank's work on the wealth of nations is based on its version of the "capital model," which is similar to the one on which the NRTEE Initiative's proposed model is based.¹ More recently, the World Economic Forum's Environmental Sustainability Index was created as an exploratory effort to measure overall progress towards environmental sustainability. The index is calculated for 122 countries and includes 67 variables. By amalgamating a broad range of indicators, from levels of urban air pollutants to government corruption, the index allows relative rankings of the environmental progress of different countries.

A few initiatives have a different starting point. Instead of tracking sustainability, initiatives such as the Canadian Policy Research Network's Quality of Life Indicators Project (QOLIP) focus on quality of life or well-being. These initiatives often feature consultation with individuals to see how they assess their own quality of life, and to discuss the broad range of complex factors that contribute to that assessment.

A great many initiatives do not try to cover the entire scope of sustainable development but focus on a particular aspect. Within the federal government, various departments have ongoing initiatives to develop sustainable development indicators related to their own work and their sector responsibilities and mandates. For example, Natural Resources Canada has been developing national sustainable development indicators in the forest, energy and minerals sectors, and the Department of Fisheries and Oceans has been looking at a range of measures to systematize data on widely distributed, complex marine biological resources.

Two federal initiatives are of particular importance to the ESDI Initiative. Statistics Canada's work on environmental and natural resource accounts is among the leading efforts in the world to develop accounts that reflect the changes in "natural capital" and track expenditures related to pollution control. The second program, which received half of the funding provided for indicators in the 2000 federal budget, is the Canadian Information System on the Environment (CISE). Currently based within Environment Canada, CISE has begun work to design and implement an integrated national environmental knowledge and

¹ *Expanding the Measures of Wealth: Indicators of Environmentally Sustainable Development*. Environmentally Sustainable Development Studies and Monograph Series no. 17, Washington, D.C.

information system. The system will address the collection, management, assessment and communication of environmental knowledge required to provide accountability to Canadians with respect to stewardship of the natural environment, and to help them to play effective roles in environmental management and in contributing to public policy. Both of these initiatives will likely form important components of the data and analytic structure that will underlie the ESDI Initiative indicators.

This proliferation of work indicates that there is a substantial demand for new indicators of sustainable development in various contexts and for various reasons. The NRTEE's ESDI Initiative is drawing heavily on many of the methodologies, data sets and approaches already developed. However, the focus of the ESDI Initiative is different from but complementary to this existing work. It is a first attempt to examine the *long-term sustainability of Canada's economic activity*. It is also one of the first at the national level to try to create a set of indicators that will be widely understood and accepted. Finally, much of its work is also linked to creating a set of indicators that are analytically robust and based on a strong data structure.

3. The Proposed Model

3.1 A Capital Model

The NRTEE is recommending a “capital model” for developing a set of indicators of economic sustainability. For the purposes of these indicators, the NRTEE is assuming that the essence of sustainability is the desire to ensure that today's economic activity does not prevent future generations from creating their own healthy economy.

This focus on capital preservation does not imply a static economy. The elements of what constitutes a good life change constantly. One objective of sustainability, therefore, is to allow the current generation to pursue its vision of the good life while ensuring that other generations have equal or greater means and options—adequate capital—to pursue their own goals.

For the purposes of this approach, capital is considered to comprise those assets that sustain our ability to create the wide range of products and services that contribute to human welfare. To maintain economic options for future generations, we need to maintain, among other things, these means of producing products and providing services—our capital—over time. This emphasis on capital thus shifts the focus of indicators from traditional measures of current economic activity, such as gross domestic product, to trends in the use of and investment in the stocks of the different forms of capital.

This model of sustainability requires an expansive view of capital that includes elements that are not traded within the marketplace. For instance, we all rely on basic ecosystem services to provide clean air, water and a stable climate. To reflect this wide range of capital, the NRTEE has recommended developing indicators for three types of capital: produced capital, natural capital and human capital.

Indicators developed according to the NRTEE's proposed approach should thus be able to provide two important things:

- a sense of the overall state of, and trends in, the capital stocks on which the economy depends for current and future performance; and
- linkages between various types of capital stocks—are we running down one type of capital at the expense of another? And will this affect the long-term sustainability of the economy?

3.2 Produced Capital

Produced capital includes machinery, equipment and other durable items used to produce goods and services used by businesses and final consumers.

There are several features of produced capital that are relevant to the development of indicators of sustainability:

- Because produced capital requires other forms of capital to function, indicators should illustrate relative changes in other forms of capital as well. Such illustrations are important to determine, for example, whether produced capital (e.g., machinery) is increasing while natural capital (e.g., oil and mineral deposits) is declining.
- Also, because produced capital deteriorates over time, sustainability requires investment in new produced capital. Indicators should therefore illustrate investment trends.

Produced capital is better understood than other forms of capital, more data are available, and we have more experience with developing indicators for it. Statistics Canada produces annual estimates of produced capital in the National Balance Sheet Accounts.

3.3 Natural Capital

For the purpose of the model being developed by the NRTEE Initiative, natural capital can be divided into three categories: natural resources, land and ecosystems. All are essential to preserving economic options for future generations: natural resources provide the raw materials used in the production of manufactured goods and in the provision of many services; economic activity occurs on land; and ecosystems provide numerous essential services, including the cleansing of fouled air and water, the provision of productive soil, biodiversity and a predictable and relatively stable climate. Like produced capital, natural capital is subject to deterioration from, for example, natural resource extraction, modification of land areas or excessive waste loadings. The deterioration of natural capital, unlike that of produced capital, can be avoided through environmentally sustainable practices.

Indicators would help determine whether stocks of natural resources are declining or degraded to the point where they are no longer able to provide sufficient raw materials for a desired level of economic activity. Similarly, indicators can help provide warning signals if human activities disrupt ecosystem functioning to the point where the services provided by ecosystems decline, or if these activities change land use patterns so significantly as to preclude future economic options.

The measurement of natural capital is not straightforward. Each category of natural capital poses conceptual challenges that will have to be addressed in developing a robust set of indicators for natural capital. For example:

- Only those natural resources that are traded in the market can be readily measured in monetary terms. And it is difficult to ascribe a monetary value to in situ natural resources that are not targeted for consumptive use (e.g., timber or other resources within park boundaries). Thus some natural capital will have to be measured only in physical units (which are the starting point for valuation).
- The measurement of land is not straightforward. Land provides space for economic activity. This is relatively easy to measure. However, land also provides space for terrestrial ecosystems. It is very hard to separate this service (the provision of space) from ecosystems themselves: it is unclear how to measure the

land itself as opposed to the “ecosystem” situated on the land. In turn, this makes it difficult to develop separate indicators for land and ecosystem services.

- Ecosystem services pose even more challenges. It is difficult to observe ecosystem processes and to value ecosystem services; in many cases, we can only observe outcomes (e.g., air and water quality).

Recognizing that more work is required to address these and other issues, the NRTEE has identified various possible topics for natural capital indicators, including:

- commercial renewable resource stocks (monetary value and physical stocks):
 - marine resources
 - timber
- commercial non-renewable resource stocks (monetary value and physical stocks):
 - minerals
 - metals
 - fossil fuels
- agricultural land use supply and demand
- ecosystem service outcomes. Indicators will measure the provision of:
 - air and water quality
 - productive soil
 - biodiversity
 - predictable and stable climate
 - protection from solar radiation
- demand for ecosystem services:
 - renewable resources
 - waste emissions

These areas will be examined next year for the feasibility of developing meaningful national indicators.

3.4 Human Capital

Human capital is generally described as the capabilities or capacities of the working-age population that allow it to work productively with other forms of capital to sustain economic production. The term *human capital* has traditionally applied to education and includes the knowledge and skills that the labour force accumulates through formal educational attainment, training and experience. The concept of human capital can also be applied to the health of the working population (or labour force). Everything else being equal, an experienced and well-educated workforce will be more productive than one with less human capital. It will be more innovative and will work more efficiently. Similarly, a healthy workforce will be more productive than an unhealthy one.

Like produced capital, human capital is susceptible to deterioration. This is partly because workers retire and have to be replaced, but also because knowledge and experience can become obsolete as new technology is

introduced. Therefore, continual investment in the factors that contribute to human capital is required if the economy is to be sustainable.

It is only in recent decades, with the study of productivity, that the notion of human capital has come to the forefront in economics. Due in part to the relative youth of the notion, there exist no official estimates of human capital in Canada (or any other country for that matter) at this time. Education and health statistics, on the other hand, are much more readily available.

The NRTEE has identified the following possible indicators for human capital:

- educational attainment
- literacy and numeracy
- Health-Adjusted Life Expectancy (HALE)
- self-reported overall health status

4. Issues To Be Addressed

4.1 Substitutability

A key issue to be addressed in developing a set of indicators of sustainable development is the extent to which different types of capital are substitutable for one another. If all capital is substitutable, it is not necessary to track different forms of capital separately. All that is relevant is whether the aggregate amount is increasing or declining.

We know that some forms of capital are relatively easily substitutable. In many cases, machines (produced capital) can substitute for labour (human capital). New fuel sources may substitute for oil and gas in the future (one form of natural capital substituting for another). The substitutability of other forms of capital is more controversial. For instance, even where we may suspect that a substitute may be possible in the future, we cannot always predict what the substitute will be or when it will be available at an affordable price.

More compelling, there are examples of natural capital for which no substitute has been found or is likely to be found. These are relatively few in number but extraordinarily important in contributing to economic production. The best examples are global atmospheric systems that control climate and regulate radiation reaching the earth. We know of no way of directly substituting for these systems (sunscreen is *not* a substitute for the ozone layer). If their functioning is reduced, the best we can do is hope to adapt to the changes.

There also exist examples of natural capital for which there may exist some opportunity for substitution but for which not all functions are substitutable. For example, even though we are able to substitute swimming pools (produced capital) for beaches that have become unswimmable, we are aware that beaches serve other purposes than being pleasant settings for weekend fun. We do not fully understand all these other functions, however. Thus degrading beaches up to the point where it is necessary to substitute for them with swimming pools may be unwise even if it allows us to continue to swim in clean (if chlorinated) water. The unforeseen consequences of degrading beaches and then replacing their services with produced capital may return to haunt us in ways that are more costly than finding the means to prevent beaches from becoming polluted in the first place.

The NRTEE suggests that prudence should dictate that there are some types of capital for which substitutions are not possible, most notably the services provided through ecosystems. The NRTEE therefore recommends that the model being developed should:

- illustrate current stocks and projected trends of each type of capital separately, while also identifying linkages that are known to exist; and
- include indicators that track trends for irreplaceable capital.

4.2 A Tiered Approach

Comparability: The NRTEE's proposed approach to indicators also reflects the fact that it may not be possible to develop indicators for each type of capital in the same way. Ideally, indicators would all be comparable. If they all measured the monetary value of a quantity of capital, for example, comparisons and aggregation would be relatively easy. As noted above, however, it will be difficult to develop monetary indicators for all types of capital, as some types (ecosystem services and some forms of natural capital) are not traded in the market. As a result, it is possible that the final indicator set will include a combination of monetary and physical indicators.

Quantification: A second problem is that it will not be possible to develop direct measure estimates of all forms of capital. For example, with respect to ecosystem services, at best it will be possible to include some measure of the outcomes/services provided (e.g., clean air and water).

Thresholds: There do not appear to be any easy ways to deal with the possibility that some forms of capital may have "critical thresholds" whose approach should be accounted for. In some cases, for example, a decline in the quantity or quality of a type of capital may not produce adverse effects until a threshold is passed, beyond which changes occur rapidly. In other cases, thresholds may exist after which adverse consequences become irreversible.

Recognizing that these and other conceptual issues require more work, the NRTEE has recommended that indicators comprise direct measurements of each type of capital as much as possible. These can also be supplemented by:

- observations of outcomes associated with each type of capital; and
- observations of the demand for each type of capital.

5. Next Steps

The next year of the ESDI Initiative will focus on the following activities:

1. **Refining the model.** This will occur through ongoing dialogue among the Steering Committee and through input received at the March 28, 2001, stakeholder workshop.
2. **Defining specific indicators.** The Steering Committee will be assisted by cluster groups of technical experts from various backgrounds. These groups will survey existing indicators work and propose specific indicators based on the capital approach. They will also examine the quality of the underlying data sets and other methodological issues. The focus will be to create indicators that will be ready in the short term, and that will lend themselves to regular reporting.
3. **Asking potential users to provide input concerning the relevance and usefulness of the proposed list of indicators.** This input will be collected through a second stakeholder workshop during which potential users will be asked to examine the proposed indicators to see if they respond to their needs.