



Written Submission for the Pre-Budget Consultations in Advance of the 2019 Budget

By: McMaster University

- **Recommendation 1:** The Government of Canada should support the impact and opportunity created through nuclear research through the implementation of the Canadian Neutron Initiative (CNI).
- **Recommendation 2:** The Government of Canada should take a proactive approach to antibiotic resistance by focusing investments to leverage expertise and position Canada as a leader developing innovative solutions to this global challenge.
- **Recommendation 3:** The Government of Canada should strengthen its investment in the Research Support Fund (RSF) to ensure continued success in the internationally competitive research environment.



McMaster University thanks the Standing Committee on Finance for its work on the Pre-Budget consultations this year in preparation for Budget 2019. In addition to this submission, McMaster also supports the submissions of the U15 and Universities Canada, the two associations that represent our sector at the national level.

Budget 2018 made a significant and historic investment in Canadian science and research. We appreciate the Finance Committee championing the important role of universities and university research leading up to Budget 2018. We were also pleased to see Budget 2018's commitment to review scholarships and fellowships. We believe this is a key component to ensuring Canada continues to build its workforce of the future. As government undertakes this review, ensuring simplification of the awards process and providing additional investment will be critical. As such we support the recommendations of the U15 and Universities Canada for additional investment in this area.

We also believe that Canada must be a global leader in developing an inclusive labour market policy. Supporting equity and inclusion has been an important priority at McMaster. Ensuring pathways to postsecondary institutions for underrepresented groups, including Indigenous populations, is another of our key areas of focus. Located near Six Nations of the Grand River, we have a unique opportunity for partnership. We have built trusted relationships and benefited from the skills, knowledge, and wisdom of our Indigenous partners over many years.

At McMaster our purpose is to advance human and societal health and well-being. This encompasses educating and training the next generation of health professionals, adaptable STEM graduates, and future leaders from all disciplines and all backgrounds, with the skills needed to address the challenges of our rapidly changing world.

McMaster University is proud to be Canada's most research-intensive university. Located in Hamilton, Ontario, with campuses in Burlington, Niagara, and Kitchener, McMaster has developed significant industry partnerships to advance innovation in a number of sectors. Our faculty and students have much to offer our partners in terms of solutions to productivity challenges, and they also reap significant benefit from working on projects with industry. McMaster ranks first in the country for the number of industrial partnerships we enjoy, and we are one of only four institutions in the country to rank in the top 100 Universities in the world.

University Research a Driver of Canadian Competitiveness

McMaster is pleased to see the Committee's focus on ensuring Canada's competitiveness. Research has the capacity to bring diverse groups of people together behind a common, focused goal. McMaster University, and its institutes, researchers, and students, partner with hospitals, governments, institutions, and businesses locally, nationally, and globally to share resources and expertise, solve complex problems, spur economic growth, and create a more skilled and adaptable workforce.

A key area of focus and strength across McMaster's Faculties is research on aging. McMaster is home to key longitudinal cohort research platforms that span the country, including the Canadian Longitudinal Study on Aging (CLSA), The Prospective Urban Rural Epidemiology (PURE) Study (which is international), and the Canadian Health Infant Longitudinal Development (CHILD) study. The cohort studies that we house support researchers across the country in better understanding the aging process, and help inform evidence-based policy in Canada and internationally. These longitudinal cohort studies generate big data that enables researchers to change healthcare outcomes for individuals and ultimately improve the efficiency of the healthcare system.

We also operate in the heart of the Canadian steel sector and as such we are uniquely positioned to understand the regional and sector challenges we are currently facing. We have worked hard to develop close and lasting relationships with our local industry partners particularly in the area of advanced manufacturing. McMaster prioritized the creation of the McMaster Automotive Resource Centre and developed an international collaboration with the Fraunhofer IZI. The Biomedical Engineering and Advanced Manufacturing Fraunhofer Centre (BEAM), brings together researchers from science, health sciences, and engineering. With 35 industry partners, researchers are developing novel technologies for eye care, point-of-care diagnostics, and cancer treatments. Forging this international partnership will ensure new skills development, approaches, and technologies to underpin economic growth and job creation.

McMaster will play a pivotal role in the Advanced Manufacturing Supercluster, working with industry partners to develop next-generation manufacturing capabilities to ensure that Canadian manufacturers will not only compete successfully in the global economy, but will drive the sector forward. The Advanced Manufacturing Supercluster is expected to yield over \$13.5 billion in GDP impact in the next decade and create over 13,500 jobs. McMaster has many areas of expertise that will encourage Canadian competitiveness:

McMaster Nuclear Reactor (MNR):

McMaster University is Canada's preeminent nuclear research institution, and home to the 5 megawatt McMaster Nuclear Reactor (MNR). When Chalk River's National Research Universal (NRU) reactor closed in March 2018, MNR became Canada's only major neutron source.

The reactor is home to many research activities and services, including the nuclear engineering program. It provides research opportunities for researchers across the country and internationally. It also provides essential services to Canada's national resources sector, including assays of new Canadian ore deposits, and qualification of the detectors used to control the safety of nuclear power plants. MNR also produces neutrons that are used for radiography to qualify the turbine blades used in all commercial aircraft engines manufactured in North America. The MNR is one of only two producers of iodine-125, a radioisotope used to

treat prostate and other forms of cancer, making up 60% of the world's supply. The production of this isotope provides treatment every day to over 400 men fighting prostate cancer.

Research reactors are centres of innovation and productivity for nuclear science and technology. They have spawned new developments in nuclear power, radioisotope production, and nuclear medicine, neutron beam research and applications, materials characterization, and testing. Research conducted at the MNR by McMaster's Centre for Probe Development and Commercialization, which converts research on medical isotopes into new diagnostic tests and cancer treatments, has recently led to the creation of two start-ups focused on improving the health of Canadians via medical isotopes. These new, innovative companies based out of Hamilton, Ontario, and located at McMaster Innovation Park, will not only build on research and development in the area of medical isotopes, but also contribute to the local economy and create jobs. These start-up companies give us the opportunity to prove that our discoveries can be scaled up to improve human health, while also creating high-quality employment opportunities.

MNR is a 5MW reactor that currently operates at 3MW, which limits the amount of research, training, materials testing, and medical isotope production that is possible. With the closure of Chalk River's NRU we would urge the government to support the Canadian Neutron Initiative (CNI), which includes a call for a modest investment in the MNR, so it could increase operation to full capacity 24/7 and achieve self-sustainability in less than a decade.

At McMaster we were pleased to see the Committee's recommendation that Budget 2018 "implement the Canadian Neutron Initiative, upgrade and fully utilize the McMaster nuclear reactor, and facilitate international nuclear research partnerships." Canada is widely recognized as a global leader in nuclear research and development, attracting international researchers to our facilities and training tomorrow's researchers using our critically-important research infrastructure. We would urge the government in Budget 2019 to support the Canadian Neutron Initiative (CNI).

Antimicrobial Resistance (AMR):

Antibiotics play a critical role in our daily lives, turning what were once high-risk situations such as pneumonia and many surgeries into routine scenarios. However, antibiotics inevitably become less effective as microbes adapt to antimicrobials naturally and in response to inappropriate and over-use of antimicrobials and emerging mutations.

As AMR increases, the associated risks are amplified. What was once a straightforward infection will no longer be readily-treatable, resulting in longer hospital stays, more serious prognoses, and even death. Beyond the individual health implications, AMR is a significant threat to public health, with serious economic implications. Without the development of any new antibiotics or alternatives, it is estimated that as many as 10 million people, who were otherwise treatable, will die by 2050. The economic cost associated with AMR is staggering: optimistic estimates

suggest that AMR would lead to a reduction of 1.1% of global GDP by 2050 (with an estimated cost of \$1 trillion by 2030), whereas more pessimistic estimates predict a reduction in the global GDP of 3.8%. The Council of Canadian Academies is currently undertaking a study on the socio-economic impacts of AMR in Canada.

At McMaster, the Michael G. DeGroote Institute for Infectious Disease Research (IIDR) is leading ground-breaking research on AMR and developing made-in-Canada solutions to this pressing issue. IIDR brings together a multidisciplinary team of over 30 clinicians, microbiologists, chemists, biochemists, and mathematicians, and over 200 trainees studying AMR as undergraduates, graduates, and post-doctoral fellows. With federal and provincial investments, IIDR researchers have developed innovative and rigorous infectious disease and drug-resistant infections programs. Other nations are investing strategically in stewardship, surveillance, and innovative discoveries to mitigate the impact of AMR. In Europe, the Innovative Medicines Initiative has received over €700 million to stimulate antibiotic discovery, and CARB-X in the United States has received \$500 million in government funding to develop new antibiotics. McMaster strongly encourages the Government of Canada to take a proactive approach to this imminent global threat by focusing investments to leverage Canadian expertise and position Canada as a leader on this important issue.

Research Support Fund (RSF)

Canada's universities are home to some of our most innovative, ground-breaking discoveries, ranging from new cancer treatments to water testing technologies, to new materials for tomorrow's technologies. McMaster University thanks the government for their support for this critical research, for the significant and historic investments to research and science in Budget 2018, and for the commitment to improving coordination of the research ecosystem. We look forward to working with our partners at the Tri-Council and the Canada Research Coordinating Committee to advance these objectives.

McMaster strives to bring together the best and brightest minds to develop innovative solutions to tomorrow's problems. Our cutting-edge research not only addresses the needs of our local, national, and global communities, but also enriches the university experience for our students. The federal government's investment in research helps drive forward these mutually-beneficial goals.

However, research grants to faculty do not cover the full cost of research. To further this research, universities are required to provide a range of supports, including laboratory maintenance, office space, health and safety equipment and training, hazardous waste management, administrative supports, and more, none of which are eligible for funding under most research grants. The federal government's Research Support Fund (RSF) works to respond to this growing gap in funded research, however there remains a significant funding gap, which the university must, in turn, meet. McMaster University recommends that the government use



Budget 2019 to begin closing the cost gap which currently compromises the quality of the research environment.

Conclusion

McMaster will continue to work with our regional, national, and international partners in all sectors to create a brighter world. Our world-leading research will continue to develop technologies, products, and services that will ensure Canada's competitiveness.

We thank the Committee for its work and for the opportunity to present our recommendations in advance of Budget 2019.