

Big picture, best practices

by Cam Vatandoust, P.Eng.

With pollution, global warming and endangered wildlife on the rise, governments have muscled up environmental protection law. Now, more than ever, engineers play a significant role in safeguarding the future.

One of the integral roles of any government is to protect the public's health and safety. Research, standards development, setting guidelines through legislation, enforcement, and performance measures, and monitoring all add up to better protection.

Public health and safety is a vast arena of practice that affects us as professional engineers. Whether working for the public sector to research and develop these guidelines, or working to meet and exceed the standards in the private sector, today's professional engineer has been entrusted with the task of protecting the public's health and safety.

Human impact

In recent decades, we have realized that our planet is a matrix of countless microecosystems in constant interaction with one another. Millions of years of evolution have caused our planet to be in perfect balance with all its systems living in harmony. But our development of technology, coupled with our expansive population growth in the last century, has placed huge demands on the planet's natural resources—putting this delicate equilibrium at risk.

We have seen drastic changes in recent years on our planet, such as ozone depletion, global warming, endangered fish and wildlife populations, and rising levels of air and water pollution. We have tried to slow these changes or reduce their effects. The role of government is defined by the demands and expectations of its citizens and, historically, our society has demanded that regulations be put in place to protect our society and its ecosystems. New standards and guidelines have been put in place. As professional engineers, regardless of our area of practice, each of us is faced with the challenge of meeting and exceeding these guidelines every day.

Changing practice

Recent trends in increased environmental regulations, monitoring and reporting in Ontario have changed the practice of professional engineering in two basic ways.

First, demand has increased for senior scientists and engineers in specialized fields of practice, such as research and development. Since the primary step in introducing any new regulation, or modifying existing environmental criteria, is to gather data and study trends, the need for well-qualified professional engineers has increased.

Second, as a result of new regulations and compliance monitoring, a new field of practice has emerged in which the professional engineer essentially acts as a third-party auditor. The primary role of the practitioner here is to interpret the new regulations and ensure compliance. Some of the new environmental initiatives, for the time being, only require reporting of existing data to establish trends within the industry, such as air emissions reporting and monitoring. This requirement allows professional engineers to work together with private sector companies to put long-term compliance philosophies and procedures in place to reduce end-of-pipe environmental effects.

Holistic approach

The most important driving factor for new and revised guidelines has been the public's demand to live in a safe environment. Traditionally, these environmental regulations have been set based on the specific needs in a specific economic sector—each sector as a separate entity with its own challenges, driving factors, and its own exclusive adverse environmental effects.

However, this traditional viewpoint has overlooked the fact that the environment that surrounds us is an interconnected living system; changes in one area affect other areas. For instance, with technological advances in data collection and monitoring, we now know that the source of most of the pollution in the Great Lakes freshwater system is air contaminants.



Recognition of this fact is the single most important aspect in establishing guidelines that are achievable and result in positive, long-term environmental change.

As we learn more about our environment and the ecosystems around us, we begin to appreciate the complex web of interaction and energy exchange among these separate, yet interdependent systems. Adopting this understanding into developing environmental guidelines and regulations means that we must consider that all systems are a part of one single living organism. For example, we cannot consider nutri-

Beefing up environmental protection

Laws for better health and safety

In Ontario, over the last few years, a number of specific environmental regulations have come into effect, some of which are as follows:

Nutrient Management Act

Provides province-wide standards that address the effects of agricultural practices on the environment, especially land-applied materials containing nutrients.

Safe Drinking Water Act

Expands on existing policies and introduces new features to protect the public by setting specific requirements for the treatment and distribution of drinking water.

Ontario's Drive Clean

Sets mandatory vehicle emissions testing procedures and regulations to reduce the level of smog in urban communities.

Hazardous Waste Information Network

Electronic manifest system to allow generators, carriers, and receivers to register their

activities to enhance quality and accessibility of information.

Pesticide Act

Includes regulatory changes to increase education requirements for exterminator licences; improves requirements for recycling pesticide containers and modernizes fumigation requirements.

Ontario Landfill Standards

Applies to new or expanding landfill sites relating to design, operation, closure and financing.

Waste Diversion Act

Gives Waste Diversion Ontario the mandate to develop and implement waste diversion programs to reduce, reuse, or recycle waste.

Airborne Contaminant Discharge—Monitoring and Reporting

This regulation applies to all industrial, commercial, institutional and municipal emitters to track and reduce air emissions.

The Ontario Emissions Trading Registry

Emissions reduction trading is a supplementary tool that provides broad incentives to reduce air emissions in all industrial sectors.

Sustainable Water and Sewage Systems Act

Helps ensure clean, safe drinking water for Ontario residents by making it mandatory for municipalities to assess and recover the full costs of water and sewage services.



ent management guidelines separately from drinking water standards and our policies on air pollutants and landfill standards are not separate from management of our freshwater ecosystems. Acknowledgment of this interdependency is increasing around the world, translating into significant guidelines that consider all of the different interdependent systems in our environment.

The quality factor

Advanced countries at the leading edge of sustainable development and environmental protection are beginning to focus on another aspect of society: quality of

life for people. Examples include providing more people-friendly greenspace development, designing economically sustainable urban communities, reducing noise pollution and improving indoor air quality. The challenge for today's engineer is to work toward compliance with regulations to improve health, safety and the quality of life of our citizens.

In 2001, the Ontario government published *Managing the Environment: A Review of Best Practices*, a comprehensive report that considers all practices in Ontario and how they can be improved. The report includes an independent review

of best practices used by other jurisdictions to meet their current environmental challenges and execute their various management responsibilities.

Managing the Environment: A Review of Best Practices is perhaps the single, most important publication available because it recognizes that the "big-picture" approach should be adopted in instances of new and ongoing problems over large jurisdictions. All environmental issues and compliance challenges are dependent on common factors.

To that end, the report explores current regulations, and how procedures to

enforce and adopt new guidelines can be improved by discussing a number of these critical factors.

Practical measures

Developing successful policies depends on understanding the challenges related to compliance monitoring and setting appropriate performance measures. In order for these regulations to succeed in the long term, they must consider surrounding communities and regions. Many of our watersheds run into other regions and jurisdictions. What we do in Ontario will affect the communities well beyond our own borders.

Stakeholder buy-in: Consultation with stakeholders is a critical factor in achieving long-term success. The general population, industrial sectors and other organizations must be consulted before demanding compliance with stringent standards. This is especially critical when considering specific economic sectors, such as the automotive industry. In fact, voluntary compliance often pays off in the long run much better than forced monitoring. In cases where our choices may affect other regions and jurisdictions, representatives from those jurisdictions should also be consulted. Much can be gained from consid-

mation among stakeholders and help provide the means for the industrial sectors to meet compliance deadlines. The Internet, for example, can be used to transfer information among the interested public, to publish relevant documentation and background data relating to a specific regulation and offer a medium for the public and industry to provide feedback.

Shared responsibility: Voluntary response is easier to achieve than monitored compliance. We must cultivate the sense of responsibility of the industrial sectors and their associations to our advantage in setting compliance criteria. Economic incentives and industrial partnerships promote the sense of duty to the environment and to the public's health and safety. Another method to share responsibility is to use innovation and advanced technologies to help smaller companies compete with much larger multinationals.

Managing results: It is very important to manage the information obtained through compliance monitoring and the corresponding performance measures for each sector of the economy. Often this data has the tendency to be "filed away." The information should be used to continuously review progress by measuring it against cer-

"big-picture" state of affairs. Most remedies in this case will not have a significant effect because they



ignore other contributing factors. Second, this reactionary mode does not take into

account the long-term goals of our environmental policy. It is a patchwork remedy to a much bigger problem. Long-term goals are important because through them we can set our performance measures and assess our achievements.



What does this all mean for the practitioner? The professional engineer of today must be well versed in finding practical alternatives to traditional ways of thinking. As engineers, we have been entrusted with the public's health and safety. Our old ways of thinking no longer suffice. We must be willing to consider the "big-picture" alternatives and deduce the best possible solutions that satisfy our public's health and safety and its demand for a healthy environment, while maintaining our prosperous economy and diverse industrial sectors.

All these transformations have put the profession in a delicate position. We can either take on all these responsibilities and continue to fulfill our role as the public's trustees, or fall behind in adopting proper training in these prominent changes and global trends in ways of thinking for the future. Our vision must be world encompassing in that we must see our local environment as a part of a much larger living organism, and we must be obligated to continually strive for insightful gradual progression toward sustainability in our choices and decisions every day. ❖

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ering successful initiatives implemented by neighbouring regions.

The big picture: Despite their intentions, all regulations can be considered as roadblocks to industry. It is critical that the government adopt a "big-picture" vision of all industrial factors and how each may be affected by new and revised regulations. In certain cases where the regulation affects a specific group of stakeholders, that group should be considered a part of this greater vision toward environmental protection.

High-tech advantage: Our lives continue to be transformed by technology. We must use this technology to distribute infor-

tain goals. In cases of environmental guidelines and regulations, this is critical because so often the desired goal is a moving target that is phased in over several years.

Modern mindset

Our mindset in meeting our environmental challenges forms the basis—and is the most important part—for arriving at our proposed solutions. Historically, we have adopted a reactionary mode where-by regulations are set based on public reaction to a negative environmental condition. This approach is not sustainable for two reasons: First, it does not consider the