Keynote speaker

Is Canadian Research and Innovation Meeting Resource Sector Needs?

John McDougall, President, National Research Council of Canada

Jeffrey Crelinsten introduced McDougall by pointing out that while he has become well known for his work with NRC over the last five years, he came to that position with some 30 years' worth of experience in the natural resources sector, including stints as a petroleum engineer at Imperial Oil and then as a consultant specializing in large energy infrastructure and technology projects.

McDougall began by noting that NRC marks its centennial next year. "Our role and mandate has always been research and development to help the country grow," he said, after noting the ways in which that mandate has mirrored the evolution of the national economy — fundamental transportation and building materials early in the 20th century, military technologies during the war years, high technology near the end of the century, and the emergence of what he dubbed the "bio-economy" or a bio-mimicking economy in the 21st century. With that progression in mind, McDougall referred to the latest consideration of the NRC values over the last few years, which has put a fresh emphasis on the organization's impact, focusing on customers, and being accountable for one's actions, becoming a leader in one's work, transparency, and collaboration.

He also listed four lines of NRC business activity. Two are internally driven: strategic R&D and technical services. Two others are externally directed: the Industrial Research Assistance Program and science infrastructure services. These fall into three distinct areas with different scopes: engineering (working with existing companies over a 3-5 year time frame), life sciences (working with emergent companies over a 5-15 year time frame), and emerging technologies (entirely new platforms over a 10-30 year time frame).

With regard to natural resources, McDougall portrayed the animating factor of this sector as people. "People need to eat, they need places to live, they need energy to do the things they do, they need other resources so they can manufacture and put products together," he said. Much of this activity remained constant throughout human history, until the unprecedented surge in population during the 20th century. This increase has been reflected by a similarly large growth in the demand for natural resources, especially in the developing world where most of this growth is occurring.

Accompanying this growth, he added, is a desire for increasing prosperity, one that is further enhanced as communications technologies enable people with less to see what they are missing. "However, having said all that, the earth isn't running out of resources. We're loaded with resources. We're very richly endowed with resources, actually — energy, minerals, biomass." Technology has enabled us to make better use of these resources, but other challenges have arisen as a consequence, specifically the environmental effects of this activity. "We see issues such as climate change and agricultural runoff into our watercourses, acidification of the sea, plastics floating around in large volume, chemicals and drugs in the environment." Unfortunately, wide variations in regional control make it difficult to address these effects in a cumulative way, taking

into account the effects on the global system rather than any discrete component of that system. “We’re struggling to build a real consensus.”

With regard to how such a consensus might emerge, McDougall presented a hierarchy of economies, which includes four categories — underdeveloped, lesser developed, highly developed, and knowledge — engaged in manufacturing at the initial stages to innovation at the more advanced stages. Success in manufacturing is relatively straightforward, he suggested, but successful innovation is much more challenging; the latter requires capital investments that must be carefully maintained and can disappear, as evidenced by the demise of a major enterprise like Nortel, which left a great deal of economic damage in its wake. Above all, innovation-based economies are premised on high consumption, which magnifies the impact on the environment.

Looking more specifically at Canada, McDougall noted that although this is a large country endowed with a significant proportion of the world’s reserves of vital resources such as oil, water, and minerals, much of this material is found in isolated settings. “Often these things are far from markets, and often they have limited access to infrastructure,” he said. Our ability to make any of these resources more accessible can make a big difference in local economic success. As a sector, natural resources is comparable in size to manufacturing — some 20% of GDP and around 1.8 million jobs — but with this added complication of operating in some of the country’s more remote corners.

He then considered the question in the title of his talk, namely whether Canada’s research and innovation agenda for natural resources is meeting the country’s needs. He suggested it is not, and that more must be done than simply finding and extracting more commodities. He recommended an additional emphasis on the construction of infrastructure to get resources to global markets, making resource-based workplaces and their allied communities safer and healthier, and assessing the environmental as well as social effects of this activity.

McDougall also raised the larger question of whether this means of supporting ourselves is ultimately sustainable. Among the most fundamental aspects of this question surrounds the ongoing growth of our population, which will continue to put pressure on resources and the environment, perhaps to the extent that we might not survive as a species. “Where does the consensus come in terms of how to respond?” he asked. As daunting as that question may appear, he voiced his own optimism that a balance between resource production, community sustainability, and landscape management could permit us not just to survive, but to thrive. Nevertheless, he pointed out some obstacles to achieving the necessary consensus to do so.

“People will not vote to destroy their personal prosperity or opportunities to improve their lives,” he insisted, noting that this resistance will come even in the face of serious

challenges such as environmental degradation. “We need intelligence, we need incentives, and we need innovation. That takes leadership, plus policy, plus investment. We’ve got to get away from the idea that significant parts of the world consume substantially more than the value-added wealth they produce.” Outsourcing production from the developed world to the developing world has realized some short-term gains, but now the consumer expectations of the developing world are exceeding the productive capacity of the developed world. This situation is generating ever greater environmental effects, which means that a great deal of innovative activity will be directed to reducing those effects through more careful use of natural resources. This could take such forms as more efficient building designs or adoption of renewable energy sources, but he says even greater gains can be made in bio-mimicry, which would regard resources in the form of a cycle so as to control both their consumption and disposal. By way of example, he offered the idea that landfill or sewage could be converted into fuel, which could yield a source of hydrocarbon fuel as great as the country’s known natural gas supplies.

Moving toward this new economic model will require setting aside many current economic rivalries and could well call for some sacrifices. “That may even entail in the developed world a short-term reduction in the standard of living in order to achieve a higher quality of life globally in the long term.”

Jeffrey Crelinsten observed that the challenges outlined by McDougall provided some clear direction for economic development. “What a huge opportunity for entrepreneurs to solve those problems and build a global business.” he said.”

A question from the audience considered whether a knowledge-based economy could be totally divorced from manufacturing. McDougall conceded that no major economy, no matter how advanced, could afford to be without some kind of manufacturing base. “You do have to make something because without that you lose the knowledge economy’s ability to continue.”