ONTARIO SOCIETY OF PROFESSIONAL ENGINEERS

The Honourable Rod Phillips
Minister of Finance
c/o Budget Secretariat
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RE: Ontario 2020 Pre-Budget Submission

Dear Minister Phillips,

The Ontario Society of Professional Engineers (OSPE) is the advocacy body and voice of the engineering profession. Ontario currently has over 85,000 professional engineers, 250,000 engineering graduates, 6,600 engineering post-graduate students and 37,000 engineering undergraduate students. The engineering profession's commitment to safeguarding the public interest has always been extremely important, and in these uncertain times, there is no exception.

Engineers generate wealth for the province, through the development and commercialization of new technologies and by designing innovative and sustainable solutions for the benefit of all Ontarians. Engineers also ensure safety and stability, by designing resilient infrastructure and reliable energy and water systems that Ontarians rely on daily. During this pandemic, engineers have led the redesign of manufacturing processes to create much needed Personal Protective Equipment (PPE) and ventilators. Engineers use 3D printers to create tens of thousands of face shields and frames for our front-line workers. They are in the med-tech industry working diligently to bio-engineer new medications and a new vaccine to combat COVID-19. In times of crisis, you will always find engineers working tirelessly, in the background, without much accolade, diligently supporting the communities they serve.

Unfortunately, the engineering community has been severely impacted by this pandemic, as thousands of engineering jobs are directly linked to the infrastructure, manufacturing, technology and research and innovation sectors. This has not only affected engineers and engineering graduates but the entire Ontario economy.

Engineering knowledge and talent is beyond capable of leading Ontario's industries into the future and will play an important role in the immediate, short- and long-term economic recovery of our province. As such, the province must now support the engineering community in rebuilding the engine that drives Ontario, and the rest of the country.

Ontario's historic funding allocations and strategic planning unfortunately fell short of serving the province's needs during this crisis, and we would like to assist in re-introducing resiliency and value in Ontario's workforce and systems. To ensure preparedness for future events and build an economy that is strong and benefits all people, it is imperative that new funding allocations provide a sustainable benefit for diverse, future generations by ensuring a targeted focus on **building sustainability, investing in talent development and retention, and fostering innovation.**

A resilient economy can be supported by:

- Leveraging Ontario's existing assets
- Building the assets that both businesses and workers of the future need to succeed
- Strengthening Ontario's competitive advantage

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Recommendations

Engineering Workforce

1. Implement a clear and transparent analytical process to review new and existing programs, policies and initiatives, to identify who in Ontario will benefit, who might be harmed and who will be left out – as part of the approval and provincial funding process.

2. Support organizations that implement inclusive design principles and the growth of a diverse workforce to enable economic equity and recovery in Ontario.

3. Invest in talent development, knowledge training, and supports for engineers across the province.

4. Support engineering students and recent engineering graduates.

5. Drive the transformation of engineering education.

6. Train engineers for the skills required to succeed in the energy efficiency and green building sector.

Sustainability

7. Support small and medium sized engineering firms by tackling increasing liability insurance costs through regulatory reform.

8. Provide further relief to Ontario's businesses and families by making surplus electricity available at current market rates.

9. Work towards a sustainable transition, by encouraging the use of Distributed Energy Resources (DERs) and emissions free technology.

10. Accelerate the electrification of the transportation system, including EV adoption.

11. Modernize Ontario's Building Code.

12. Invest in Ontario's Mining Industry to ensure proper clean-up of Ontario's orphaned and abandoned sites, as well as the sustainable development of the Ring of Fire

13. Ensure all provincial infrastructure projects adhere to the following principles:

    a. Use of a Qualifications Based Selection (QBS) framework
    b. Properly report life-cycle costing
    c. Create diverse supply chains

14. Work with Conservation Authorities and municipalities to update the province's floodplain mapping.

15. Invest in Small Modular Reactors (SMRs) to create jobs in the nuclear energy industry and provide additional sources of low carbon electricity and heat.

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Research and Innovation

16. Support local manufacturing innovation and production.

17. Support the generation, protection, and commercialization of intellectual property (IP) in small to medium enterprises (SMEs).

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Engineering Workforce

1. **Implement a clear and transparent analytical process to review new and existing programs, policies and initiatives in order to identify who in Ontario will benefit, who might be harmed and who will be left out – as part of the approval and provincial funding process.**

There is a strong business and social case to advance diversity and inclusion in the Ontario economy. In the next year, the government will be making a series of strategic investments to boost economic performance. It is imperative that these decisions are made in the interest of all Ontarians. The government cannot afford to make decisions that exclude communities and individuals across the province. Failing to guarantee the equitable distribution of economic and social gains is both unethical and economically damaging. It is critical to get ahead of the curve and integrate inclusion from the onset rather than filling the gaps retroactively. To ensure that this does not occur, the Ontario Government can use the federal government's Gender Based Analysis Plus (GBA+) tool as a model. The Government of Canada has been committed to using a GBA+ approach in the development of policies, programs, and legislation since 1995.

Using a tool like GBA+ will ensure that moving forward decisions account for diverse needs and avoid a disproportionality of benefits. Communities across the province experience this today with issues such as limited broadband connectivity in rural locations or unsafe drinking water. GBA+ can be used in all sectors and domains of government such as:

- To review large procurement projects to ensure products and equipment meet diverse needs.
- To improve labour policies and contribute to more diverse and inclusive workplaces both within and outside of the public sector.
- To address labour and talent shortages in sectors such as manufacturing and mining by considering barriers to entry for some segments of the population.

Through our research and advocacy work we know that the engineering profession continues to face challenges in achieving full participation from members of under-represented groups despite their representation within the province. These challenges are further compounded when considered with diversity dimensions such as race, ethnicity, sexuality, ability, and religion, amongst others. The disadvantages facing these groups are only exacerbated during times of crisis. As a result, we believe that some of Ontario's engineering talent is being disproportionately impacted by COVID-19. Full participation may be achieved by not only ensuring that products and equipment meet diverse needs but by ensuring that government contracts consider workplaces that demonstrate diversity and inclusion.

We request that the government applies an equity lens in developing all policies impacting employment and economic growth to ensure that this talent is not lost in a time when diverse perspectives and experiences, are more important than ever before.

2. **Support organizations that implement inclusive design principles and the growth of a diverse workforce to enable economic equity and recovery in Ontario.**

Inclusive Design:

In many ways, COVID-19 has highlighted the need for innovative solutions aided by the implementation of new technologies. Though this provides numerous recommendations regarding nuanced and innovative processes that can generate economic benefits for the province, the Ontario government must emphasize and incentivize industry to ensure that the design of these new systems and processes is inclusive and benefits all Ontarians.

Inclusion in design is an important component to ensuring that new products, services, and technological advancements serve the needs of all Ontarians. Engineering inclusive designs are a key component that embeds critical considerations/aspects of everyday life into solutions, and existing engineering talent in Ontario

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is beyond capable of leading industries in this initiative for the immediate, short- and long-term economic recovery of our province. Without this, monetary and discriminatory repercussions could ensue as solutions will likely fall short of objectives, serving some segments of the population well and overlooking others, ultimately negatively impacting the health of all Ontarians.

As engineers also have an ethical mandate to safeguard the public interest, the province should engage the engineering community as technological stewards to rebuild the engine that drives Ontario and the rest of Canada.

The engineering community recommends that the Government of Ontario:

a. **Require organizations to demonstrate a commitment to inclusive design to access funding. Projects must account for our diverse population, be flexible and adaptable, employ inclusive processes and tools, and have a broad beneficial impact. The requirements outlined in this funding framework should be measurable generating accountability from industry to advance a vibrant, thriving ecosystem in Ontario.**

Diverse and Inclusive Workforce:

The impacts of the COVID-19 pandemic on the workforce continues to be assessed, however, it appears that groups that were historically under-represented in the workplace, have once again been most impacted by layoffs amid the pandemic. A report released by the Royal Bank of Canada shows that women's participation in the labour force is the lowest it has been in three decades, with 1.5 million Canadian women losing their jobs or choosing to quit to better support households in the first two months of the pandemic alone.

This is increasingly problematic throughout sectors of the economy, where women, racialized persons, and members of other equity seeking groups remained highly under-represented. For example, based on most recent data women accounted for only 12.8% of engineers in Ontario. *Calling All STEM Employers: Why Workplace Cultures Must Shift to Change the Gender Landscape* demonstrated that women in STEM continued to face significant barriers to success. These barriers included being undervalued and disrespected in the workplace, lack of mentorship and sponsorship, and the existence of a gender-wage gap. These barriers were a contributing factor to the trends above and likely mirror the barriers to other under-represented groups. As a result, conditions are now exacerbated for those who remain in the labour market.
OSPE has been an avid advocate of building a diverse and inclusive engineering sector across Canada. We have seen incremental progress made across industry, academia, and government that is now being threatened by the disproportionate impact of COVID-19 on labour force participation. We can quantify the impact on women as this has historically been measured, however, the impact on other under-represented groups with diversity dimensions including race, ethnicity, ability, and sexual orientation cannot be determined, as these trends have not been widely analyzed and studied.

We urge the government to implement policies that encourage the participation of under-represented groups in the workplace by:

a) **Addressing the wage gap.**
OSPE's census analysis revealed that the wage gap between men and women working in engineering was 12% or $11,000 annually. Ontario has introduced robust legislation intended to tackle the gender wage gap through the *Pay Equity Act*, however, there is an insufficient accountability mechanism within this legislative tool. Further, the wage gap for other under-represented groups should also be assessed and mechanisms similar to those developed for gender, be introduced. The government must create accountable and enforceable tools to truly address this issue.

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b) Reducing the burden of unpaid care.

Research shows that caregivers continue to face the brunt of responsibilities in Canadian homes and has been cited as one reason for women leaving the workforce during the COVID-19 pandemic. Since women's inclusion in the workforce began during the last century, caregiving responsibilities now impacts all professionals regardless of gender – including engineering graduates and engineers – limiting career progression. Investing in access to affordable and quality childcare and eldercare could be an important factor in determining the participation, attachment, and retention of professionals in the labour market. Specifically, as the population of senior citizens is expected to double to 4.5 million in Canada by 2041, it is important that the government implement programs to support all caregivers, perhaps through tax credits, that facilitate household outsourcing of child and elder care.

c) Investing in robust labour market analysis.

In a data driven economy it is imperative that the provincial government continue to make investments in data collection, analysis, and evaluation. For the Science, Technology, Engineering, and Math (STEM) sectors, most data pertaining to the unique experiences of equity seeking groups in the Canadian labour market focuses on gender. This remains consistent during the current crisis. It is therefore important to expand labour market analysis to be more inclusive and to ensure that reliable data is available to inform both private and public sector responses to the barriers impacting all underrepresented groups in engineering and other STEM professions.

d) Encouraging diverse and inclusive workplace practices.

Organizations must demonstrate a real commitment to diversity and inclusion through their workplace practices to access public funding. A revision of current funding frameworks to include specific measurable requirements from organizations seeking to access public funding should be included to ensure accountability. We encourage the government to look at workplace policies and practices, representation, commitment to inclusive design and/or diverse supply chains when determining eligibility.

3. Invest in talent development, knowledge training, and supports for engineers across the province.

Ontario must invest in engineering talent across the province. One of the primary barriers to innovation and growth is the access to a talent pool that possesses the skills needed to adapt to the future economy. Prior to COVID-19, some of Ontario's most strategic sectors, such as infrastructure and transportation were already facing a talent-gap in their engineering departments. Engineering jobs were being given to international firms because Ontario did not have the right talent to get the job done. This is deeply concerning to the economic recovery of the province as the success of the economy depends on the ability to match talent with job vacancies and to ensure that this talent can adapt to market demands. This concern has become magnified by immediate demands for more technologically equipped engineers due to changes caused by the current crisis.

The government should create incentives to support a strong culture of lifelong learning across Ontario, where employers and employees are provided with the tools and resources to upskill and retrain local talent. This year, OSPE is launching the Ontario Engineering Academy (OEA) to up-skill/re-skill engineering graduates exclusively to meet industry needs in Ontario. Your support of this initiative by mandating companies be responsible for the upskilling of local employees is critical for engineering graduates to adequately support Ontario's economic recovery. There is an opportunity for the government to incentivize engineering companies to invest in the professional development of their employees, to ensure that they are equipped with the knowledge and know-how to design and execute based on new realities. Investing in engineering talent allows the economy to shift towards more innovative and efficient processes and systems, which in turn creates jobs for other professionals, stimulating job creation and growth.

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4. **Support engineering students and recent engineering graduates.**

COVID-19 has negatively impacted engineering students and new engineering graduates in numerous ways. Specifically, students and engineering graduates are having difficulty accessing co-op/work integrated learning (WIL) opportunities. Co-op placements provide practical training experience that is needed as part of the work experience requirement for licensing and to obtain the necessary applied skills to succeed in the workplace.

Moreover, the decrease in access to co-op placements/WIL opportunities has a significant impact on engineering students, who use these as a source to finance their studies. As outlined in OSPE's 2019 report *Engineering Students and Graduates: Perspectives on Tuition, Job Prospects, and Co-op/internships*, tuition for engineering students in Ontario is higher than the national average and considerably higher than some other undergraduate degree programs. While survey results indicated that this did not dissuade students from pursuing an engineering degree, most respondents expressed significant concern regarding their ability to pay off student loans or debt, needed to finance these higher tuition fees and educational expenses.

OSPE recognizes that the Ontario government took action to reduce all tuition fees by 10% in the 2019-20 school year and freeze tuition fees for the 2020-21 school year. The government stated this would be a reduction of $660 on average for university students enrolled in an undergraduate arts and science degree. Northern schools have access to a contingency fee to offset some of their lost revenue due to their inability to attract a high proportion of international students. However, it is also important to note that this cut to tuition was also accompanied by significant proposed cuts to the Ontario Student Assistance Program (OSAP) grants, which is expected to increase student debt loads.

There is deep concern that the financial strain that engineering students are currently facing has only become more pronounced because of these changes. Given the limited availability of such programs, student engineers often seek student loans from banks and credit unions to pay higher tuition fees and are further disadvantaged because (i) commercial bank/credit union student loans typically carry higher interest rates than federal/provincial student loans and (ii) interest paid on student loans provided by banks and credit unions are not eligible for tax deduction purposes.

Government support programs for students and new graduates must recognize that:

- Engineering programs are far more expensive than arts programs (Ontario engineering programs are amongst the costliest in Canada), so current financial support programs, are effectively less supportive for engineering students than arts students/other programs.
- Engineering sources of income are essentially disappearing during the COVID-19 pandemic.
- Historical pre-COVID-19 earnings tests from parents are effectively irrelevant to determining whether a student can pay forthcoming engineering tuition.
- Parental earnings may not be available to support students going forward.
- The value of traditional tax incentives available to students and parents (RESP, Textbook tax credit, tuition credits etc.) have either been cancelled or significantly atrophied as a percentage of real student educational and living costs.

Without effectively addressing this we are compromising access to engineering programs and ultimately constraining the future engineering talent pool, and the industry's future ability to innovate in support of Ontario's economy.

To address this, the Ontario Government should:

a) **Create accessible and predictable funding opportunities for companies that are looking to hire interns, recent engineering graduates and students.**

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b) **Evaluate and restructure the Ontario Student Assistance Program (OSAP) and other educational government support programs to account for the impact of COVID-19 on historical income data.**
c) **Provide additional income support to students and their parents in the form of tax credits through a system that bases financial supports on the cost of their educational program (i.e. implementing transferrable tax credits that are capped based on a percentage of tuition paid rather than a dollar cap).**
d) **Review and enhance the amount of tax incentives and supports available to students and their families to account for diverse family structures and dynamics (multiple children in college and university, child support payments, disabled children, high health care, financial support for aging parents etc.)**

5. **Drive the transformation of engineering education.**

To rebuild the Ontario economy in the years to come, the province will require engineering talent that possesses the skills to innovate and succeed in new market realities. Engineering is changing, and the requirements for engineers to demonstrate new competencies is needed. As such, the learning objectives and outcomes need to shift to recognize this reality. However, while engineers are highly competent and ready to perform in today's economy, engineering training and education has been constrained by an outdated accreditation system, which impacts the ability for higher educational institutions (HEIs) to adapt curriculum and train the engineers of the future.

Canada has an inputs-based (time allocated to learning) and not outcomes-based (what students have learned) accreditation system. Assessment is based on a measure of curriculum content and quality by Accreditation Units (AU). AUs are an inputs-based metric which measures in-class learning time, instead of focusing and organising programs around clearly defined outcomes students should demonstrate when they leave school.

Engineering Deans Canada (EDC) has been requesting that the accreditation model be changed from an inputs-based to an outcomes-based model, allowing HEIs increased flexibility to be innovative, creative, and inclusive with their curriculum.

Changes to the accreditation model have focused on increasing the curriculum requirements that must be met by university programs, without improving the learning outcomes and skills acquired by students. This has placed an increased burden on students to acquire knowledge that does not reflect current engineering practices. An outdated model means that engineering students are graduating without the skills needed by employers.

To address this the Ontario Government should:

a) **Convene a meeting with OSPE, and other stakeholders including but not limited to Engineering Deans Ontario (EDO), and Professional Engineers Ontario (PEO) to discuss this issue and ensure that the appropriate actions are taken to improve student outcomes.**
b) **Upon a better understanding of the key issues, convene a meeting with their provincial counterparts and other key stakeholders, including but not limited to Engineering Deans Ontario (EDO), Engineering Deans Canada (EDC), Engineers Canada, and the engineering regulators, to ensure that all provinces are taking action to improve student outcomes.**

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6. **Train engineers for the skills required to succeed in the energy efficiency and green building sector**

As Ontario and Canada transition towards a low-carbon future, the energy efficiency and building sectors will be at the forefront of change. To accelerate this, we need to strengthen the capacity of the existing workforce and attract more people to work in these sectors, especially engineers. This is why OSPE has joined Workforce Coalition 2030, which is a broad cross-sectoral coalition of employers, educators, and practitioners across the construction ecosystem working to collectively impact government policy, business practice, and education.

Engineers believe that sustainability, investing in talent development and retention, and fostering innovation must be the priority of new government funding allocations. As COVID-19 has proven to be a major disruptor to the world order, causing rapid changes to the work force, this will ensure a strong economy that can withstand future catastrophes.

Prior to COVID-19, some of Ontario's most strategic sectors, such as infrastructure and transportation were already facing a talent-gap in their engineering departments. Engineering jobs were being given to international firms because Ontario did not have the right talent to get the job done. This is deeply concerning to the economic recovery of the province as the success of the economy depends on the ability to match talent with job vacancies and to ensure that this talent can adapt to market demands. This concern has become magnified by immediate demands for more technologically equipped engineers due to changes caused by the current crisis.

The pandemic has also expedited trends such as digitalization and building information modelling that were already transforming building design and engineering. By aligning with Workforce 2030, OSPE looks to accelerate new approaches for rapid up-skilling, growing women's participation in STEM occupations, and emphasizing continuing professional education to build design capacity and deliver enhanced low-carbon building performance.

Ontario must invest in engineering talent across the province. One of the primary barriers to innovation and growth is the access to a talent pool that possesses the skills needed to adapt to the future economy. While the labour market has faced severe disarray from the pandemic, it also presents an opportunity to re-skill unemployed and under-employed Ontarians, with a focus on sectors with sustainable long-term growth.

In 2018, the green building sector directly employed approximately 436,000 workers across 51,000 establishments in Canada within the following key industries: construction, manufacturing, wholesale trade, professional and business services and utilities, all of which employ engineers. Together, these generated $82.6 billion in estimated energy efficiency operating revenues in 2018. In the next 10 years, targeted investment and policies in support of green buildings can lead to 626,080 direct green building jobs in Canada. Engineers are key to planning and executing the green projects that will provide these jobs. Without engineers this sector will not flourish.

However, despite this growth, research from the Environmental Careers Organization of Canada reveals that **employers are generally experiencing difficulties hiring energy managers/directors/consultants, jobs which engineers can perform well.**

Currently the energy efficiency workforce is also, on average, less diverse than the national workforce. Just 18% of workers were reported to be female, and 2% indigenous, both figures below the national average. Proper government funding towards training in this sector can lead to an increase in diversity and equity seeking groups.

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Further investment in this sector, would not only help fight climate change, but would also stimulate the economy by creating more jobs for Ontarians. This is extremely important now more than ever, due to high unemployment rates experienced due to the COVID-19 pandemic. Ensuring an adequate supply of skilled workers is crucial to supporting the sector's growth.

Government policies that help the energy efficiency sector thrive will lead to a more productive and sustainable workforce, that will help grow the economy while protecting the environment.

Therefore, we suggest the Government of Ontario:

a) **Ensures an in-depth skills gaps and needs assessment of the energy efficiency sector is conducted,** including the building sub-sector and occupations across the full ecosystem, from design and construction to building operation and management. This would identify the most effective education and training pathways and determine how to update this information regularly and expeditiously as markets and technologies evolve. Such assessment would lead to better understanding of current and future needs.

b) **Strengthen training provision** by increasing the capacity of educators and trainers, specifically with emphasis on green literacy basics, low-carbon skills and latest technologies training content.

c) **Support training uptake** by aiding new entrants and incumbent workers to build in-demand skills and rapidly up-skill for re-employment, especially work such as building retrofits for energy efficiency and indoor air quality improvements. It is recommended that design and engineering professionals, and skilled trades workers, who have been impacted by the COVID-19 pandemic job losses, are given the opportunity for immediate skills training in areas already identified by employers and unions in order to meet urgent demand for low-carbon building skills and associated occupations. Some of these include energy modelling, low-carbon materials, mechanical/electrical and building automation systems, geothermal heat pumps, photovoltaic systems, plumbing and pipefitting, etc.

d) **Create incentives to support a strong culture of lifelong learning across Ontario**, where employers and employees are provided with the tools and resources to up-skill and retrain local talent. This year, OSPE is launching the Ontario Engineering Academy (OEA) to up-skill/re-skill engineering graduates exclusively to meet industry needs in Ontario. Your support of this initiative by mandating companies be responsible for the up-skilling of local employees is critical for engineering graduates to adequately support Ontario's economic recovery. There is an opportunity for the government to incentivize engineering companies to invest in the professional development of their employees, to ensure that they are equipped with the knowledge and know-how to design and execute based on new realities.

e) **Provincial funding should mirror the type of funding that the government destined to preparing people for careers in the Auto and Advanced Manufacturing Sectors.**

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Sustainability

7. **Support small and medium sized engineering firms by tackling increasing liability insurance costs through regulatory reform.**

Engineers support the provincial and federal government's approach to focus immediately on "shovel-worthy" infrastructure projects that can deliver short- and long-term benefits for Ontarians.

However, to achieve this, engineering firms must be able to compete in the market. Currently, insurance providers consider Ontario a high-risk jurisdiction. This has impacted engineering firms greatly, causing an increase in insurance costs and implications on coverage. These changes have not only resulted in the rising cost of liability insurance (professional liability as well as commercial general liability/property) but have prevented some engineers access to specific aspects of insurance coverage that were historically readily available.

This impacts the ability of small to medium sized engineering companies to operate in the province, which limits the amount of infrastructure that can be built, further debilitating economic growth. Further, this increases the costs of engineering projects, costs which are being downloaded to consumers. As the largest procurer of infrastructure projects, the government should be deeply concerned with these escalating costs, and the availability of design talent required to build the infrastructure needed in this province.

Several factors have caused these conditions:

- The regulatory body, Professional Engineers Ontario (PEO) does not currently make continuing professional development (CPD) mandatory in Ontario, despite the recommendation brought forward by the Elliot Lake Commission of Inquiry;
- There is no minimum required liability insurance for professional engineers with a Certificate of Authorization, thus offering services to the Public;
- Engineers are not regularly focused on projects within their specialization, and many lack micro-credentials.
- Engineering firms are not required to train and develop their own talent

8. **Provide further relief to Ontario's businesses and families by making surplus electricity available at current market rates.**

Ontario must leverage its existing assets, which include its low-emission electricity system. This system has already been transformed into a low emission system, which produces significant amounts of emission-free electricity that is in surplus to domestic needs. Ontario currently exports most of this surplus to other Canadian provinces and the United States at low wholesale market energy prices and discards the amounts it cannot export. Unfortunately, Ontario consumers cannot access this low-cost surplus electricity, as Ontario's retail price plans do not allow surplus electricity to be made available at its low wholesale market energy price.

The government's recent announcements of suspending time-of-use rates for 45 days and deferring a portion of Global Adjustment (GA) charges for some industrial and commercial electricity consumers are only beneficial to some energy users.

The Government of Ontario should take this opportunity to implement **permanent electricity price reform** that will allow consumers to purchase surplus electricity now and in the future. This will alleviate the economic burden posed by COVID-19 by reducing energy bills for consumers and businesses, as well as decreasing greenhouse gas (GHG) emissions. This reform is required to achieve real economic relief both in the short and long term. Additionally, low-cost, carbon free electricity can support increased adoption of electric vehicles (EV), supporting job creation in the selling of EVs and its required infrastructure in both public and private locations.

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9. **Work towards a sustainable transition, by encouraging the use of Distributed Energy Resources (DERs) and emissions free technology.**

Restoring our economy in the wake of the COVID-19 pandemic should keep in mind our existing environmental and climate change concerns. DER technologies leverage economies of scale to produce economic, environmental and reliability benefits to the local economy. They also offer consumers the potential for lower-cost, higher-service reliability, high-power quality, increased energy efficiency, energy independence, and energy security to mitigate future effects of climate change.

Widespread use of local and regional district energy systems has been a fundamental and primary contributor to low-carbon communities in countries like Denmark and Finland. Toronto's *TOCore Downtown Energy Strategy* also concludes that district energy systems are fundamental to reducing greenhouse gas emissions from buildings at a lower cost compared to individual buildings.

The Ontario government should encourage the adoption of locally owned energy sources and storage systems that increase local jobs and energy costs throughout the entire province. Although this will require investment in distribution system upgrades, the upgrades will allow for a more optimal use of existing assets and, if designed correctly, can result in the elimination or deferral of other system costs. Furthermore, upgrading Ontario's energy infrastructure represents an ideal opportunity to address the needs of current and future generations, while creating employment opportunities for engineers and energy innovators.

The government should also support technological innovation that reduces energy use, through grants and incentive programs for innovators. These incentives should reward technologies that are able to provide energy efficient solutions that will make Ontario's infrastructure and energy sources more resilient to intensified weather patterns.

10. **Accelerate the electrification of the transportation system, including EV adoption.**

Ontario should work towards a safe, green, innovative, and integrated transportation system that is able to support a clean environment, while boosting trade, economic growth, and public safety. Policies should seek to develop and foster a transportation system that works for current and future generations.

Electric motors are about 3 times more energy efficient than the internal combustion engine under ideal operating conditions. Electric vehicles also reduce greenhouse gas emissions and take advantage of the province's largely low carbon electricity grid. Transit use will likely decline because of the pandemic, so adoption of EVs may limit the resulting increase in GHG emissions from the transportation sector. Investing in EVs provides the opportunity of achieving short-term results, while allowing clean sectors to grow sustainably over time.

By increasing the uptake of EVs in Ontario and encouraging recharging during evenings, EVs will in effect store Ontario's surplus energy supply, which will significantly reduce the amount of surplus energy that is sold for a loss to external jurisdictions and/or curtailed, which is currently costing Ontario energy ratepayers approximately $1 billion per year.

According to the Windfall Centre, if EVs were to reach a 10% share of the total vehicle population by 2025, Ontario would experience a GDP increase of over $3.6 billion. Ontario would benefit from a growing industry that would be modern, efficient, and create new employment opportunities across the province.

The government also has the opportunity of electrifying its public bus fleet. Investments in electric public transport have an amplified positive impact since the vehicles run several hours per day. For individual consumers, EVs cost a quarter of the price to drive than gas vehicles. This means, the average Canadian driver, who travels 20,000km per year, would save as much as $2,000 per year on fuel alone.

As Ontario historically has been a leader in automotive manufacturing, OSPE is pleased that the government is partnering with their federal counterparts and Ford Motor Company to invest in making our province a global electric vehicle manufacturing hub.

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However, although this is a positive first step, OSPE believes that more can be done. The Ontario Government cancelled the EV incentive program, which resulted in a 53% decrease of EV purchases in the first half of 2019. Ontario is the only province in Canada not experiencing an increase in EV sales. **With the current pandemic, the government has the opportunity of rectifying this decision, and supporting a clean growing sector right here in our province.**

Some of the uptake barriers encountered with EVs, such as a shorter range, longer recharge times, and a higher upfront cost, can be addressed by smart government action. Some jurisdictions, like California, have committed to achieving a "tipping point" of electric vehicle adoption by enacting EV sale mandates requiring automakers to sell a specified number of EVs per year, as percentage of sales. In Quebec, such action has resulted in a 131% percent increase in one year.

To ensure Ontario accelerates the electrification of its transportation system, the province should:

a) **Work with the federal and municipal governments to allocate specific resources to the electrification of the public transportation system.**
b) **Develop and implement an incentive program for electric vehicles, until mass adoption "tipping point" is achieved.**
c) **Enact an EV sales mandate like the ones established in Quebec and California, requiring automakers to sell a minimum percentage of electric vehicles.**
d) **Permit free or discounted access for EVs to all tolled highways in Ontario.**
e) **Establish a robust network of electric vehicle charging stations across Ontario.**
f) **Amend the Building Code to ensure that there is a minimum percentage of electric vehicle supply equipment (EVSE) in residential and non-residential buildings, including condo and apartment buildings.**

11. Modernize Ontario's Building Code.

The construction and renovation industries employ hundreds of thousands of Ontario workers, which have been greatly impacted by COVID-19. The National Building Code (NBC 2020) and the National Energy Code for Buildings (NECB 2020) contain new guidelines for energy efficiency in homes, small buildings, and commercial and institutional buildings. NBC 2020 section 9.36 focuses on energy efficiency and reducing greenhouse gas emissions to support a long-term goal of a net zero energy ready (NZER) model building code by 2030. Provinces have the option to adopt these provisions. **Ontario should adopt these sections of the NBC 2020 into the Ontario Building Code *O.Reg. 332/12* and define clear steps and deadlines to achieve a NZER code by 2030.**

By doing so, not only would Ontario decrease its carbon footprint, but would also create jobs moving forward, especially under the lens of more energy efficient buildings and retrofits. This would also provide opportunity to lower life cycle costs to building owners and retrain workers in particularly hard-hit sectors. Ontario could learn from other jurisdictions, like British Columbia, who in 2017 became the first North American jurisdiction to create a regulated pathway for net-zero energy-ready buildings, through its *BC Energy Step Code*.

British Columbia's success rests on:

- **Prioritizing the Building Envelope.** An envelope-first approach designs a measurable level of performance into the very fabric of the building, permanently wedding energy efficiency to the structure.
- **Prescribing outcomes, not processes** by defining a target, and working backwards with fixed interim deadlines and requirements.
- **Providing a baseline and working towards capacity building** by allowing local governments to adopt higher energy-efficiency requirements at a pace that works for them.

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- **Consulting appropriately** with municipalities and local governments, professional associations, and utilities

These measures will help stimulate the COVID-19 economy, as greener buildings have been proven to lead to lower utility bills, and higher property value. Having these provisions in the Ontario Building Code will significantly increase the number of green homes and buildings being built. This is a unique opportunity to both create jobs and increase consumer spending as well as contribute to Canada's transition to a low-carbon future.

The recovery from COVID-19 also provides the Ontario government with the opportunity to further support companies in the retrofitting of existing buildings with energy-efficient and low-carbon options. The goal should be to have existing buildings consume at least 30% less energy than 2005 levels by 2030. This could be achieved through energy labelling or EnerGuide. This requires assessing the energy efficiency of existing buildings on renovating or selling and should also be included in the Ontario Building Code. There needs to be additional financial support to make these cost-efficient, until the retrofit industry is more mature, such as reductions to HST/PST and enhancements to the current SaveONEnergy program.

These are strategic steps towards the development of sustainable communities for current and future generations. Green buildings provide some of the most effective means to achieving a range of goals, such as addressing climate change, creating sustainable and thriving communities, and driving economic growth.

12. Invest in Ontario's Mining Industry to ensure proper clean-up of Ontario's orphaned and abandoned sites, as well as the sustainable development of the Ring of Fire

Mining is one of the economic backbones of the Ontario economy and is especially important to Northern Ontario. The materials and products delivered help Ontarians stay safe, meet basic needs, and sustain northern communities. This industry produces around $10 billion in revenues for Ontario per year and employs over 75,000 Ontarians. Mining is also the largest private sector employer of Indigenous Ontarians.

Ontario is responsible for one-third of Canada's total mined metal production. Our province is the largest producer of gold, platinum group metals and nickel, and the second largest producer of copper in the country. The province is also a major producer of salt and structural materials. Mining produces key metals for the development of high-tech products and batteries, as well as medical devices, including ventilators and diagnostic COVID-19 test kits.

Additionally, the Ring of Fire region of Northern Ontario is an immense and untapped economic opportunity. Research done by the Ontario Chamber of Commerce suggests that in the first 30 years of its development, this region could generate more than $25 billion in economic activity across several different sectors in Ontario, including mining, financial services, retail trade, manufacturing, and utilities.

The development of this region will also provide enormous long-term benefits to northern communities through increased economic activity and job creation. To realize the full economic potential of the Ring of Fire, the government must prioritize key investments in core infrastructure, as well as ways to address the needs of the labour market and Indigenous communities.

Despite its tremendous benefits to the province, investment in the mining sector has lagged, causing serious concerns with existing legacy issues, that require attention immediately. To keep turning Ontario's natural resource potential into jobs and sustainable wealth, it is essential to invest in activities that keep the mining cycle robust. These include but are not limited to encouraging more sustainable exploration, conducting appropriate project feasibility studies, design work, environmental and impact assessment studies, and ensuring mines are closed properly.

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Unfortunately, the lack of proper closure of historical mines in Ontario has been a problem for decades. Ontario currently has over 5,000 known abandoned mines, containing over 15,000 hazards. These abandoned sites are an enormous environmental concern and pose health and safety risks to the surrounding communities.

It was only in 1991, under the *Mining Act,* that legislation established that all mining companies must prepare and submit for approval a Mine Closure Plan certified by a qualified professional engineer that the plan adheres to government's standards and is backed by a financial assurance bond. Therefore, there are thousands of abandoned sites that were closed prior to 1991 that have no current ownership. This means that the government, and ultimately the taxpayer is on the hook for cleaning up these sites. For example, Ontario has spent about $75 million to date to clean up the former Kam Kotia Mine near Timmins. As we strive towards a robust economy post-COVID-19, it should be noted that these costs will continue to increase if these legacy issues are not dealt with appropriately and in a timely manner.

The Government of Ontario should work with the Federal government to ensure that the Canadian Minerals and Metals Plan (CMMP) achieves all its goals under each of its six strategic directions.

- **a) Direct funding should support the re-imagination of the National Orphaned or Abandoned Mines Initiative (NOAMI)**
  - **i. NOAMI should develop a long-term plan that outlines key steps for the remediation of orphaned and abandoned mine sites.**
  - **ii. Funding should mirror the type of funding that the federal government has destined to help clean up orphaned and abandoned oil and gas wells in Alberta, Saskatchewan, and British Columbia ($1.7 billion).**

In addition, the engineering community suggests that the Government of Ontario:

- **a) Ensure resource development is sustainable, by establishing guidelines and frameworks that ensure corporations respect economic, environmental, and social needs of the communities.**
- **b) Ensure Indigenous peoples are full partners in the development of the Ring of Fire, where consultations with Indigenous communities begin at the planning stage and continue throughout the mining exploration stages.**
- **c) Develop a Youth Training Program, in partnership with OSPE, to teach Indigenous youth the engineering expertise and skills that will allow them to co-develop the different mining sites in ways that respect and integrate indigenous ways of knowing while serving the needs of the people of Canada.**

13. Ensure all provincial infrastructure projects adhere to the following principles:

a) Use of a Qualifications Based Selection (QBS) framework

Given Ontario's current economic and fiscal situation, it is essential that all public infrastructure investments be transparent and return the greatest possible value for money. By adopting Qualifications-Based Selection (QBS) as its best practice for the selection of consultants, the government can realize the greatest possible value for investment in its infrastructure projects.

QBS is a competitive, sound, and fair process that selects those that are the best qualified. Selecting a consultant is one of the most important decisions a client makes. To a great degree, the success of a project depends on securing the professional services firm with the most experience and expertise that best fits the project. Experience demonstrates that selecting a consultant through QBS ultimately provides the best value for money.

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QBS was codified as part of the *Brooks Act*, passed into law by the United States Congress in 1972, to protect the interests of taxpayers. The Act stipulates that public owners negotiate engineering and architectural services contracts based on demonstrated competence and qualifications for the type of professional services required and at fair and reasonable prices. Its intent is to discourage public owners from contracting for professional services based exclusively on price. The *Brooks Act* requires a competitive process in which professional services firms submit their qualifications to the project owner. The owner selects the consultant from this pool based on their technical competence, experience on similar projects, managerial ability, personnel to be dedicated to the project, local knowledge, industry reputation and integrity.

This process provides the owner with a clearer and accurate understanding of overall project costs. This process also provides for vigorous and open competition among firms, assuring the owner they are selecting the most capable professionals, while at the same time obtaining a price that is "fair and reasonable."

The Benefit to Ontarians:

i. Better value to taxpayers

QBS encourages innovation which in turn drives better value on the infrastructure investment. It provides accountability by ensuring that fees will directly correspond to the level of service and the value of deliverables to be provided. QBS also results in more realistic and predictable budgets and schedules for project expenditures.

ii. Significant life-cycle savings

QBS maximizes the value of the consultant's contribution to a project while reducing the project's life cycle costs. A recent American Public Works Association study shows that using QBS for professional services reduces construction cost overruns from an average of 10% to less than 3% - equivalent to a savings of up to $700K on a $10M capital project.

iii. Benefits small firms

QBS helps small firms compete by providing them a process through which to demonstrate the advantages that they often have over larger firms, including a greater degree of niche market expertise, greater knowledge of the local market and greater involvement of senior level management in the execution of the project.

iv. Promotes communication and technical innovation

Using QBS provides owners the opportunity to fully define the scope of work of the project during the selection process. This results in a project that is thoroughly thought out and fosters innovative, creative, cost-saving, and timesaving approaches to problems. It also fosters better communication and business relationships between owners and proponents as the process makes them partners in the job.

b) Effectively report life-cycle costing

It is essential that all infrastructure projects conducted by the province properly report and consider life-cycle costing. In order to gain the maximum value for money, all costs incurred over the whole life span of infrastructure projects must be estimated. This will ensure that taxpayer's money is used for infrastructure projects that are able to produce multigenerational benefits for most Ontarians at a proper cost.

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c) Consider diversity and inclusion

The provincial government should implement supply chain diversity policies. This will enable the province to use procurement to advance equity, diversity, and inclusion. The benefits of a diverse supply chain are well documented in research done by the Centre for Diversity and Inclusion and the Conference Board of Canada. Small to medium enterprises owned by women and members of other equity seeking groups provide value to large organizations, reduce the risk of streamlined supplier pipelines, and lead to economic growth. The federal government has committed to increasing the participation of under-represented groups and Indigenous businesses in federal procurement, while cities like Toronto have established social procurement programs with similar objectives. It is imperative that the provincial government establish this to ensure that engineering companies led by women and members of equity seeking groups are provided with access to public procurement opportunities.

14. Work with Conservation Authorities and municipalities to update the province's floodplain mapping

The primary duty of engineers is to hold paramount the safety, health, and welfare of the public, which includes environmental stewardship. Changing climate and weather patterns that lead to more severe environmental conditions such as flooding can adversely affect the design, operation, and management of engineered systems such as those for wastewater and flood management. Also, many of these engineered systems interact with the climate and can generate more severe and destructive impacts of weather events.

Engineers know that accurate floodplain mapping and data is crucial to better understand the impact of flooding, as well as to help municipalities and individuals reduce potential risks and better respond to flooding events.

A robust and updated floodplain mapping program ensures that individuals and homeowners are aware of the natural hazards in their own communities. It will also guide future development, inform flood mitigation efforts, and improve planning and design of infrastructure.

The Ontario Government should update the province's flood mapping program and ensure it recognizes new technology and approaches for flood hazards. This should be updated and reviewed frequently. Such mapping should inform the creation of "municipal/communal flooding briefs" that identify and analyze the following flood risk factors:

- History of Flooding
- Proximity to Floodplain
- Stormwater Runoff Potential
- Groundwater Potential
- Potential for Combined Sewers
- Future Extreme Rainfall

It is also important that the province establishes flood mapping data standards that are consistent throughout Ontario and ensure all regions use the same parameters. This data should be shared with other agencies, as well as Conservation Authorities, municipalities, and the general public, to ensure public safety.

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15. Invest in Small Modular Reactors (SMRs) to create jobs in the nuclear energy industry and provide additional sources of low carbon electricity and heat.

Nuclear energy in Canada provides 60% of Ontario's electricity supply. The nuclear industry employs thousands of highly educated and skilled people. As new large, centralized nuclear projects are not being built, there is a growing acknowledgement of the need for smarter, simpler, and cheaper nuclear energy. SMRs, defined by the International Atomic Energy Agency (IAEA) as nuclear reactors that generate under 300 megawatts of electricity, are being developed around the world for that purpose.

The Canadian government, together with several provincial governments (Ontario, Alberta, Saskatchewan, New Brunswick) has formed a Small Modular Reactor Roadmap Steering Committee. Canada has long been a leader in developing new nuclear technology and SMR technology has the potential to provide emission free and affordable energy for a low-carbon future. SMRs require lower capital investment and so can potentially compete with other low-cost forms of electricity generation. Due to their efficient, safe, and modular design, SMRs present a real solution for remote energy needs which are currently provided by combustion of oil and gas.

Ontario has signed a Memorandum of Understanding with several different provinces committing to collaborate on the development of SMRs.

SMR development in Ontario will create well-paying jobs. Design, manufacturing, servicing, and management of SMRs (along with the associated supply chain) represents a huge potential future industry that Ontario's scientific, manufacturing and engineering communities are ideally positioned to create, as well as export to other markets. The estimated total global export potential of SMRs is approximately $150 billion per year for 2030 to 2040.

There are still some challenges to address with SMRs. The World Nuclear Association has identified licensing costs and waste management concerns as issues to overcome for favourable economics of this technology. The Canadian Nuclear Safety Commission has also noted that more research is required before licensing this technology as reliable and safe.

The Government of Ontario should continue to include the development of SMRs as part of a long-term comprehensive energy strategy in partnership with other provinces and the federal government.

This strategy should address:

a) The limited supply of economically recoverable Uranium 235 needed to power SMRs.
b) Security and safety concerns.
c) Concerns regarding the disposal of long-lived used fuel and other nuclear waste.
d) Lack of public knowledge regarding SMRs.
e) The need for Indigenous engagement in advance of specific project proposals.
f) The unique challenges faced by northern communities due to access and remoteness.

Research and Innovation

16. Support local manufacturing innovation and production

The Government of Ontario has launched a procurement tool that will remove barriers and leverage Ontario manufacturing capacity in the fight against COVID-19. Immediately, the government must continue to support the manufacturing sector to maintain strong supply chains.

The government should refocus investment in "Made-In Ontario" solutions and products. This could be achieved by working with the federal government to identify nationally strategic products and services and establish a minimum level of domestic production of these. Items such as medical supplies, PPE, food, energy, and other essentials should be included.

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The uptake of technology and digitization will improve the sectors ability to be able to switch production to respond to consumer demand more quickly, not only in times of crisis but also in response to market shifts. For economic recovery it is critical that engineering expertise be deployed to ensure the safety and optimization of innovative solutions within industrial spaces. Ontario should work with the federal government to provide additional advanced manufacturing (AM) focused programs with potential financial incentives for Ontario companies to enhance their competitiveness both domestically and internationally. Supporting businesses in improving current manufacturing processes and methods, developing, and implementing digital technologies and focusing on developing more sustainable and energy-efficient products, will help create resiliency in this sector and improve Ontario's export potential.

17. Support the generation, protection, and commercialization of intellectual property (IP) in small to medium enterprises (SMEs).

Ontario should encourage research and development (R&D) that will accelerate technology transfer and commercialization of innovative products, processes, and services based on immediate demand. As a result of COVID-19, many businesses are having to shift their operations, processes, products, and services, and the need to invest in research and development has become crucial to their ability to remain competitive. All small to medium sized enterprises are integral to the economic recovery and long-term prosperity of Ontario and Canada. According to a recent report by the Ontario Chamber of Commerce titled *Small Business, Big Impact,* Canada is home to 1.2 million SMEs (426,490 are in Ontario). SMEs are responsible for employing 90% of Canada's private sector workforce.

SMEs are being forced to pivot their operations to adapt to new realities and remain competitive. These enterprises play an important role in fueling innovation through the creation and commercialization of new products, services, and processes. As a result, it has become increasingly important for these companies to invest in research and innovation. These investments are not only critical to the long-term sustainability of organizations but also to the overall economic health of the province and its workforce.

A key driver of this innovation potential is the generation, protection, and commercialization of associated intellectual property (IP). As noted in the province's IP Report titled *Intellectual Property in Ontario's Innovation Ecosystem,* Ontario has fallen significantly behind other jurisdictions in its economic growth and prosperity. The report outlines the potential to recover Ontario's economic position through research and innovation with a specific focus on increasing intellectual property assets.

We commend the government's recent announcement to develop a Made-in-Ontario Intellectual Property Action Plan, to ensure that the social and economic benefits of research and innovation are incentivized and retained within the province. Many engineers and engineering school graduates are either entrepreneurs involved in launching SMEs or otherwise associated with SMEs. As such we recommend that the government address three key barriers currently preventing all types of SMEs from pursuing the generation, protection, and commercialization of IP:

- Limited access to IP professionals with practical expertise (patent agents or patent lawyers)
- Lack of transparency and uniformity in the process to engage research institutions in IP development and commercialization
- Cumbersome administrative requirements that impact the access for funding

The Government of Ontario should:

a) Provide a dedicated fund for small to medium enterprises (SMEs) to access IP expertise alongside their R&D efforts. SMEs require practical IP advice at every stage of the R&D process. This includes providing a foundational understanding of the types of IP protections available for R&D, guidance on IP strategy, and how to capture and leverage IP protections to achieve business

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goals. The patent filing fee and legal fees associated with this are costly and a deterrent for companies to file. Current government funding programs either do not consider IP a fillable expense or do not encourage the expense as it may be a significant portion of the grant. If the government wants to increase the number of patents filed in Ontario it must make this process more affordable by assisting with the cost of IP filing.

b) **Create a resource that effectively explains the process by which industry can engage with universities and other research institutions to access IP assets for commercialization. Currently, the owner of the IP is dependant on the funding program used to engage the institution. This means that working with one research institution will not be the same as working with another leading to an initial lack of transparency regarding who will own the IP until the company is engaged in the process. The negotiation can also take time and resources that SMEs do not have the capacity to provide. A resource/tool should be developed to provide distinctions between research institutions that will enable companies to make informed decisions in the selection of their research partner and assist in navigating the negotiation process once it begins.**

c) **Work with the federal government to reduce cumbersome red tape that impedes access to public funding for R&D efforts by implementing the following:**

   i. **Public disclosure of funds available to disperse for that year and an up-to-date version available regularly. This should avoid the filling of applications to programs where funding may no longer be available or become highly competitive as funding is closed to being fully committed. Submitting a funding application requires a time investment that organizations can spend on other activities with higher ROI if funding is no longer available.**

   ii. **Companies undertake strategic relationship building, with members from funding agencies, located within regional innovation hubs. This relationship building process is onerous creating an added burden on SMEs. At times, these relationships may not be well established by the end of the funding cycle, and companies miss the opportunity to access funding for the year. The government must examine this process and determine how best to streamline these activities considering the potential economic burden these place on SMEs.**

OSPE believes that these recommendations are essential for the economic recovery of Ontario. We look forward to working with you to further develop these recommendations. If you have any additional questions please contact Stuart Atkinson, OSPE Policy and Government Relations Lead at satkinson@ospe.on.ca or 416-223-9961 ext. 225.

Sincerely,

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