



PROFESSION PONDERES ITS ROLE IN CLIMATE CHANGE DEBATE

By Michael Mastromatteo



Although an engineering regulator can't choose sides in evaluating global warming science, individual members have strong feelings on the question. For a profession eternally challenged with developing technological fluency, the climate change issue could be a watershed moment.

Who would suspect that a chemical compound as common and seemingly innocuous as carbon dioxide would generate such gales of contention? But there it is. Climate change has become a social, environmental and political issue that promises only to expand.

If the letters to the editor of this publication are any indication, professional engineers are concerned with climate change and global warming, but some question the urgency with which its most vocal adherents would have political leaders respond.

For every mention of the dire consequences of a do-nothing or business-as-usual policy about greenhouse gas buildup and global warming, other voices prick holes in climate change science, and tell of the overtly political and economic motives in sounding the global warming alarm bells. The Kyoto Accord, an international agreement designed to reduce CO₂ emissions, is the most telling example. It has been described as everything from a huge exercise of tilting at windmills to a symbolic, but imperative, ultra-national measure to reverse a catastrophic climate trend.

GREAT DEBATE

Whatever one's take on the issue, anthropogenic global warming due to carbon dioxide concentrations in the atmosphere has all the makings of a great debate. Consider, for example, the chilling words of British journalist and climate change researcher George Monbiot who, in his 2006 work *Heat: How to Stop the Planet from Burning*, reported: "The campaign against climate change is an odd one. Unlike almost all public protests which have preceded it, it is a campaign not for abundance but for austerity. It is a campaign not for more freedom, but for less. Strangest of all, it is a campaign not just against other people, but against ourselves."

Or consider the advice of Australian environmental activist Tim Flannery, whose 2005 book *The Weather Makers: The History & Future Impact of Climate Change* pulls no environmental punches. "We have seen that human health, water and food security are now under threat from the modest amount of climate change that has already occurred. If humans pursue a business as usual course for the first half of this century, I believe the collapse of civilization due to climate change becomes inevitable."

Flannery, incidentally, was a guest speaker at the April conference of the Industrial Accident Preven-

tion Association (IAPA) in Toronto. He used the platform to expand on his generally dire viewpoint.

Balancing the environmentalist view in the confused and, occasionally polarized, public imagination are works such as *Cool It: The Skeptical Environmentalist's Guide to Global Warming* (2007) by Danish researcher Bjorn Lomborg. Although Lomborg accepts that anthropogenic CO₂ buildup is a problem, he believes it is well down the list of the most urgent environmental, social or global priorities.

"When we talk about global warming, we seem obsessed with regulating just one parameter—namely, CO₂," says Lomborg. "But while turning down the CO₂ knob may be part of the solution, surely our primary concern ought to be to advance human and environmental well-being the most, where many other knobs are in play.... Policies reducing the total problem [malnutrition, disease, poverty, etc.] will benefit many more people than policies that only reduce the small additional part caused by global warming."

MORAL PROBLEM?

Lomborg raises more hackles by referring to the "moral problem" of climate change doomsayers. "[They] mean well," Lomborg says, "but by almost expropriating the public agenda, trying to address the hardest problem, with the highest price tag and the least chance of success, [they] leave little space, attention, and money for smarter and more realistic solutions."

Lomborg's claim that CO₂ buildup is not the most urgent global concern has left him open to charges of environmental heresy. Nonetheless, his criticism of the Kyoto Accord and related carbon dioxide reduction schemes speak in many ways to the difficulties of developing sound environmental policy, which to engineers in the global warming debate, is especially salient.

Lomborg's "smarter and more realistic solutions" are especially inviting words to professional engineers. As the custodians of technology, engineers have a professional duty to assess the real implications of global warming and to help develop solutions that best address the problems. It's a challenge that a profession eager to bring its influence to bear in a policy-making realm might want to embrace with enthusiasm.

Although some engineers have criticized the Kyoto Accord and related CO₂ abatement schemes as unfair and unworkable, there appears to be growing consensus that global warming must be dealt with at many

levels. Indeed, engineers now appear to recognize global warming and climate change as issues having some impact on the profession as a whole.

From energy efficiencies, to decarbonization, to research into geoengineering solutions that would impact on solar light and heat entering the atmosphere, engineers are being invited to strut their hour on the global warming stage. And most hope whatever sound and fury they voice will signify important things.

In their *National Guideline on the Environment and Sustainability*, for example, Engineers Canada describes climate change as a recognized phenomenon that bears watching, especially for civil engineers and those involved in infrastructure-related projects.

“Whether the observed changes in climate are caused by humankind or are due to natural causes, these changes can have significant effects on engineered structures,” the report says. “In the worst case, inadequate design could present a significant risk to the safety of the public, who depend on these structures and systems. The professional engineer should stay apprised of climate change developments and apply reasonable improvements to the systems and structures that they design in order to accommodate these changes.”

In a 2005 *Engineering Dimensions* article about climate change and engineering practice, David Lapp, P.Eng., manager, professional practice, Engineers Canada, suggests it’s time for engineers to move beyond the why and how of climate change, and begin incorporating mitigation and adaptation strategies into engineering practice (March/April 2005, p. 51).

Similarly, the Canadian Academy of Engineering, in its *Energy and Climate Change* paper (2002) found that a majority of scientists agree the climate has already been affected by human activity since the beginning of the Industrial Revolution. As such, the report says, “a wait and see attitude is not acceptable for evaluating definitive climate changes, and hence for developing an energy strategy capable of coping with changing circumstances.”

The Canadian Standards Association (CSA), meanwhile, has been measuring not only the depth of engineers’ climate change knowledge, but also its potential impact on engineering practice.

As well, Natural Resources Canada, in its study of Canada’s ability to adapt to climate change indicators, found that global warming presents significant challenges to the engineering community.

In its report, *From Impacts to Adaptation: Canada in a Changing Climate 2007*, Natural Resources Canada found: “it can no longer be assumed that historic variability in climate and climate-related parameters adequately define the range of conditions needed to guide infrastructure design and maintenance. While greatest attention is given to the frequency and magnitude of extreme climate events, sea level rise, permafrost degradation, reduced seasonal ice cover, increased air and water temperatures, reduced soil moisture and many other changes will impact infrastructure and industrial operations.... Examples of innovative engineering adaptations to address climate changes already exist, and can provide a basis for the dialogue needed to see that adaptation is achieved in a proactive manner.”

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WHAT DOES IT MEAN TO P.ENGs?

With so many voices weighing in, emerging questions centre on what climate change really means to engineers, and what regulatory associations should do.

The Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) is moving forward on the climate change issue. In February 2008, APEGGA released results of a membership survey on climate change. The survey found that virtually 100 per cent of 1100 respondents agree the climate is changing, but there is no firm consensus as to the exact causes.

In a report to APEGGA’s governing council, the association’s Environmental Committee discussed regulator responses to global warming concerns. “The preferred roles for APEGGA,” the committee says, “are to support scientifically informed debate, provide education to members, and provide technical/policy advice to government. The preferred topics at professional development sessions are energy efficiency, renewable energy, and climate change science.”

Glenn Sorokan, P.Eng., assistant director, professional practice, APEGGA, told *Engineering Dimensions* climate change remains an important issue for Alberta’s engineers. “We will be uploading a climate change

article on our website inviting our membership (and others) to comment and to submit papers or their thoughts on the issues," he said. "We have been receiving a large number of letters to the editor [for *The PEGG*, APEGGA's magazine] on the topic of climate change."

He added that while APEGGA cannot come down in favour of any one viewpoint, it is well within its purview to foster member engagement and further debate about climate change and global warming.

The Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) has also taken up the climate change issue with members.

"We've been doing a lot of work in this area," says Janet Sinclair, director of communications and engagement. "While we have a number of members who aren't convinced climate change is an issue, we also have a lot of members who are convinced."

Sinclair reports the BC association recently struck a Climate Change Task Force, to provide a report to council on activities that APEGBC can undertake to help members adapt their practices to mitigate climate change.

"We've run a number of professional development sessions on sustainable practice and have done a few articles in our association magazine," Sinclair adds. "We've also done sessions on the topic at our annual conference. In October 2009, the BC government climate change secretariat will be one of our keynote speakers."

In Quebec, the Ordre des ingénieurs du Québec (OIQ) has also encouraged members to pay heed to climate change as a practice issue. The Quebec regulator in 2006 pledged to ensure its members become more aware of climate change and its potential impact on practice. The regulator also challenged itself to provide information, tools and methods to members to assist them in understanding the variability of climate change in their work.

Like other provincial regulators, PEO has not taken an official position on climate change, but it is monitoring member opinions through its official publication and its online members' forum.

Nonetheless, providing information into practice dimensions of climate change remains a

legitimate regulatory concern. To that end, PEO continues to monitor proposed legislation on issues related to climate change, energy conservation and global warming.

Ontario's proposed *Green Energy Act*, for example, was the subject of an April 14 town hall meeting organized by PEO's Algoma Chapter. The province has touted the *Green Energy Act* as one way of combating climate change, protecting the environment and fostering Ontario's economic competitiveness.

In addition to the Algoma initiative, the Mississauga Chapter, in conjunction with PEO's new Ontario Centre for Engineering and Public Policy (OCEPP), is planning a similar public town hall meeting and has invited George Smitherman, minister of energy and infrastructure, to speak.

OCEPP is also considering a joint effort with Carleton University to organize a fall 2009 conference on sustainable energy.

Meanwhile, the Ontario Society for Professional Engineers (OSPE), the advocacy organization for the province's engineering profession, has fully embraced the global warming challenge.

At the June 2007 OSPE board of directors' meeting, board members approved the adoption of climate change as an issue for OSPE to advocate for on behalf of the engineering profession. A climate change task force was established in November 2007, with Sudbury engineer Nadine Miller, P.Eng., named as chair.

ENGAGING THE PROFESSION

In a March 4 interview with *Engineering Dimensions*, Miller said the task force's mandate is not to debate climate change theory, but promote the engagement of professional engineers in developing climate change solutions. One of the task force's first functions was to organize the October 2008 Engineering in a Climate of Change conference at the Ontario Science Centre.

Keynote speaker at the conference was Ron Prinn, PhD, professor of atmospheric science at the Massachusetts Institute of Technology. Prinn outlined probabilities in arresting global warming based on aggressive, moderate and passive responses. He suggested a key role of professional engineers in any

geoengineered efforts is to slow the rate of global warming to allow the climate to adjust to more benign levels of atmospheric CO₂ concentration.

“We’re essentially working to ensure the voice of engineers is heard at different levels of government, industry and in universities,” Miller said. “I think, as a profession, we’ve agreed a problem exists and that it’s time to bring the prestige of engineers to the table in helping draft workable solutions.”

In a “topic summary” released after the October conference, OSPE allied itself with the City of Toronto’s Ahead of the Storm climate change adaptation strategy.

“It [the City of Toronto plan] captures the day-to-day effects of climate change on the overall well-being of a lake-side community and offers a range of short-, medium- and long-term strategies for policy implementation,” the OSPE summary says. “Most importantly, it recognizes that jurisdictions must integrate climate considerations into all aspects of its operations. As other jurisdictions follow this model, they can count on engineers to offer sound technical advice and act as key interlocutors between scientific researchers, industry leaders and policy-makers.”

Engineers contacted by *Engineering Dimensions* support the view that it’s unhelpful for engineers to haggle over the exact causes of climate change and global warming.

Darren Swanson, P.Eng. (Manitoba), senior project manager for the Winnipeg-based International Institute for Sustainable Development (IISD), is a policy-directed engineer who believes uncertainties in climate change science are no excuse for inaction.

The IISD was established in 1990 as a not-for-profit organization dedicated to research, networking and communications into sustainability issues.

Swanson says it’s difficult for climate change scientists to make precise, long-term predictions due to the complexity of systems at work in the global environment. Nevertheless, he says, a number of issues are beyond dispute. Among these are that the debate about the reality of climate change is essentially settled, and that data from the “climate past” can no longer accurately predict the climate future.

Swanson says engineers should commit themselves to the dual challenge of mitigation and adaptation in response to global warming. He says ongoing research into energy efficiency and “decarbonization” is the most suitable course of action for P.Engs.

“There are always people in every sector who can write a letter and doubt whether climate change and global warming are occurring, but I say in my pre-

sentations that the debate is over, basing on a number of things, such as surveys of scientific professionals,” Swanson says. “The vast majority are saying the climate is changing and it is more than likely attributable to human action. There is not a debate in the scientific community for all intents and purposes. We’ve done that.”

John Boyd, P.Eng., president, International Federation of Consulting Engineers, is scheduled to present at the Engineering Institute of Canada’s climate change technology conference, May 12-15 at McMaster University in Hamilton. Although not a climate change authority, Boyd says the engineering profession has little choice now but to become involved in the global warming debate.

“Engineers are implicated in the climate change issue and will have a key part to play in any successful solution,” Boyd says, “and probably in a manner that changes the way we carry out our work. At present, we are ill-equipped to tackle the challenges represented by this issue and it is likely that becoming better equipped will require us to work more aggressively with politicians and with the general public than we have in the past. To address this issue, we need to begin with ourselves—to put together some of the tools that will be necessary but, perhaps first and foremost, to change our own attitudes so that this issue begins to drive the profession’s activities.”

Boyd suggests there is some onus on professional engineers to accept the climate has been changed by the cumulative effects of humankind’s activities over the past century. “Anything we do now should be intended to reverse the process,” Boyd says. “By definition, therefore, we are actually engaged in an attempt to engineer a better climate for the world of the future than the one that we think faces us based on our current understanding.”

Greg Evans, PhD, P.Eng., a professor at the University of Toronto (U of T) and a member of its Centre for Global Change Science, agrees it’s time for engineers and other professionals to accept the legitimacy of climate change science and to move forward with adaptation and mitigation strategies.

HOW MUCH CERTAINTY IS NEEDED?

“The current level of scientific understanding of the issue justifies prompt action right now,” Evans told *Engineering Dimensions* in a March 2009 interview. “We have to ask ourselves how much absolute certainty we need before we try to proceed with some remedial action.”

Evans encourages ongoing debate and discussion as to the best use of technology and engineering expertise in responding to the global warming challenge, but he has little patience for those who argue that unreliability of climate modeling justifies inaction.

Similarly, Danny Harvey, PhD, professor of geography, U of T, is intolerant of those seeking to poke holes in the underlying science.

Harvey, whose personal experience with global warming in the 1970s led to a career path change, says the debunkers are ill-informed on a number of levels. "Climate modeling is not in its infancy, as all the accepted results were already well-established in the 1970s," he says. "The most important results do not entirely depend on climate models anyway, but either are intuitively expected and easy to understand, and/or can be confirmed through approaches that do not depend on climate models."

Like Evans, Harvey is one of several U of T-based professionals involved with the school's global change centre.

Harvey came to the defence of the United Nations International Panel on Climate Change (IPCC), which is cited as the ultimate authority on climate change science. Some critics have argued the IPCC fudges its data and that it operates under a political, rather than purely scientific mandate.

"Due to its consensus-driven process, the IPCC tends to minimize risks," Harvey says, adding that it's near negligent for scientists and engineers to hold off

on developing global warming solutions because of perceived vagaries in climate science.

Despite lingering doubt as to the exact causes of global warming, there is more and more evidence that climate change simply cannot be dismissed by professional engineers. As well, attitudes about global warming, the Kyoto Accord and related topics are often shaped by which sources of information are used. For a profession struggling with its moral obligation to use technology for the greater public good, engineers might want to consider developing their own fluency in the wider climate change debate. In this case, much depends on where individuals turn for information and research.

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SCIENCE SETTLED

So is the climate change debate really settled? Most agree the science is settled, but the response to the problem is not. As the profession ponders the relevance of its licence, its impact on positive public policy development and its commitment to the public good, it will be continually called on to help evaluate the best response to climate change and global warming.

Says Bryan Karney, PhD, P.Eng., U of T civil engineering professor and an advisor on how engineers might better impact the public policy realm, there is enough incentive now to go forward.

"I would agree there is still a lot to learn about the climate, and the system is staggeringly complex," he says. "Lots of the relations are indeed hard to model. However, there is no doubt in my mind that the understanding of these processes will be refined and gradually improved, not 'falsified and replaced,' as some imply." Σ

