

Partnership Group for Science and Engineering (PAGSE)

Responses

1. Economic Recovery and Growth

Given the current climate of federal and global fiscal restraint, what specific federal measures do you feel are needed for a sustained economic recovery and enhanced economic growth in Canada?

Recommendation: To maximize economic recovery and enhance economic growth, Canada must leverage the incredible investment that has been made in Canadian science and engineering researchers and research infrastructure by focusing on Canada's unique strengths. On a per capita basis, Canada has one of the most powerful science and engineering research engines in the world; but the return on investment in this engine has not yet been fully realised. The government has an unprecedented opportunity to capitalise on this investment by enhancing the flow of the world-class basic research that has been generated, into applied work and subsequently into industrial innovation. The research to innovation continuum is an incubator, indeed an "ecosystem", for sustained economic recovery and enhanced economic growth. The opportunity lies in catalysing discovery through strategic investment in scientific and engineering research that is likely to have an immediate benefit for Canada and Canada's place on the global stage. This research-to-innovation investment would focus on areas that set Canada apart; where Canada is best positioned to be a leader. This would include research focused on the north/Arctic, water security, renewable resources (boreal forest, fisheries, agriculture), non-renewable resources (oil sands, mineral resources), clean energy technologies, digital technologies, and the health of a diversified population (including ageing & immigrant groups). Canada is uniquely placed to outcompete other nations by strengthening its research base in these areas, where connectivity to stakeholders is obvious and where conversion of ideas to innovation can be rapid. Federal agencies already in place to help attain these goals include CIHR, NSERC, SSHRC, CFI, Genome Canada, MITACS and Brain Canada; but they must be adequately resourced if we are to achieve the potential that Canada's strengths can offer. In keeping with this, we encourage the government to continue to undertake periodic assessments of the state of Canadian science and technology (S & T). By identifying Canada's strengths, weaknesses and areas of growth, informed decisions on S & T funding can be made, and Canada can be more strategic and internationally competitive in the knowledge economy.

2. Job Creation

As Canadian companies face pressures resulting from such factors as uncertainty about the U.S. economic recovery, a sovereign debt crisis in Europe, and competition from a number of developed and developing countries, what specific federal actions do you believe should be taken to promote job creation in Canada, including that which occurs as a result of enhanced internal and international trade?

Recommendation: The government should develop policies that enhance job creation in areas that strengthen connections between public-supported science and engineering and real-world economic enterprise. This connectivity could be fostered through mentorship / training of new and young Canadians by world-class, late-career scientists. Opportunities for increasing this connectivity include: 1) Reinforce the continuum between science, engineering, innovation and the marketplace. The most robust jobs in the knowledge economy will be created when scientists, engineers, investors, business people and policy makers are brought together in common "ecosystems", breaking down disciplinary

barriers. Government programs should provide greater opportunities for scientists, engineers, businesses, investors, and policymakers to work together in a flexible, adaptable, responsive workforce, able to face future challenges and uncertainties. 2) Develop job creation solutions that leverage Canada's strengths, building on areas that differentiate Canada from the rest of the world. This would focus on north/Arctic, water security, renewable resources (boreal forest, fisheries, agriculture), non-renewable resources (oil sands, mineral resources), clean energy technologies, digital technologies, and the health of a diversified population (including ageing & immigrant groups). Job creation in these areas should be knowledge-based – developing intelligent innovations that provide unique, Canadian-made products and services for the global economy. 3) Mentorship / training of new Canadians and Canadian youth by the world-class, late-career, cohort of scientists and engineers in Canada. Mechanisms need to be put in place to better “capture” the knowledge and experience of Canada's later-career scientists and engineers. In addition to leveraging this investment to train the next generation of Canadian workplace leaders, such mechanisms could capitalize on the skills of different groups in Canadian society. 4) Reinforce international connectivity in science and engineering. Provide opportunities for scientists and engineers to be trained abroad, and for international scientists and engineers to be trained in Canada. Providing this global connectivity with the science and technology will expose Canadians to different scientific cultures and facilities; and make Canada a preferred business partner.

3. Demographic Change

What specific federal measures do you think should be implemented to help the country address the consequences of, and challenges associated with, the aging of the Canadian population and of skills shortages?

Recommendation: We propose that the government provide incentives for Canadian universities, colleges and public institutions to create intergenerational mentorships that will help young - and new – Canadians to enter the workforce with a much broader base of experience and institutional knowledge. Canada's baby-boom bubble means many of our science researchers and engineers have or are approaching the traditional age of retirement. Given our increased life-span, many of these researchers and engineers would like to continue at their profession after retirement but with added flexibility in their schedule. At the same time many young people, including recent immigrants, are pursuing studies in these fields. Our research and engineering organizations need and want to encourage them in their chosen fields of research or engineering, but often face financial constraints. There is an opportunity to blend supply and demand through a program to support knowledge and skill transfer. Many of those scientists and engineers wish to continue their involvement in their research or engineering and would be willing to mentor recent graduates. What is needed is a program that assists this relationship. This program would enable universities, research institutions and engineering organizations to supplement the income of the young graduates and emeritus faculty or association members, while allowing the senior scientists and engineers flexibility in the time involved in mentoring. The investment required would not be large and the outcome of the knowledge and skill transfer would be substantial. Working together, Canadian universities, colleges and public institutions can provide an intergenerational mentorship system that leads young Canadians, including new Canadians, into the workforce. Canada's urban centres, which have a confluence of post-secondary education institutions and other public institutions, an ageing population, and large and growing new and first generation Canadians, are an ideal test bed to encourage the development of this mentorship system. The creation of such a system provides incredible opportunities for all parties involved, not the least of which is a society that is much better connected across demographic lines.

4. Productivity

With labour market challenges arising in part as a result of the aging of Canada's population and an ongoing focus on the actions needed for competitiveness, what specific federal initiatives are needed in order to increase productivity in Canada?

Recommendation: We propose that federal initiatives be brought to bear to create a seamless research-to-innovation system, focused on furthering Canadian competitiveness in areas where Canada has a distinct international advantage. Canada is ideally positioned to be one of the most productive economies in the world. Canada has all of the factors necessary to be a global leader in productivity: a richness of natural resources; a historically strong industrial base; an increasingly diverse population with a profoundly broad worldview; a strong post-secondary education system; and good government investment in the knowledge economy. While each of these distinct elements is necessary for global productivity leadership, its incredible potential can only be realised when it is brought together in a synergistic relationship, creating an "innovation ecosystem". Such an ecosystem would focus on furthering Canadian competitiveness in areas that differentiate Canada in the global marketplace. As with all ecosystem approaches, the research environment must be adequately resourced to enable linkages - the 'continuum' - to occur. Similarly, the government must incentivise linkages within the research-to-innovation system to ensure interdisciplinarity and ensure that discovery flows to production. An excellent example of such incentivising exists through programs offered by MITACS, a government-funded agency that links industry with researchers in post-secondary institutions, and NSERC's partnership grants. Building upon these programs, and emulating them in other government agencies and departments, leverages the investment that is being made in research and ensures that it is translated to productivity. OECD research (2003) indicates that sustained increase in innovation intensity may produce a permanent increase in the rate of productivity, rather than a one-time increase in output level. Beyond this, we encourage the government to continue their support for policies that provide international students, particularly doctoral graduates, the opportunity to live and work in Canada following their studies, as well as programs that encourage greater participation in sciences and engineering by women, first nations and visible minorities. These initiatives address the skill's shortage, broadening participation in the knowledge economy, and diversifying Canada's innovation workforce.

5. Other Challenges

With some Canadian individuals, businesses and communities facing particular challenges at this time, in your view, who is facing the most challenges, what are the challenges that are being faced and what specific federal actions are needed to address these challenges?

Recommendation: That the Government promote the creation of innovation clusters to catalyse the generation and transfer of knowledge between the public and private sectors. Things happen when people interact on a day-to-day basis. Shared physical location facilitates communication and mutual understanding, the conception of natural partnerships, the exchange of ideas and resources, and the gestation and emergence of innovations. Although technology has shortened the distance between distant points, there still is really nothing like getting together to make something happen. This is especially true when it comes to innovation. The STIC report (STIC 2010; p 55) highlighted the importance of clusters – a critical mass of geographically concentrated and intellectually interconnected companies, educational institutions, and government research organizations – as indicators and incubators of knowledge transfer and innovation. The members of a cluster compete, but also cooperate, providing a place where a more fluid movement of resources and talent allows new ideas to prosper and shortens times to market. There are plenty of examples where clusters have been successful: Silicon Valley is probably the leading one, followed closely by the private sector campuses of Bell Laboratories, North Carolina's Research Triangle, and, in Canada, the MaRS Discovery District. All

bring basic scientists, applied scientists, engineers, industrial operations and technology transfer officers together in a shared environment, to catalyse innovation. We encourage the government to expand partnerships with municipalities and provinces to create new environments for innovation partnerships. Capital funds provided to universities to build infrastructure would serve as “Innovation Incubators” embedded in their campuses. Capital funds would be leveraged in public-private partnerships with any companies that wished to be housed within the Innovation Incubator. Innovation Incubators would provide shared space for university researchers, government agency employees working on specific “themes” (e.g. health, energy, agriculture, forestry, environment, water, food security, digital economy, etc.), and established private sector enterprises with shared interests. Finally, there are currently issues with regards to intellectual property (IP) protections that hinder innovation. Effective right of appeal, patent-term restoration and increased data protection, to international benchmarks, will be important in nurturing, sustaining and attracting investment in Canadian innovation.