

# Sustainable Development

and Canada's next century: Combining environmental protection and economic well-being

by Gayle Aitken and Stephanie Wei

In the past few decades, our society has seen advances in technology, urban development and resource management that have improved the standard of living for most Canadians. But what is the cost to society of this development?

The federal government has commissioned the National Round Table on the Environment and the Economy (NRTEE) to develop environment and sustainable development indicators (ESDI) over the next three years that will promote the integration of environmental considerations into economic decisions.

The engineer's responsibilities in terms of stewardship of the environment includes integrating the principles of environmental protection and long term sustainability into all disciplines of engineering work. This is according to the Canadian Council of Professional Engineer's national *Guideline on the Environment and Sustainability*, a model guideline that PEO Council endorsed in February 2001, on

the recommendation of PEO's Environment Committee. The guideline states: "With ever-growing public awareness and concern over the environment, engineers must, more than ever before, understand environmental issues and the long term impacts of their work."

According to Section 16.2 (entitled "Role of the Engineer with Respect to the Environment") of the PEO *Guideline to Professional Practice*, the engineer's duty to protect the public safety includes the protection and maintenance of the environment and Canada's natural resources, because a healthy environment is essential to public welfare. Understanding the broader implications of engineering practice, including the environmental impact, is recognized as an important element of professional engineering practice.

To shed light on how sustainable development will affect the engineers' duty to protect public safety, *Engineering Dimensions* spoke with Dr. Stuart Smith, who chairs the NRTEE.



**ED:** *Can you explain why NRTEE selected to base the ESDI on tracking stocks of key types of capital—produced, natural and human—that will be needed by future generations to support high quality of life? How will preserving these stocks protect public safety?*

**Dr. Smith:** It is not immediate public safety we are measuring but rather the ability of our economy to sustain itself over the longer term. Obviously, if natural capital were run down so that air and water are no longer cleansed, public safety would be imperilled.

NRTEE's mandate from the federal Minister of Finance in the 2000 Budget was to develop "indicators" of the environment and sustainable development. These are to be seen as lending a long-term context to the Gross Domestic Product (GDP), a statistic that describes current performance but not future prospects. Our primary focus is on "Natural Capital," especially those environmental assets and services that are impossible to replicate or substitute for once they are gone.

Some types of Natural Capital can be substituted for or replaced, especially certain non-renewable natural resources such as metals or coal. Rather than keep those resources in the ground, it could make sense to sell such resources and use the proceeds to invest in other forms of capital. We thought we should track those other forms to make sure that such re-investment was being carried out.

We see sustainable development as an intergeneration equity issue; for example, we should not be living high at the expense of the ability of future generations. By analogy, we should not be consuming the capital represented by nature but should be living on the income. That is why we track stocks as opposed to flows. The analogy (imperfect as it is) is one where stocks are a measure of capital and flows are a kind of consumption.

**ED:** *How will NRTEE's work to develop the indicators improve Canada's ability to deal with existing environmental challenges and predict new ones?*

**Dr. Smith:** It's important to look at the issues of pollution and sustainability of the services that we get from nature. Canada needs to address not just the issue of pollution, but also human settlement and the tendency to move human industrial activities into areas where the ecology will not support it. However, since the spe-

cific indicators are still under development, I can only say the indicators will deal with pollution issues indirectly. More likely, we're going to be looking at stocks—how much forest land we have, how much agricultural land, how many free flowing rivers, how many wetlands. This is important because wetlands and forests clean the air and rivers clean the water. Agricultural soil is obviously responsible for economic growth.

At the end of the day, our indicators are going to be stocks of our existing natural resources or services. Any loss of wetlands and forests will be an indicator that we have to be careful about our assumption that our water will always be there in a clean state. The so-called natural state of water being clean is dependent on a good number of other factors, including forest cover and not having to throw tremendous amounts of chemicals into our agricultural soil to grow anything.

Indirectly, if we're maintaining good agricultural soil and wetlands, chances are we will have abundant fresh water and decent air, although we can still manage to overwhelm all natural goodness with industrial activity that is ill-thought-out. Anti-pollution legislation, I think, is a separate issue with which we have to deal.

When the Minister of Finance reports to us Canadians about the health of the economy, the indicators will enable him also to tell us what's being left for future generations. That's our main point.

**ED:** *NRTEE has identified that our quality of life will be increasingly linked to the quality of our environment and that our economy cannot prosper in the absence of a healthy environment. What is your view of the public perception on whether taking care of the environment is an investment in the economy?*

**Dr. Smith:** I think the public strongly supports taking care of the environment as an investment in health and aesthetics or surroundings. But whether they see sustaining the environment as an investment in the economy is a good question. I don't think they do. I think if you can show the public the win-win of efficiency, that if you use less energy, you'll pollute less and you'll also save more money, then they certainly understand that one. I'm not sure they see, for example, that if we introduce new technology to improve the environment, that that technology would have a market around the world and we could benefit. I'm also not sure that they see that if we have to spend the money to clean up after the fact, it's going to cost our economy a heck of a lot more than it would if we didn't ruin the environment in the first place.

**ED:** *From your experience managing companies that have a large engineering component, such as Philip Utilities Management and Ensyn*



*Technologies, are sustainable development indicators a consideration that is relevant only to certain disciplines of engineers, such as those involved with water projects, or can they be useful to all engineers?*

**Dr. Smith:** Naturally, it is more important for engineers whose works have a direct impact on the natural environment to be up to date on such concepts as sustainable development. That is a pretty broad group, however, and includes anyone dealing with water, combustion, resource exploitation, agriculture, urban development, transportation and electricity, just to name a few. Furthermore, the “environment” with respect to sustainable development is increasingly being taken to include the social and cultural circumstances that can be affected by a project or development. It is hard to think of any engineer that would be excluded from responsibility in that regard.

**ED:** *When the Ontario Professional Engineers Act was changed in the 1930s to protect the right to practise so that engineers would protect public safety, the major concern of the government was personal injury due to collapsing structures, such as bridges or buildings. Then, engineers had a very different job than they do today. In the last century, most engineering was concerned with greenfield development and building up the infrastructure from scratch. In this century, engineers need to be concerned with greater complexities, including redevelopment on original property and brownfields; transportation gridlock; green building design and energy efficiency. What does the engineering profession need to look at to make sure that the engineering licence remains relevant in the future as we try to deal with these issues?*

**Dr. Smith:** Engineering has gone very far into various specialties now: hydraulics, mechanics, electronics, electrical and chemical. There is now such a vast array of specialties within engineering going way beyond concepts that are applicable to civil engineering that, plainly, safety of the public and the long-term safety of the planet will be looked at differently in each of those specialties.

If you're a chemical engineer, obviously, you're going to have to be dealing with issues of pollution pretty directly. If you're a biochemical engineer, you're going to be dealing with issues of genetic modification and whether these are properly investigated before release and so on. If you're a hydraulics engineer, again you're going to be dealing with the impact of trying to move water from one place to another, shift streams or rivers or whatever, the impact on wetlands; one could go on.

As far as the public and policy makers are concerned, there are many more ways today that engineers have to be experts in order to protect us. Many of these specialized areas require expertise that is very different from what civil engineers do, important as that is. Many of these new areas of engineering work are part and parcel of the sustainable development issue.

If you are going to engineer a pipeline in the Northwest Territories, you need to think about the impact of the pipeline on caribou herds. There are people who depend on the caribou for not only their livelihood, but also for their way of life. It's not just a matter of saying “Oh, we'll airlift some other food from a grocery store.” It's their way of life! You need to know where the caribou herd is and know how to deal with it. You can't just say, “It's just a few caribou, forget about it; the oil or natural gas is more important.”

The engineers who are designing a natural gas pipeline will find that they're not going to get very far if they're not dealing with some basic local questions. These questions include: Does the project provide employment for the people in the area? Will the project help schools? Will there be training for the people who live there? Will there be an impact on the natural flow of waters? Will there be an impact on the caribou herds? All of these considerations show how the concepts of sustainable development are absolutely crucial to engineering.

As an electronics engineer, you might say, “I'm just sitting here working on computers.” That might be true. However, when you take certain considerations into account, it becomes a matter of understanding the impact of what you've designed, irrespective of whether what you've designed requires you to specifically cut a tree down or dig up a mineral.

There is a wide variety of issues associated with sustainable development. The majority of engineers will at some point in their careers be required to prepare submissions, pass some kind of assessment, or appear in front of some kind of tribunal. For example, the engineers designing diamond mines in the Northwest Territories have to work with a group of about 48 band chiefs, and make sure that they're happy, or they're not going to be able to mine any diamonds. One way or another, [engineers] have to take sustainable development issues into account because they have to deal with the social impact or the environmental aspects of the work that they do.

**ED:** *How can engineers use NRTEE's environmental and economic sustainable development indicators to contribute to the stewardship of sustainable infrastructure development and help protect the public interest?*

**Dr. Smith:** I think it would be fair to say that the indicators will be at too “macro” a level to be of help to individual engineers working on specific projects. The other work of the NRTEE, however, would be directly relevant to engineers since our Round Table deals with many current issues in sustainable development and approaches these with a balanced, multi-stakeholder approach. By keeping abreast of our reports and projects, engineers will find themselves in possession of the latest ideas on sustainable development and their possible incorporation into public policy. ❖

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Dr. Stuart Smith, who chairs the National Round Table on the Environment and the Economy (NRTEE), will be the keynote speaker at the PEO Environment Committee's sustainable development seminar on March 6, 2002. For more information about NRTEE visit the website at [www.nrtee-trnee.ca](http://www.nrtee-trnee.ca).

Smith graduated in medicine from McGill University and was a professor of psychiatry at McMaster University Medical School in Hamilton for eight years. Smith is now a senior advisor at ICF Consulting Inc. and is chairman of Ensyn Technologies Inc. Smith chaired the Science Council of Canada from 1982 to 1987. He was also leader of the Ontario Liberal party from 1976 to 1982, and Ontario's leader of the opposition from 1977 to 1982.

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