

DECEMBER 2024

# THE VOICE

OF ONTARIO'S ENGINEERS

Sustainable Engineering for the Future: Bridging the Skills Gap For Effective Carbon Emission Reduction

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The Future of Engineering: Integrating Green Technologies to Build Smarter, More Sustainable Communities

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Engineering Smart Communities: A Path Toward Reliable, Sustainable Energy Systems

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Building Resilience: Strategies to Future-Proof Infrastructure Against Climate Risks

## Effective Transportation as the Key to Sustainable Cities





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# THE VOICE

OF ONTARIO'S ENGINEERS

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Dear OSPE Members,

Earlier this year the **Bank of Canada** reminded Canadians that our productivity continues to lag behind our G7 peers.

Our lagging productivity is not a new problem, in fact economists have commented on it perennially. In a recent update, the Bank of Canada reminded us that the best way to increase our national productivity is to work smarter, not harder. They suggest that investments in training and education, and equipment and technology are necessary components of any solution.

There are many theories for why Canadian businesses are struggling to keep up with our peers – I'm no economist so I'm not going to attempt to further examine the issue through that lens. At the same time, I am quite confident that many of the solutions will come from our engineering community.

Almost universally our engineering peers take pride in finding the most efficient solution to a problem. And when it comes to the professionals most equipped to navigate potential solutions at the nexus of society, science and technology – it is engineering professionals across most sectors of our economy.

However to bring these productivity solutions to light, we need to make ongoing investments in ourselves; **Continuing Professional Development** - courses, conferences, and industry working groups, but also mentorship. This means continuing to invest in the next generation of engineers by teaching them the business of engineering and transferring the institutional knowledge we have accumulated. It also means being open minded when our younger colleagues identify potentially new and creative ways of doing things, using tools that didn't exist when some of us started our careers.

Bridging the productivity gap also means communicating more effectively across disciplines. The complexity of our systems means that as engineers, we are increasingly more specialized. Recognizing opportunities to collaborate with our peers and leverage each other's strengths will allow us to provide better, more fulsome solutions.

Advancing those solutions will also mean communicating more effectively outside of the engineering profession to critical decision makers. It means getting engineers to the decision-making tables with policy makers, executives, and the public, ensuring that we are not just heard but understood, so that private and public dollars are put to work in ways that enhance our productivity, quality of life, and ensure the ongoing competitiveness of Canadian businesses.

Helping engineers invest in themselves and communicating the value of engineering is at the core of the OSPE mandate. Not just for the benefit of the engineer, but for the benefit of the community.

OSPE's new strategic plan, launching in 2025, doubles down on both, especially the importance of raising the appreciation of our profession. The more we can get engineers into the equation, the better off we will be.

Do you agree that engineers can and should provide leadership in addressing Canada's productivity gap? What opportunities do you see in the sectors you operate within?

Tell us more at [advocacy@ospe.on.ca](mailto:advocacy@ospe.on.ca)

Sincerely,



**Dave Carnegie, P.Eng., MBA**  
OSPE Chair  
Ontario Society of Professional Engineers

A handwritten signature in black ink, appearing to be 'D. Carnegie', written in a cursive style.



# Attention OSPE Members

As of **March 31, 2025** you will no longer be able to purchase an OSPE membership through Professional Engineers Ontario (for new memberships and renewals).

If you have a current membership and intend to renew, we encourage you to use our auto-renewal service to ensure continuity. You will also receive a **10% discount** for doing so.

Login to access your OSPE account:

[go.ospe.on.ca/login](https://go.ospe.on.ca/login) 



## NEWS FROM THE FRONT

In the last quarter of 2024, OSPE's advocacy team focused on energy issues, contributing to discussions on dynamic pricing options for non-RRP Class B electricity consumers and making significant strides with Ontario's Minister of Energy, Stephen Lecce. Over the past few months, the team has also advocated for the elimination of gender-based violence through a collaborative, cross-industry approach. Additionally, the team continues to actively oppose Bill 212 – the Reducing Gridlock, Saving You Time Act.

### September 9 - Ontario Energy Board (OEB) Meeting on Dynamic Pricing Options for Non- RRP Class B Electricity Consumers

OSPE staff and **Energy Task Force** Chair, **Stephen Pepper, P.Eng.** discussed the proposed changes to dynamic pricing options for Non-RPP Class B electricity consumers at an OEB consultation meeting.

### September 12 - Gender-Based Violence Sector Consultation: Implementing Motion CC8.2 and Addressing the Declared Epidemic of Gender-Based Violence in the City of Toronto

OSPE staff attended a cross-industry consultation meeting on Gender-Based Violence (GBV) and Intimate Partner Violence (IPV) held by a GBV/IPV Working Group. OSPE commented on each of their recommendations and provided further considerations regarding the implementation of Motion CC8.2.

### October 22 - Press Conference on Ontario's Affordable Energy Future

OSPE staff attended minister **Stephen Lecce's** press conference where he announced his department's plan, **Ontario's Affordable Energy Future: The Pressing Case for More Power.**

Minister Lecce covered key points of his strategy that OSPE can now provide feedback on. OSPE staff scheduled a follow-up meeting with the minister.

### [Policy Win: Ontario Supports Continued Safe Operation of Pickering Nuclear Generating Station](#)

OSPE is excited to share that the continued operation of the **Pickering Nuclear Generating Station** will ensure the safe production of reliable, affordable, and clean

energy. This decision brings many benefits, including the employment of approximately 4,500 staff at the Pickering plant alone, with a total of about 7,500 jobs across Ontario related to its operations. OSPE has been a leading advocate for sustainable energy solutions that align with Ontario's economic and environmental goals. The successful endorsement of the **Pickering Nuclear Generating Station's** refurbishment is a testament to OSPE's dedication to shaping policies that prioritise the province's long-term prosperity and well-being.

### [Policy Win: Ontario Marks Completion of Darlington Unit 2 Refurbishment Project Five Months Ahead of Schedule](#)

In a major win for sustainable energy and Ontario's economic future, we are pleased to announce that Ontario has completed the refurbishment of Unit 1 at the **Darlington Nuclear Generating Station**, five months ahead of schedule. This key achievement will deliver 875 megawatts (MW) of reliable, affordable, and clean power for the next 30-plus years, enough to supply energy to 875,000 homes. The \$12.8 billion project, along with the subsequent three decades of station operation, is expected to generate \$90 billion in economic benefits for Ontario and create 14,200 jobs annually. This milestone underscores the impact of OSPE's advocacy efforts, which have played a leading role in promoting sustainable energy solutions that align with the province's economic and environmental goals.

### [Policy Win: Asahi Kasei Breaks Ground on Electric Vehicle Battery Separator Plant in Port Colborne](#)

OSPE is excited to announce that the **Government of Ontario** is celebrating the commencement of construction on **Asahi Kasei's** \$1.7 billion manufacturing facility in **Port Colborne**, which will produce lithium-ion battery separators—an essential component of electric vehicle (EV) batteries. OSPE has long advocated for the acceleration of transportation electrification, including the widespread adoption of EVs and the infrastructure

needed to support this expanding sector. This new plant, the first of its kind in **Canada**, plays a crucial role in strengthening **Ontario's** end-to-end EV and battery supply chain, boosting the production of Ontario-made EVs and creating additional job opportunities in the region.

### [Policy Win: Ontario Building More Electric Vehicle Charging Stations](#)

OSPE has been a strong advocate for the adoption of EV infrastructure to support the electrification of transportation in Ontario. In line with this vision, the **Government of Ontario** is adding over 1,300 new electric vehicle (EV) charging ports in small and medium-sized communities. This marks a significant step in the province's plan to expand access to EV chargers beyond large urban centers and promote the electrification of transportation throughout Ontario. As more people in the province transition to EVs, the addition of these charging stations will improve connectivity, fill gaps in the network, and ensure that residents across Ontario feel more confident in adopting electric vehicles.

## LETTERS AND SUBMISSIONS

### October 3 - Letter to Premier Doug Ford

OSPE sent a letter to Premier Doug Ford regarding his recent announcement about **Bill 212 – Reducing Gridlock, Saving You Time Act**, which employs blatant favouritism towards motor vehicle users to the detriment of more vulnerable road users. Not only this, Bill 212 is tied to the exclusion of Highway 413's environmental impact process - a project which OSPE publicly called on the government to cancel back in 2021. We have sent a letter opposing this and submitted a comment on the consultation that arose from this act.

### November 12 - Letter to the Minister of Energy, Stephen Lecce

In response to the content of minister Stephen Lecce's press conference regarding Ontario's Affordable Energy Future Plan, OSPE sent him a letter. OSPE lobbied the minister to include thermal networks and technologies in his plan.





# OSPE Launches Project to Enhance Gender Equity Through Flexible Work Options



The **Ontario Society of Professional Engineers (OSPE)** is thrilled to announce the launch of a transformative new initiative aimed at advancing gender equity in the workplace. This 3-year project, titled “**Advancing Gender Equity by Embedding Flexible Work Options**” is set to drive systemic change and promote economic security and prosperity, particularly within STEM fields in Ontario.

Finding a balance between work and personal life can be tough, especially for women in demanding STEM careers. An **International Workplace Group (IWG)** survey found that 82% of women believe that flexible work arrangements allow them to prioritise their family and

children. More than half of respondents who identify as caregivers viewed flexible work arrangements as a caregiving benefit.

Women and caregivers face challenges when balancing their work and family responsibilities and often must choose between one or the other. Our goal is to break down these barriers and create workplaces that support everyone, regardless of their personal commitments.

The initiative funded by **Women and Gender Equality Canada (WAGE)** will unfold in three distinct but interconnected phases:

## Research and Analysis

The first phase involves a thorough exploration of existing workplace policies. This includes a comprehensive literature review, surveying OSPE members, and engaging directly with employers to gather their views and experiences regarding flexible work options. This research will provide a solid foundation for understanding the current landscape and identifying gaps and opportunities. To participate in OSPE's Work-from-Home Survey click [here](#).

## Policy Development and Promotion

Based on the insights gathered, OSPE will create a Model for Flexible Work Policies. This model will serve as a blueprint for employers, offering guidelines and best practices for implementing flexible work arrangements. The promotion of this model will be a key focus, and OSPE aims to reach both public and private sector employers across Ontario to encourage widespread adoption.

## Advocacy and Implementation

In the final phase, OSPE will engage in targeted advocacy efforts to promote the adoption of the flexible work

model. This will involve collaboration with a diverse range of stakeholders, including industry leaders, policymakers, and advocacy groups. An external evaluator will be appointed to monitor progress and assess the project's impact, ensuring that the initiative meets its goals and delivers tangible results.

We're excited about the difference this project can make, but we can't do it alone. We're calling on employers, industry leaders, and community members to get involved and support this initiative. Stay tuned to our [blog](#) for updates on our progress and find out how you can be a part of this important change.

For more details or to get involved, get in touch with us directly at [advocacy@ospe.on.ca](mailto:advocacy@ospe.on.ca). Let's work together to make a positive impact and create a better work environment for everyone in STEM!

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*This project has been funded through Women and Gender Equality Canada's Women's Program.*



Women and Gender  
Equality Canada

Femmes et Égalité  
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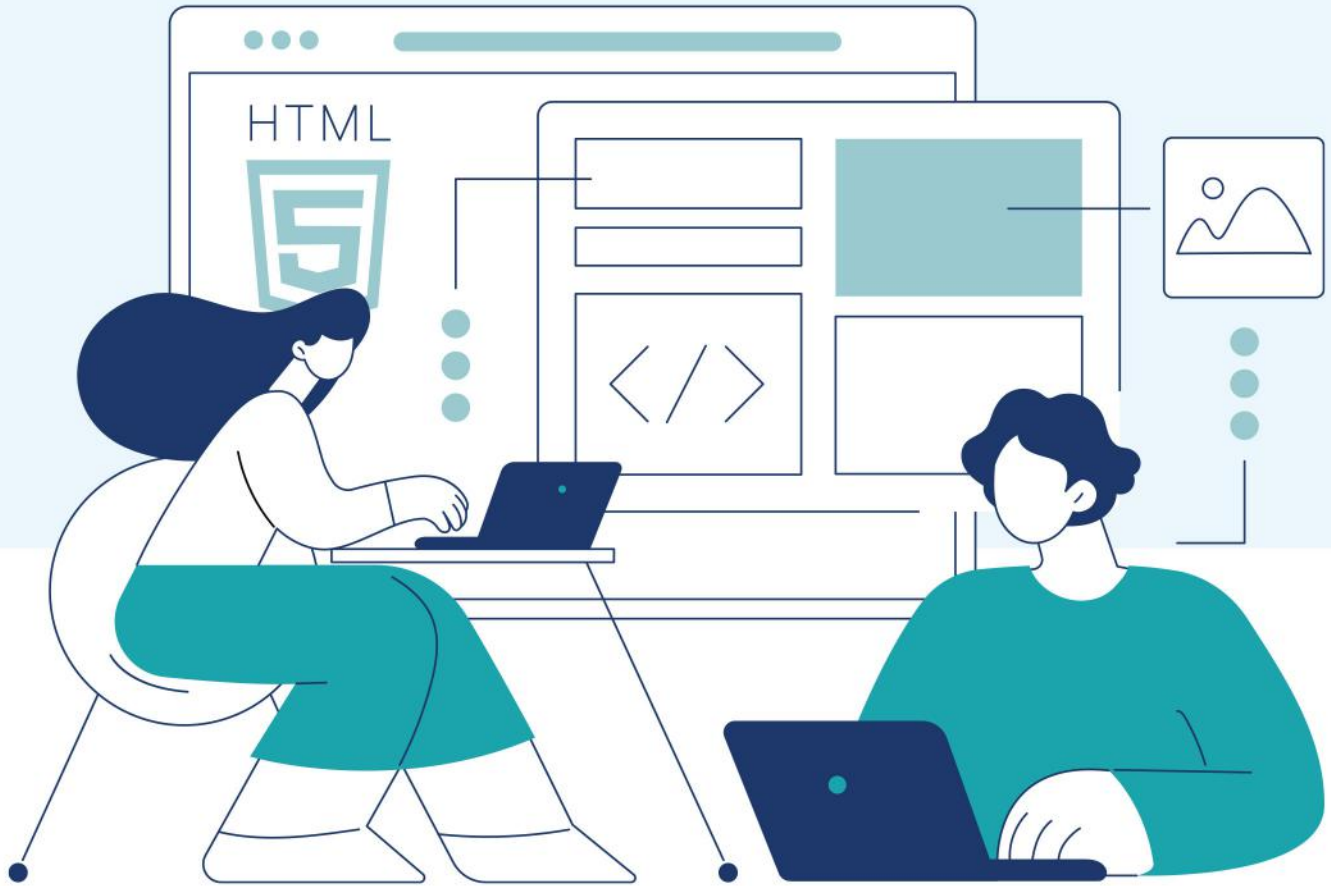
Please note the OSPE offices will be closed from **December 25th through January 1st**. Staff will not be available during this time, but you can continue to access all member services as usual or browse upcoming events.

Wishing you the happiest of holiday seasons,

The OSPE Team



# We're launching our new website!



**Coming January 2025**

Just in time for OSPE's 25th anniversary, we're proud to announce that this January we'll be launching the new and improved OSPE website, featuring:

- ✓ A Modern New Look
- ✓ Easier Navigation
- ✓ More Ways to Engage

# Looking Backward - Looking Forward: Remembering December 6th

Provided by Western University



December 6th marked the **National Day of Remembrance and Action on Violence Against Women** and the 35th anniversary of the murder of 14 young women at **Polytechnique Montréal** - 12 of them engineering students - in a tragic act of antifeminist violence. On this day, we also remembered **Lynda Shaw**, a Western mechanical engineering student who was murdered in 1990.

As a part of this year's commemoration, we reflected on the theme "**Looking Backward - Looking Forward**", honouring the lives lost and highlighting mother and

daughter engineers who inspire progress and hope for the future.

In this video series, we spoke with 12 multi-generation pairs of women engineers to hear how they responded to the events of December 6 and what their hopes are for women in engineering.

On behalf of **Western Engineering**, thank you to all who participated in this project and shared their stories.

**Please click on the images to view each video story.**

**Mary Wells, P.Eng.**, McGill University (Class of 1987) & **Patricia Owen**, McMaster University (Class of 2024)



**Emily Moore, P.Eng.**, Queen's University (Class of 1992) & **Evelyn Cudmore**, McMaster University (Class of 2024)



**Christine Haas, P.Eng.**, Western University (Class of 1993) & **Alyssa Haas**, McMaster University (Class of 2021)



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**Annette Bergeron, P.Eng.**, Queen's University (Class of 1987) & **Noelle Bergeron**, McGill University (Class of 2019)



**Susan Goertz**, Western University (Class of 1996) & **Samantha Goertz**, Western University (Class of 2024)





# 35 Years After the Montréal Massacre: Reflecting on Gender Equity and Discrimination in Engineering



By: Shivani Nathoo, P.Eng., EDIA Task Force Chair and Naomi Williams, P.Eng., PMP

December 6th marked the 35th anniversary of the Montréal Massacre, the day when an armed man killed 14 women and injured 13 other individuals at **Polytechnique Montréal**. The shooter's focus on women in engineering left a profound impact on the engineering community, causing us to come together and reflect on gender-based violence in the profession every year since. Now, 35 years on, what can we say about gender equity and discrimination in the field and in society as a whole?

Engineering undergraduate enrolment has diversified significantly, with women making up 27% of students in engineering programs in Ontario. However, despite the rise in women in engineering education, the proportion of newly licensed professional engineers who are women has stagnated around 19% in Ontario since 2018.<sup>1,2</sup>

In a study of engineering graduates in Canada, Chan et al found that women were more likely than men to go the non-traditional path and move away from engineering into another discipline.<sup>3</sup> Breaking this down further, racialized women were almost twice as likely to go the non-traditional path than white women. It is difficult to pinpoint one specific reason causing women to leave the field. Nor is it the same reason for all women. While women in engineering are all at risk of misogyny and discrimination, a woman's experience in engineering will also be impacted by her other identities. For example, Chan et al found that racialized women had a weaker sense of belonging than others in engineering but did not notice a similar discrepancy with white women.

According to **Statistics Canada**, "49% of LGB+ women and 35% LGB+ men experienced unwanted sexual behaviours in the workplace... more than among heterosexual women (28%) and men (16%)." Research from **Reidy, Baumler, and Temple** found that for STEM majors that had gender parity, women were more likely to experience sexual violence than women in other majors. Further study also revealed that women of a sexual minority (i.e. LGB+) were more likely to experience sexual violence than heterosexual women in the same program.

Notably absent from the statistics is information on other gender minorities, including transgender, and non-binary people, who are significantly more likely to experience gender-based violence and unwanted sexual behaviours in the workplace than their cisgender counterparts. Some of the studies and data sources are not collecting data on other gender minorities. Others were unable to report on the experiences of other gender minorities due to a small number of respondents. The same can be said for Indigenous women and 2-spirit individuals, who are also disproportionately affected by gender-based violence in society at large, which can translate into the workplace.

Last year, the **Equity, Diversity, Inclusion and Accessibility Task Force** talked about the importance of data collection, including a more comprehensive list of gender identities on forms and in studies to allow the profession to take stock of where we are and work to become more equitable. Building upon that, we are calling upon the engineering community to think bigger. There is no single solution for addressing inequities within the field, reducing gender-based violence and workplace harassment, and improving gender equity. To fix these issues, we need to apply an intersectional lens, work from a variety of different angles, and work collectively. Additionally, gathering data on gender and race, sexual orientation, ability, and other identity dimensions is crucial for cataloguing inequities in the field, and working to address them.

As we observe the 16 Days of Activism against Gender-Based Violence and the National Day of Remembrance and Action on Violence Against Women, let us recommit ourselves to the ongoing work of reducing gender-based violence and discrimination in the engineering community.

## Works Cited

1. <https://www.peo.on.ca/sites/default/files/2024-04/2023fullregulatorystats.pdf>
2. <https://www.peo.on.ca/sites/default/files/2024-04/2023fullregulatorystats.pdf>
3. <https://nemo.asee.org/public/conferences/344/papers/41619/view>

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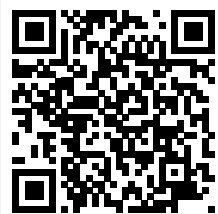
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# The Nuclear Waste Management Organization Selects Site for Canada’s Deep Geological Repository



On November 28, 2024, **The Nuclear Waste Management Organization (NWMO)** announced it has selected [Wabigoon Lake Ojibway Nation \(WLO\)](#) and the [Township of Ignace](#) as the host communities for the future site for Canada’s deep geological repository for used nuclear fuel.

Canadians and Indigenous peoples have been clear that it is essential to take responsibility now, in this generation, to safely manage Canada’s used nuclear fuel for the long-term. This announcement is an important milestone in delivering on that promise to not leave it as a burden for future generations to manage.

“This is a historic moment,” said Laurie Swami, NWMO President and CEO. “This project will solve an environmental issue and supports Canada’s climate change goals. And today’s decision was driven by a

consent-based siting process led by Canadians and Indigenous peoples. This is what making history looks like.”

There is international scientific consensus that a deep geological repository is the safest way to manage used nuclear fuel over the long term, and Canada is among the leading countries on this solution.

The NWMO launched its community-driven, consent-based site selection process in 2010. It included clear commitments that Canada’s plan for used nuclear fuel could only move forward in an area with a site that meets rigorous safety standards and that has informed and willing hosts. The project also needs to be implemented in a way that advances community well-being as defined by the host communities.



The people of both host communities have demonstrated their willingness to move forward in this process. Earlier this month, WLON confirmed its willingness, following a decision-making process that was open to all its members. **The Township of Ignace** completed a decision-making process with its residents in July, which also confirmed willingness.

This important decision for Canada was possible because of the communities' leadership and active engagement over a decade of learning, as well as considering the future of their communities. The safety of the site was also established through rigorous site assessment and technical studies.

"We have learned so much from all the communities that took part in this process over the years," said Lise Morton, NWMO Vice-President of Site Selection. "By challenging us, they helped the NWMO grow and become a better organization, and they directly shaped this project."

The project will drive a wide range of benefits for both host communities, the region and Canada as a whole over the 175-year timeline of the project. These include new jobs and investments in community well-being driven by the priorities communities themselves defined.

As the project now advances into the regulatory decision-making process, Canada will take another step forward on this long-term management solution for its used nuclear fuel, which will protect people and the environment, including water, while supporting its goals around energy security and climate change.



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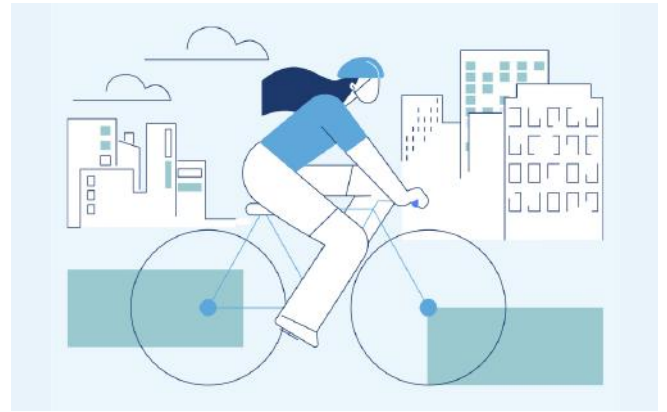
Speaker submissions are being accepted on a variety of topics, including but not limited to - innovation, technology, climate change, sustainability, infrastructure, and more.

To demonstrate your interest, complete the form linked below by **January 31st, 2025**. An OSPE team member will be in touch once your submission has been reviewed.



[bit.ly/engcon25-abstracts](https://bit.ly/engcon25-abstracts)

# Response to Bill 212: Why We Need to Rethink Bike Lanes and Embrace Multi- Modal Solutions



In Ontario, we are facing an increasingly complex transportation challenge. 80-90% of personal trips in the Greater Toronto and Hamilton Area (GTHA) are made by single-occupant vehicles, and transportation systems are disjointed, contributing to extreme congestion and significant challenges related to parking, infrastructure, and high greenhouse gas emissions.

The **Ontario Society of Professional Engineers (OSPE)** is committed to advocating for smarter, safer, and more sustainable transportation solutions. The recent proposal, **Bill 212 – Reducing Gridlock, Saving You Time Act, 2024**, proposed by **The Ministry of Transportation** on October 21st would prohibit the installation of bike lanes when motor vehicle lanes are removed, as well as exclude highway 413's environmental impact process and assessment. OSPE believes this is a step in the wrong direction for Ontario's future.

This proposed legislation risks reinforcing a car-centric approach to urban planning that prioritises vehicles over pedestrians and cyclists. Limiting bike lane installation and removing environmental assessment processes for major highway projects does nothing to reduce gridlock. In fact, it actively ignores the growing demand for more sustainable, safe, and diverse transportation options.

## The Need for Multi-Modal Transportation

The key to solving Ontario's traffic woes is not about maintaining the status quo of car-dominated roadways. Instead, we need to embrace multi-modal transportation — an approach that supports different forms of transport that cater to the needs of the people in each community.

OSPE firmly believes that each municipality should have the ability to design and implement transportation infrastructure that suits its communities' unique needs. Different neighbourhoods face different challenges, and the solutions must be tailored accordingly.

For instance:

### In High-Density Areas:

- In areas with dense populations, the answer is often mass transit. Light Rail Transit (LRT) and Bus Rapid Transit (BRT) systems, when feasible, can move large numbers of people quickly and efficiently, easing traffic congestion and reducing pollution in densely populated downtown areas.

### In Low-Density Areas:

- For areas with less robust public transit infrastructure, solutions like On-Demand Transit (ODT) are proving to be successful. Edmonton, for example, boasts the largest ODT network in Canada, providing flexible, cost-effective transportation where traditional transit may not be viable.

## Urban Core: Addressing the Safety of Vulnerable Road Users

Perhaps the most compelling reason for rethinking transportation policy is safety. Ontario, like many other regions, has seen tragic incidents involving vulnerable road users — particularly cyclists. Just this year, six cyclists were killed on Toronto's streets. Bill 212 disregards the safety of these individuals, which is not only unacceptable; but dangerous.

Limiting bike lanes undermines efforts to make our roads safer for all users. By encouraging more cycling and creating designated lanes, we protect cyclists, reduce traffic congestion, and make the streets safer for everyone — drivers, pedestrians, and cyclists alike.

## Empowering Municipalities

One of the biggest concerns with the proposed



legislation is that it would limit municipalities' ability to make decisions based on their communities' specific needs. Cities like Toronto, Ottawa, and Hamilton all face different transportation challenges, and it's essential that local governments have the flexibility to address these issues on their own terms.

Instead of restricting municipalities' ability to install bike lanes, we should empower them to make decisions that reflect the realities of their communities. Each city should be able to create a transportation strategy that prioritises safety, sustainability, and accessibility for everyone — not just motorists.

### The Way Forward: A Commitment to Forward-Thinking Policies

OSPE has commented on the ongoing consultation pertaining to Bill 212 and urges the **Government of Ontario** to reconsider the proposed legislation and adopt a more forward-thinking approach to transportation. We believe that a balanced strategy, which supports both cyclists and motorists, is key to addressing gridlock, improving safety, and enhancing the quality of life for all Ontarians.

Rather than reverting to outdated, car-centric policies, we must invest in a diverse range of public transportation options, including cycling infrastructure, to make our roads safer and our cities more sustainable. We owe it to our communities to develop solutions that will support our growing population, reduce emissions, and ensure that all road users can navigate the streets safely and efficiently.

As we look to the future, we hope that the Ontario government will adopt a progressive transportation strategy that prioritises safety, environmental considerations, sustainability, and municipal autonomy. After all, the future of Ontario's transportation system must be one that works for everyone — whether they are driving, cycling, walking, or taking transit.

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# Effective Transportation as the Key to Sustainable Cities

Mukul Asthana, P.Eng., MBA, and Mo Yousefpour, MEng, EIT





Transportation plays a crucial role in shaping the future of sustainable cities. Effective transportation systems are not only essential for reducing greenhouse gas (GHG) emissions and air pollution but also for enhancing the quality of life, economic opportunities, and social equity (Shifan et al., 2003; Song et al., 2013; Steg & Gifford, 2005). This article explores how an integrated and efficient transportation ecosystem can transform the Greater Toronto and Hamilton Area (GTHA) into a model of sustainability and urban livability. By examining successful examples from global cities like **Hong Kong, Paris, Helsinki, Copenhagen, Singapore,** and **Amsterdam**, this article offers recommendations for the GTHA to overcome its current transportation challenges, prioritize funding for key projects, and create an environment where all residents, including the affluent, choose public transit over personal vehicles.

The rapid urbanization of the GTHA presents both opportunities and challenges. As the region continues to grow, it is crucial to develop a sustainable transportation system that supports economic vitality, environmental health, and social inclusivity. Transportation is often referred to as the backbone that keeps cities functioning smoothly, enabling residents to access jobs, education, healthcare, and other essential services. However, in the GTHA, challenges such as low public transit ridership due to safety concerns, lack of reliability, and failure to meet customer satisfaction, combined with traffic congestion, inadequate infrastructure, and limited coverage hinder the effectiveness of the transportation system and its ability to support a sustainable and thriving urban environment. This white paper argues that addressing these issues through a comprehensive transportation strategy is key to creating a sustainable and high-quality urban environment in the GTHA.

## The Role of Transportation in Sustainable Cities

### Quality of Life

Effective transportation systems are fundamental to improving the quality of life in urban areas (Litman, 2017; Othman & Ali, 2020). In the GTHA, well-planned transportation can lead to better standards of living by ensuring that residents have access to affordable housing, employment opportunities, and essential services. When people can move efficiently and affordably within a city, it reduces stress, saves time, money, and enhances overall well-being.

### Environmental Benefits

Transportation is one of the major contributors to GHG

emissions and air pollution (Domke et al., 2022). By shifting from car-dependent travel to more sustainable modes of transport, such as public transit, and active transportation modes like biking, the GTHA can significantly reduce its environmental footprint. A well-integrated transportation network can help achieve climate goals by lowering emissions, reducing energy consumption, and minimizing the impact on natural resources.

### Circular Economy

Transportation systems can also support the development of a circular economy by promoting resource efficiency and reducing waste (De Abreu et al., 2022). In 2021 (Statistics Canada, 2023), nearly 74% of Toronto census metropolitan area (CMA) workers commuted by car, with 85% driving alone. Average commute times were 25.5 minutes by car, 47.6 minutes by public transit, and 15.6 minutes by walking or cycling. Transit users faced longer commutes, with 40% of trips lasting 60 minutes or more. Commuters from neighboring areas like **Oshawa, Hamilton, Barrie,** and **Guelph** were heavily car-dependent, often driving alone, and those using public transit typically experienced significantly longer travel times compared to those driving. A large majority of workers who commuted southbound to Toronto from Barrie (97.0%) and eastbound from Guelph (96.0%) traveled by car, with over 90% of these vehicles carrying just one person—the driver.

It is worth mentioning that the monthly cost of owning a vehicle in Toronto has risen to \$1,623, up from \$1,068 per month in 2019 (Gauthier, 2024). In comparison, the average cost across Canada is \$1,300 per month (Casemore, 2024). Despite these expenses, vehicles remain parked 95% of the time. Many residents are compelled to rely on personal vehicles for their work-home commute due to the absence of a seamless, efficient, reliable, and safe means of transportation. Integrating shared mobility options, such as ride-sharing and bike-sharing, can help optimize transportation systems, reduce reliance on personal vehicles, and support the development of a circular economy by promoting resource efficiency and reducing waste (Machado et al., 2018).

## Creating a Supportive Ecosystem for Sustainable Transportation

### Urban Planning Integration

Integrating transportation infrastructure with urban planning is essential to creating a sustainable transportation ecology, especially in high-density

developments and new housing projects. By ensuring that residential and commercial areas are well-connected to public transportation, this strategy makes it simpler for individuals to select environmentally friendly means of transportation over private automobiles.

The significance of **Transit Oriented Communities**—where significant efforts are being made to boost the amount of new housing units was a discussion at an **Association of Municipalities of Ontario** meeting this year. The province's commitment to this program aligns with the broader goal of meeting housing targets while enhancing public transit connectivity.

In a recent speech, the **Hon. Paul Calandra**, minister of municipal affairs and housing recognized significant progress in surpassing housing pledge commitments in Oakville, showcasing how effective urban planning can integrate transit options within both greenfield areas and new high-rise developments. An example of this is the **Hurontario Light Rail Transit (LRT)**, where routes are being strategically planned to serve new high-rise developments, demonstrating the potential of integrated planning to support sustainable urban growth.

## Active Transportation and Public Transit User Satisfaction

There is a strong correlation between active transportation (walking, cycling, and other human-powered modes), public transit user satisfaction, and increased ridership. Encouraging walking and cycling, along with reliable and efficient public transit, can boost transit use, reduce congestion, and promote a healthier population. Public transit systems should be designed to cater to the needs of all users, providing safe, convenient, and accessible options that enhance user satisfaction. Enhancing passengers' satisfaction with various service attributes is considered crucial for boosting the overall appeal of public transit. This, in turn, can lead to increased patronage by encouraging more frequent use and fostering long-term loyalty. Gaining insights into the factors influencing transit users' satisfaction is essential, as it helps predict their likelihood of continued service use, increased expenditure, and willingness to recommend the service to others (Dixon et al., 2010; Van Lierop & El-Geneidy, 2016).

To enhance public transit systems and foster greater user satisfaction, transit agencies should prioritize several critical improvement strategies. These include elevating service quality by incorporating rail-like features into bus services, focusing on reliability rather than merely increasing service frequency, and ensuring high standards of safety through careful vehicle operation

and robust security measures. Improving users' perception of safety can be achieved by increasing the presence of police, installing surveillance cameras, and enhancing overall service reliability. Additionally, providing accessible, accurate on-board information and maintaining high levels of cleanliness, especially in rail stations, are crucial for improving overall user satisfaction. By addressing these aspects, transit agencies can significantly boost user loyalty, encourage more frequent use, and ultimately strengthen the appeal of public transit systems. Understanding and implementing these strategies is essential for predicting continued service use, increased expenditure, and positive recommendations from users (Chakrabarti & Giuliano, 2015; Diab & El-Geneidy, 2014; Van Lierop & El-Geneidy, 2016; Yavuz & Welch, 2010).

Another method to increase public transit ridership is through active transportation, especially bike-share programs. As of April 2021, approximately 1,993 cities globally had implemented bike-share programs, collectively using over 9,387,903 bicycles. Additionally, around 291 other cities were in the process of planning or developing similar bike share initiatives (Godavarthy et al., 2022; Meddin et al., 2020). The GTHA faces several challenges in urban mobility, including high car ownership rates and limited walking and cycling infrastructure. In congested cities like Toronto, land is limited, thereby the city cannot accommodate transit, cars, buses, bicycles, and sidewalks all at the same time. What the city can do is prioritise cyclists and pedestrians where applicable and make sure we can accommodate connecting them to a public transit system.

The **Bloor Street Bike Lane Pilot Project**, approved by **Toronto City Council** in May 2016, involved installing separated bike lanes on **Bloor Street West** from **Shaw Street** to **Avenue Road**. The project aimed to assess the impact of bike lanes, with results presented to the **Public Works and Infrastructure Committee and Toronto City Council** in late 2017.

Key outcomes included a 56% increase in cycling, a 44% reduction in conflicts, and positive economic impacts, such as higher customer spending (Smith Lea et al., 2017). A 2016 research study found that around 4.35 million trips within the GTHA could feasibly be made by bicycle, representing about one-third (33%) of all trips that are not currently taken on foot or by bike. Among these potentially cyclable trips, more than half (53%) are relatively short, spanning distances of 1 to 3 kilometers (Mitra et al., 2016). Neighbourhoods with a higher percentage of short trips (below 4 km) and trips between 4-8 km are more likely to have a higher cycling mode share. This suggests that short trips currently not made by bicycle present an opportunity to increase cycling as a



mode of transportation (Assunção-Denis & Tomalty, 2019). Several studies indicate that bike sharing is generally linked to public transit ridership, though the nature of this relationship is not fully understood (Campbell & Brakewood, 2017; Martin & Shaheen, 2014; Saberi et al., 2018; Zhang & Zhang, 2018). Bike sharing can either substitute public transit, potentially decreasing ridership, or complement it, particularly by addressing the first-mile/last-mile issue, thereby increasing ridership.

Alternatively, bike sharing might be used for recreation, with no effect on transit usage. The interaction between bike sharing and public transit can vary depending on the user or context. According to the **2017 National Household Travel Survey** conducted in the **United States of America**, researchers found that increased public transit usage leads to more frequent use of bike sharing. Specifically, a rise in public transit use boosts bike sharing usage by 1.4% for first-mile/last-mile trips and 4.0% overall. This suggests that bike sharing effectively connects public transit stations with destinations. The positive link between bike sharing and public transit is stronger in areas with high population density and rail service. This means bike sharing and public transit can work well together, especially in more urbanized areas (Zhang & Zhang, 2018). To maximize the benefits, it's important to integrate these transport modes effectively in planning and policy.

### Removing Barriers to Public Transit Use

One of the key challenges in the GTHA is the reliance on personal vehicles. To shift people towards public transit,

it is necessary to remove barriers by offering first-mile/last-mile solutions such as ride hailing, ridesharing, and access to floating shared bikes and e-scooters. These services can make public transit more accessible and convenient, particularly for those who live in areas with limited transit coverage. **Innisfil** implemented a subsidy program for Ubers and taxis, believing it would be more cost-effective than running traditional bus services. This partnership between **Innisfil** and **Uber** greatly improved mobility options for residents and encouraged the use of ridesharing.

The introduction of fixed-fare destinations further increased the number of subsidized ridehailing trips (Benaroya et al., 2023). In October 2021, **Fort Erie** underwent a significant transformation by replacing its fixed-route system, which consisted of four buses, with an on-demand service. This new system employed a fleet of four standard minivans and two handicap-accessible minivans instead of the previous four gasoline buses. In addition to making it possible to carry more passengers, the switch to on-demand services resulted in significant fuel savings that cut carbon dioxide emissions each ride by more than 60%. This transformation has made public transit more accessible and affordable for all residents of Fort Erie. Interviews with town employees and preliminary survey results indicate a high level of customer satisfaction, with over 90% of respondents reporting that their trips were satisfactory (Powell et al., 2023). This increase in customer satisfaction is also reflected in a notable rise in ridership.

Another approach is connecting people to transit stations



via app-based **On-Demand Transit (ODT)** services like **Uber** and **Lyft**. People may choose to use this type of service because it is reliable, predictable, and flexible. However, in a report, (Weinreich et al., 2020) analyzed the effectiveness of transportation network companies like **Uber** and **Lyft** when used as public transportation in providing first-mile/last-mile service connecting users to transit services. They found that people are not comfortable booking their ODT service and transit service on different apps. Additionally, when the ODT service lacks a fixed stop, has an uncoordinated schedule, and offers transfers without discounts, it creates uncertainty for riders.

They were unsure whether they would make their train, where they should wait for their ODT service, and they are required to pay the full cost for both. This illustrates that transportation network companies have been unable to gain the trust of riders. Moreover, when these first mile/last mile ODT services are provided by a different agency or a private company, they are more likely to deliver unsatisfactory outcomes. **Mobility-as-a-Service (MaaS)** integrating mobility services to reduce vehicle ownership by solving first-mile/last-mile, lower carbon emissions, ease congestion, and scale back parking in favor of more public space.

Combining public transport, car sharing, bike sharing, mopeds, electric scooters, and taxis in a single platform from booking to paying can save money and time for the user. One of the best advantages of MaaS is reduced traffic congestion and excess driving. MaaS is crucial for the future of transportation as it can make transportation available anywhere and anytime. It is also capable of efficiently routing vehicles and determining fleet size and composition (Alonso-Mora et al., 2017; Wallar, Alonso-Mora, et al., 2019; Wallar, Schwarting, et al., 2019).

The GTHA lacks a dedicated app that would seamlessly integrate its multimodal public transit system. In **Markham**, a first-mile ODT study was conducted and aimed to supplement the current **GO Transit** commuter train system. The analysis involved assessing various operational scenarios using different types of on-demand solutions and their potential to replace car-based trips to four GO train stations in **Markham**. They also considered aspects like vehicle capacity and fleet size in their scenarios. The wait time, travel time, demand served, cost, and environmental impact were assessed during morning peak hours.

The results of their evaluation showed that three cases using vans provided the most favourable outcomes. Also, the van-based scenario the evaluation led to the conclusion t used 75% of the optimal fleet size and had a low detour factor emerged as particularly suitable for the

case study. This scenario was projected to result in a 7% monthly cost saving for passengers compared to using a private car and paying for parking fees. Additionally, this scenario contributed to a 30% reduction in greenhouse gas emissions compared to the current mode of personal vehicle-based trips (Bürstlein et al., 2021).

## High-Quality Public Transit for All

A truly sustainable and equitable city is one where all residents, regardless of income, choose public transit as their preferred way to travel. To achieve this, we need a transit system that is not just efficient and reliable, but also comfortable, safe, and convenient. By making public transit appealing even to the wealthiest residents, the GTHA can lead the way in inclusivity and sustainability.

This vision can be brought to life by offering discounted or free transit passes for students, seniors, and low-income residents, making public transit accessible to everyone. Seamless connections between buses, trains, and bike-sharing systems would allow for easy, uninterrupted journeys. In addition, well-maintained, clean infrastructure, real-time tracking apps, frequent services, and comfortable waiting areas, especially in cold and hot weather, all play a vital role in improving the transit experience.

The GTHA can also promote transit use by creating communities where housing, jobs, and amenities are close to transit hubs—this is known as transit-oriented development. Higher parking fees or congestion charges for driving in urban areas can encourage more people to leave their cars at home. Lastly, public awareness campaigns, loyalty programs, and reward systems can motivate residents to embrace public transportation as a regular part of their lives, fostering a strong culture of transit use across all income levels.

## Case Studies and Comparative Analysis

The Urban Mobility Readiness Index (UMRI), developed by the Oliver Wyman Forum in partnership with the University of California at Berkeley, is an innovative annual ranking that assesses how well global cities are prepared to lead the future of mobility. The data and findings from the UMRI have provided a solid foundation for understanding the current state of urban mobility and the key factors driving its evolution. The information extracted from this report has been instrumental in analyzing and evaluating the preparedness of various global cities to lead the future of mobility, with a focus on their public transit systems, cycling infrastructure, and sustainable urban planning initiatives (Oliver Wyman Forum, 2023).

## Singapore

Singapore's public transit system is offering a variety of transportation options, reasonable fares, quick travel times, and stations conveniently located within walking distance for most residents. This robust network earns Singapore the third spot in the public transit sub-index. The city-state plans to enhance station accessibility by expanding its rail network, aiming to have 80% of households within a 10-minute walk of a station by 2030 as part of its "45-minute city" initiative. With a relatively low car ownership rate and advanced traffic management, Singapore experiences minimal congestion. The low car ownership is partly due to the \$76,000 license required to purchase a vehicle.

## Hong Kong

For the second consecutive year, Hong Kong ranks first in the public transit sub-index, owing to its efficient, affordable, and accessible transit system. Public transit accounts for 71% of all distance traveled in the city, highlighting the effectiveness of its dense and well-connected network. Ongoing investments, like the new station linking the eastern and western New Territories, further strengthen the system.

Hong Kong's **Mass Transit Railway Corporation (MTRC)** stands out as one of the few profitable public transit systems globally, thanks to a model that combines transit operations with real estate development. The MTRC develops and manages properties around its stations,

generating substantial revenue that supports its transit operations (Aveline-Dubach & Blandeau, 2019). This approach could be adapted to the GTHA, where transit-oriented development could provide new revenue streams and alleviate the financial pressure on public funds.

## Helsinki, Paris, Copenhagen, Amsterdam

Cities like **Helsinki**, **Paris**, **Copenhagen**, and **Amsterdam** are renowned for their successful public transit and active transportation networks. **Helsinki**, in particular tops the **Urban Mobility Readiness Index**, showcasing the value of a holistic approach to urban transport. Contributing factors to **Helsinki's** success include extensive car-free zones, substantial investments in EV charging infrastructure, advanced cycling infrastructure, and an expanding public transit network with affordable fares. The city's public transit system is both comprehensive and cost-effective, with a \$3 ticket granting access to multiple modes of transport. Additionally, 94% of residents in the **Helsinki/Vantaa** area live within 300 meters of a protected bikeway.

**Paris** has made significant investments in expanding its subway and bus systems, while **Copenhagen** and **Amsterdam** have emerged as global leaders in cycling infrastructure. **Amsterdam's** urban mobility strategy prioritises cycling and active transportation, with over a quarter of all trips currently made by bike. The city aims to increase this figure to 35% by 2030, highlighting the advantages of investing in dense cycling infrastructure and establishing car-free zones.



**Copenhagen** stands out as a leader in sustainable mobility, featuring dedicated car-free zones and extensive cycling infrastructure that encourages residents to choose bikes over cars. In 2022, the city introduced five new “Cycle Superhighways” — routes that allow cyclists to commute across municipal borders, covering a total of 25 kilometers. This emphasis on active mobility has reduced light and noise pollution and improved air quality. **Copenhagen** also boasts one of the world’s most robust multimodal public transit systems, known for its affordable fares and extensive operating hours. These factors place **Copenhagen** among the top five in the sustainability and public transit sub-indexes. Additionally, a new light rail system serving the greater metro area, with trains running every five minutes in each direction during daytime hours, is set to open in 2025.

While the GTHA has made some progress in expanding its transit network, it still behind these global cities in terms of coverage, efficiency, and user satisfaction. By adopting best practices from Singapore, Hong Kong, Helsinki, Paris, Copenhagen, and Amsterdam, the GTHA can overcome its current challenges and build a transportation system that meets the needs of its growing population.

## Addressing Funding and Operational Challenges

### Funding Priorities & Revenue Generation

Mega transit projects, such as new subway lines and regional express rail, should be the focus of public investment. At the same time, existing transit services must be improved to enhance reliability and user satisfaction.

The GTHA can explore innovative funding models to support transportation projects. One option is to dedicate the entire gas tax to transportation infrastructure, providing a stable source of funding. Additionally, real estate development around transit hubs can generate significant revenue, as demonstrated by **Hong Kong’s** MTRC model (Aveline-Dubach & Blandeau, 2019). Another potential way to fund public transit is through taxes and fees based on “ground rent theory.” This idea, first proposed by **John Stuart Mill**, suggests taxing landlords who benefit from rising property values due to urban development (Mill, 2024). Popularized by **Henri George** in the **United States of America**, this approach, using “land value capture mechanisms” is used in cities like **Los Angeles**, where taxes are applied to properties near new transit lines (Stopher, 1993). A similar method could be used in the GTHA to help fund transit projects.

## Cost Reduction and Technological Integration

Reducing operational costs is critical for the financial sustainability of public transit. By leveraging technology, such as automated fare collection, real-time data analytics, and predictive maintenance, transit agencies can operate more efficiently and provide better service to passengers. Another approach to reducing operational costs and shortening travel time is by electrifying the GO rail system. Electrified trains offer a significant advantage in acceleration and deceleration compared to traditional diesel-powered trains. The instant torque provided by electric motors allows these trains to reach optimal speeds much faster, which is particularly beneficial for routes with frequent stops. Additionally, electric trains can decelerate more efficiently through regenerative braking systems, which not only slows the train more quickly but also recaptures energy that can be reused. This ability to speed up and slow down rapidly without sacrificing efficiency or energy consumption drastically reduces overall travel time, making rail travel more competitive with other forms of transportation. Consequently, electrification can lead to increased passenger throughput and more cost-effective operations over the long term.

The GTHA can effectively use digital transformation and data analytics to use active transportation, especially public transit (rail, LRT, BRT, buses) to become far more efficient.

With digital transformation taking place in the GTHA, we can collect large amounts of raw data through digital means. This can be anonymized, analyzed in real-time and shared to users (passengers) who can use it in real-time to help plan commute schedules. They will be able to travel seamlessly, reliably, affordably, comfortably, with minimal wait times/delays.

Provinces, cities, investors, and project managers can make data informed decisions to cut through red tape and sluggishness; optimize routes and mobile resources efficiently and utilize assets optimally. Data driven decisions result in reduced costs, reduced project lead times and satisfied transit users.

### Real-Time Demand Prediction

To ensure that public transit meets the needs of passengers, it is vital to deploy adaptive strategies that respond to changes in demand or supply. Real-time demand predictions using one-step ahead prediction can help transit agencies manage passenger flow, optimize service levels, and prevent service deterioration. In addition to all available means of estimating and predicting attendance, the utilization of **Automated**



**Fare Collection (AFC)** technologies has enabled more advanced analysis of transit ridership (Santanam et al., 2021). Based on this, transit frequencies can be optimized to reduce wait times and control crowd size.

(Karnberger & Antoniou, 2020) examined the public transportation system in **Munich** by using automated passenger counting sensors. They constructed a gradient-boosted random forest prediction system for ridership between linked stations in parts of **Munich** by looking at weekly system averages. Another study focused on multiscale radial basis function network for predicting the irregular fluctuation of subway passenger flows at three large **Beijing** train stations. The model predicted riders at a station 30 minutes in the future using a one-step-ahead model. Their results for three empirical studies showed that their proposed algorithm could effectively predict the emergence of ridership bursts (Li et al., 2017).

### Recommendations for the GTHA

The GTHA should adopt a comprehensive policy framework that integrates transportation planning with urban development. Prioritizing transit-oriented development, this approach would ensure that new projects are well-connected to public transit, while promoting sustainable modes of transportation. To achieve long-term success, it is vital to engage the community—residents, businesses, and other stakeholders—fostering support for public transit and encouraging a shift away from personal vehicle use. Additionally, the GTHA should explore innovative funding models such as value capture mechanisms. These strategies can help alleviate the financial burden on public funds, accelerating the development of critical transit infrastructure for future.

### Conclusion

- Transportation is the key to creating a sustainable, high-quality urban environment. By learning from successful global cities, prioritising funding for critical projects, and adopting innovative strategies, the GTHA can build a transportation system that supports economic growth, environmental sustainability, and social equity. The future of the GTHA depends on its ability to transform its transportation network into a model of efficiency, accessibility, and inclusivity.
- Efficient, integrated transportation systems improve urban living, reduce stress, and provide better access to essential services. They also lower GHG emissions, shift societal behavior from car dependency to public transit use, and support a

circular economy through optimized resource use.

- Effective urban planning and robust transit infrastructure enhance sustainability. This can be achieved by promoting transit-oriented communities, improving public transit and active transportation options, and increasing user satisfaction
- To increase public transit use in the GTHA, it is crucial to address barriers by implementing first-mile/last-mile solutions such as ride-sharing, bike-share programs, and on-demand services. These strategies, combined with high-quality, reliable, and convenient public transit, can make transit more accessible and appealing, and foster a more sustainable and equitable urban transportation system.
- To enhance the GTHA's transportation network, prioritise funding for major transit projects and improvements to existing services. Explore innovative revenue models such as dedicating gas tax revenues to transit, leveraging real estate development around transit hubs, and implementing infrastructure-based taxes on properties benefiting from new transit corridors.
- To enhance public transit sustainability, focus on reducing operational costs by integrating advanced technologies such as automated fare collection, real-time data analytics, and predictive maintenance. Electrifying the GO rail system can further cut costs and travel time by providing faster acceleration, efficient deceleration through regenerative braking, and increased overall passenger throughput. Additionally, employing real-time demand prediction methods and adaptive strategies can optimize service levels and manage passenger flow effectively, ensuring better service and operational efficiency.

[For a full list of references please view the full white paper on the Ontario Society of Professional Engineers Website.](#)

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# Sustainable Engineering for the Future: Bridging the Skills Gap For Effective Carbon Emission Reduction

Yash Vyas, B.A.Sc., M.A.Sc., PhD Candidate, Medhat Shehata, PhD, P.Eng., FCSCE, Lee Weissling, PhD and Nika Zolfaghari, B.Eng., M.A.Sc.



## Introduction

Climate change poses a severe global threat, manifested through rising temperatures, frequent heatwaves, and increasing sea levels due to greenhouse gas (GHG) emissions. Nations worldwide are prioritizing decarbonization as part of their sustainability goals, guided by frameworks like the United Nations' 17 Sustainable Development Goals (SDGs). Among these, SDG11 (Sustainable Cities and Communities), SDG12 (Responsible Consumption and Production), and SDG13 (Climate Action) are particularly relevant as they inform local policies and standards aimed at mitigating climate impacts. In Ontario, the building sector is a major focus due to its significant contribution to GHGs — accounting for 22% of the province's total emissions. Initiatives such as the Toronto Green Standard align with Ontario's Climate Change Action Plan to address this challenge.

The transition to a sustainable future demands a workforce skilled in green technology and adaptation strategies. Current educational standards must evolve to emphasize skills in renewable energy, green infrastructure, and other sustainability areas. This shift is crucial for maintaining economic stability and achieving carbon emission reduction goals. Despite the growing commitment to sustainability, a skills gap amongst new hires hampers progress. Studies highlight that many companies struggle to meet sustainability targets due to a shortage of qualified talent. With the renewable industry needing millions of additional workers by 2030, the disparity between industry needs and available skills is evident. Efforts to close this gap are essential, yet many countries have yet to integrate the necessary training into their educational frameworks. This discrepancy underscores the critical need for updated education systems to better prepare students for green jobs and support the transition to a sustainable economy.

## Purpose and Scope of Study

This research investigates the sustainability skills gap by interviewing industry professionals and academic experts to understand the specific competencies needed to reduce greenhouse gas emissions effectively. The primary objective is to identify where current training and educational programs fall short and propose actionable improvements. The research seeks to spark a dialogue leading to practical changes in educational strategies and curriculum design.

This study is significant because it assesses how well educational frameworks in engineering and architecture adapt to the growing need for sustainability skills. By identifying specific gaps and evaluating the effectiveness

of current educational changes, the research will provide valuable insights for improving curricula and training, ensuring that future professionals are equipped to contribute meaningfully to environmental preservation and greenhouse gas reduction.

## Methodology

### Expert Selection

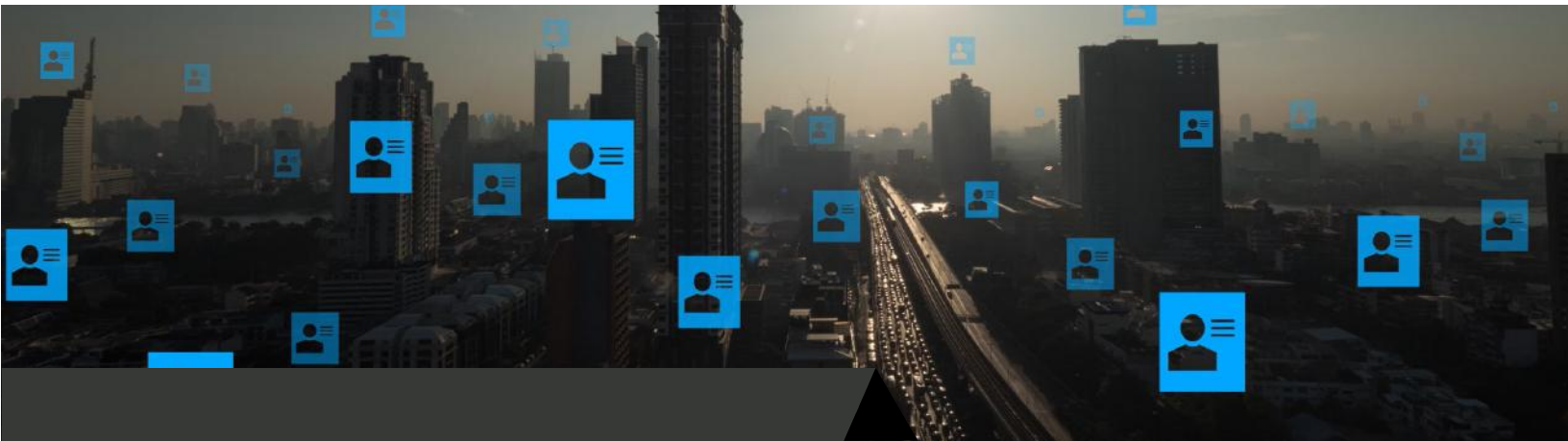
The selection of experts to interview was a critical step to ensure the collection of relevant and insightful data on the sustainability skills gap. Fifteen experts were interviewed. The following criteria were used to identify and choose suitable experts:

- **Professional Experience:** Individuals with at least 5 years of experience in roles related to sustainability, environmental science, and/or clean technology within various sectors such as construction, manufacturing, energy, or consulting.
- **Contribution to Sustainability Initiatives:** Individuals who have actively contributed to or led sustainability initiatives, projects, and/or programs that have demonstrated measurable impact.
- **Diverse Representation:** Representation from multiple sectors to understand the sustainability skills gap across different industries.
- **Geographically Confined:** Experts from the Greater Toronto Hamilton Area (GTHA) or working within the GTHA region were preferred to capture a local perspective.

### Remote Interview Process

Twenty-minute interviews were conducted about sustainability skills gaps and involved a structured approach to ensure systematic data collection and comprehensive analysis. Interviews began with a 3-minute introduction followed by a 2-minute overview of the research background and scope to contextualize the interview. The core of the interview, lasting 12 minutes, involved asking targeted questions about the interviewee's observations and potential strategies for addressing sustainability skills gaps. The final 3 minutes were dedicated to a general discussion, where the interviewee could provide additional insights and reflections, concluding with a summary of key points and expressions of gratitude for their participation.





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**Question 1 Findings**

*Question 1: What skills do you think recent engineering/architecture graduates and young professionals need to contribute to decarbonization and carbon reduction strategies on the job or in academia?*

Recent engineering and architecture graduates, along with young professionals, must develop a balanced skill set to effectively contribute to decarbonization and carbon reduction strategies. According to industry experts, proficiency in quantitative analysis and clear communication of findings are essential. Additionally, a deep understanding of sustainability regulations and compliance is crucial as well. Strong communication skills are necessary to convey complex sustainability issues effectively, while experience gained through internships and co-ops contributes to the practical knowledge needed to excel in green engineering fields.

Experts also highlighted the importance of systems thinking and reflective problem-solving, as these skills help professionals understand the broader implications of their actions and devise comprehensive solutions. Furthermore, the ability to adapt skills to specific tasks and foster innovation and teamwork is critical for addressing diverse sustainability challenges. This consensus from 15 industry professionals reinforces the need for tailored training and collaboration between academia and industry to prepare graduates for the evolving green job market.

Key findings from interviews with industry experts highlight the necessity of a balanced skill set that includes both technical (hard) skills and non-technical (soft) skills. For instance, possessing quantitative analysis abilities is insufficient without the complementary skill of

effectively communicating findings.

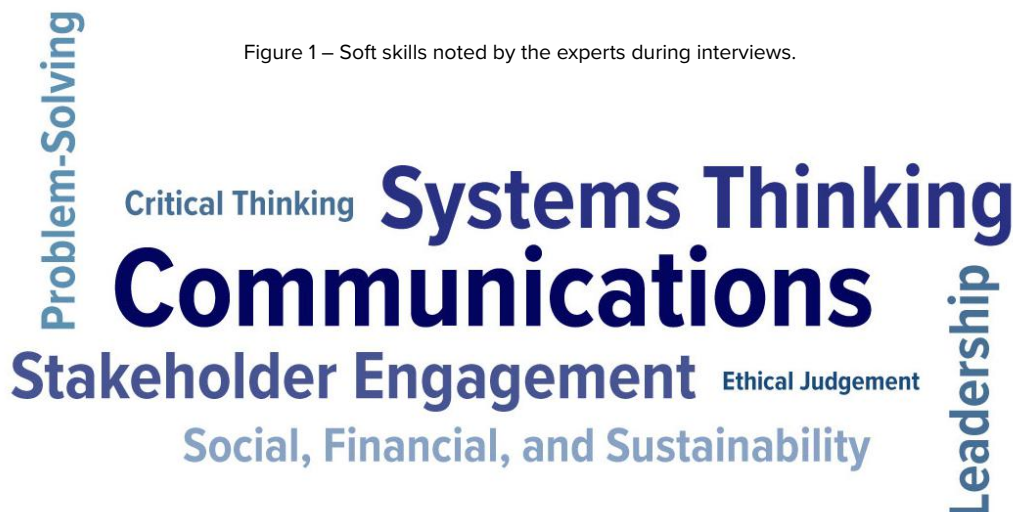
**Missing Soft Skills & Knowledge - According to Industry Experts**

Industry experts highlighted several crucial soft skills that many new graduates lack which are essential for addressing sustainability challenges effectively. These skills enhance professional competencies and foster a holistic approach to sustainability. Please note that experts were not asked explicitly if a certain skill is needed; rather, these skills came into the discussion as important and needed qualities.

\*In The Voice, we have only listed the most referenced soft skills and knowledge, for the full list, view Figure 1.

- **Communication Skills:** This most critical skill, emphasized by 14 out of 15 experts, is vital for conveying complex sustainability concepts and solutions to various stakeholders, ensuring successful implementation and impact.
- **Stakeholder Engagement:** Highlighted by 12 out of 15 experts, engaging with stakeholders is essential for the success of sustainability initiatives, fostering collaboration and support.
- **Leadership Skills:** Highlighted by 9 out of 15 experts, strong leadership is necessary for driving sustainability initiatives and inspiring teams to achieve sustainability goals.
- **Social, Financial, and Sustainability Understanding:** Highlighted by 8 out of 15 experts, this comprehensive understanding balances social, economic, and environmental factors in sustainability strategies.
- **Problem-Solving Skills:** Identified by 7 out of 15 experts, effective problem-solving involves

Figure 1 – Soft skills noted by the experts during interviews.



diagnosing issues and implementing long-term solutions. It includes the ability to identify real-world problems and stay informed about trends and best practices.

By developing these soft skills, educational institutions and industry partners can better prepare individuals to meet the demands of sustainability, fostering a holistic and effective approach to sustainability challenges.

**Missing Hard Skills & Knowledge - According to Industry Experts**

Industry experts identified several crucial hard skills necessary for addressing sustainability challenges effectively. These skills include technical knowledge and practical expertise that are essential for implementing successful sustainability initiatives. Note: the skills named are those that were top of mind for the experts during the interviews and this is not an exhaustive list.

\*In The Voice we've selected the most commonly referenced hard skills and knowledge gaps, for the complete list, view the full report linked at the end of the article.

- **Policies, Codes, and Standards:** Understanding policies, codes, and standards is vital, as noted by 13

out of 15 experts. This knowledge ensures regulatory compliance and supports the development of sustainability practices that align with legal and industry standards.

- **Financial Management:** Highlighted by 10 experts, financial management includes budgeting, cost analysis, and financial planning to support sustainable investments and initiatives.
- **Operational Energy Savings:** Identified by 8 experts, this skill includes strategies to reduce energy consumption during the operation of buildings and systems, leading to cost savings and reduced environmental impact. It also involves energy modeling to predict energy performance and identify improvements.

By developing these hard skills, educational institutions and industry partners can prepare individuals with the technical expertise necessary to drive successful sustainability efforts and achieve long-term sustainability goals.



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# ARE YOU COVERED?

## THE IMPORTANCE OF COMMERCIAL GENERAL LIABILITY

Engineers strive to deliver the best possible service to their clients. However, as a professional, you may face risks that are not covered under an Errors & Omissions / Professional Liability policy. Having appropriate insurance coverage in place is essential to protecting yourself from financial responsibility in the event of a claim or lawsuit.

### Commercial General Liability Insurance

Commercial General Liability Insurance (CGL) protects you against claims arising from an injury or property damage that you, or your business, may cause to another person as a result of your operations and/or premises, excluding claims related to the delivery of your professional services.

This coverage is recommended if you are an independent contractor or business owner, and/or if you sell products, conduct manual work, or oversee projects.

Consider a few scenarios where a CGL policy may respond:

#### Third Party Bodily Injury

A client comes into your office on a rainy day. When heading to reception, she slips and falls on the wet floor, injuring herself and breaking her arm. She may look to hold you or your business responsible for her injury.

#### Third Party Property Damage

While visiting a client's office, you plug your laptop charger into a wall and an electrical short causes a fire. The client may want compensation for the damage.

#### Personal and Advertising Injury Liability

You unintentionally make a false claim about a competitor's business in an advertisement, and they sue you for slander in response. Your CGL policy should cover the cost of legal fees, settlement or judgment amounts, and other associated costs.

#### Tenants Legal Liability

Many engineers rent office space. If you were to leave the sink's tap running overnight, causing water damage to your rented office space and others, the landlord may look to hold you legally responsible for the repair costs in the vicinity.

In the scenarios above, a CGL policy can safeguard your livelihood should someone demand compensation. The potential costs associated with your defence in the event of a claim or paying out settlement costs can be upwards of tens of thousands of dollars.

### Do you have contents or property to insure?

If you have valuable contents or property to insure, a standalone CGL policy may not be sufficient protection. OSPE members also have access to Property Coverage to protect your business and the contents within from losses associated with property damage, such as fire or water damage. It also protects against damage to contents, including professional equipment, laptops, and more.

### Additional Coverages

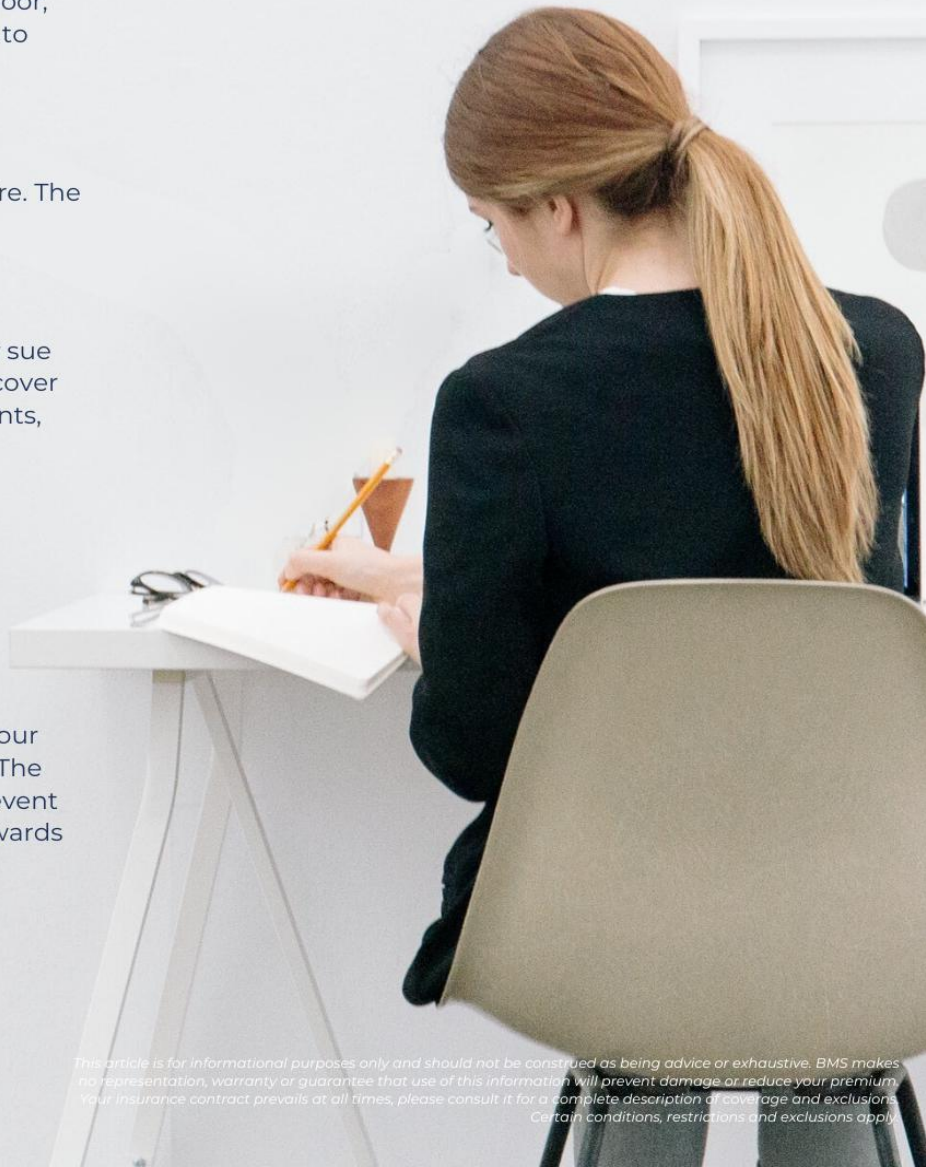
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## Question 2 Findings

*Question 2: What are your thoughts on how a university education could bridge sustainability skills gaps in delivering and implementing carbon reduction?*

To transition to a sustainable future, a workforce equipped with green skills is essential. Industry experts identified several methods to teach these skills effectively, which can be integrated into academic programs:

- **System Thinking Modules:** Incorporating systems thinking modules helps students understand the complexities of sustainability. Experts emphasized the importance of interdisciplinary thinking to innovatively address sustainability issues.
  - » **Removing Tunnel Vision through Focus Groups:** Forming focus groups can encourage diverse thinking and collaboration, helping students develop a broader understanding of sustainability issues.
  - » **Integrated/Multidisciplinary Learning:** Interdisciplinary learning opportunities, such as capstone projects, enable students from various disciplines to collaborate on real-world sustainability challenges.
  - » **Collaborative Learning Opportunities:** Group projects and team-based assignments help students develop collaborative skills necessary for addressing sustainability challenges.
- **Testing for Creativity and Innovation:** Encouraging innovation and creative problem-solving is crucial for effectively handling sustainability issues. Project-based learning can foster this mindset.
- **Teaching Industry Vocabulary:** Learning the specific vocabulary used in industry is essential for clear

communication of sustainability problems and solutions.

- **Real-World Examples:** Including real-world examples and case studies in the curriculum helps students understand the practical application of theoretical concepts.
- **Dedicated Sustainability Courses:** Offering dedicated sustainability courses at both undergraduate and graduate levels can fill the current gap in sustainability education.
- **Stakeholder Analysis/Human-Centric Design:** Understanding the needs and perspectives of different stakeholders is crucial for designing effective sustainability solutions.

By integrating these methods, academic institutions can better prepare students to meet the demands of sustainability in their professional careers and foster a holistic and effective approach to sustainability challenges.

### Methods to Bridge Academia and Industry Gaps

To effectively bridge the sustainability skills gap and align educational outcomes with industry needs, a multi-faceted approach involving various methods to connect industry with academia is essential.

- **Seminars:** Seminars serve as platforms for organizations and engineering disciplines to converge, focusing on systems applications and practical implications of sustainability solutions. They emphasize impact-focused strategies and the scaling of sustainable solutions.
- **Industry Guest Lectures:** Experts can share their knowledge and experiences with students, offering valuable exposure to current practices, technologies, and challenges in sustainability.

- **Networking Sessions:** Facilitate connections between students, professionals, and industry experts, leading to collaborative opportunities, mentorship, and insights into industry trends.
- **Workshops:** Provide hands-on learning experiences where participants engage with sustainability concepts in a practical setting, exploring emerging technologies and best practices.
- **Technical Lab Sessions:** Allow students to gain practical experience with sustainability-related technologies and methodologies.
- **Industry-Sponsored Projects:** Students and researchers can work on real-world problems posed by industry partners, ensuring academic research is directly relevant to current industry needs.
- **Industry-Collaboration Projects:** Foster a synergistic environment where academia and industry share expertise and resources, leading to innovative solutions.
- **Certification Training:** Provide specialized knowledge and skills in sustainability practices, aligned with industry standards and certifications.
- **Site Tours:** Expose students to operational aspects of sustainability practices in real-world environments.
- **Co-Curriculum Development:** Ensure educational programs are aligned with industry needs and emerging trends, integrating sustainability principles into various disciplines.
- **Industry Internships and Co-Ops:** Offer practical work experience in sustainability-related roles, allowing students to apply their knowledge in a professional setting.
- **Mentorship from Industry:** Industry professionals can provide valuable guidance and real-world insights, helping students understand practical applications of green skills.

By integrating these methods, academic institutions can better prepare students to meet the demands of sustainability in their professional careers, fostering a holistic and effective approach to sustainability challenges.

## Conclusions

Preparing students and early career professionals to contribute effectively to the green economy requires a balanced combination of hard and soft skills. Mastery of technical knowledge, such as policies, codes, standards, and energy management, must be complemented by the development of essential soft skills, including communication, leadership, and systems thinking.

An interdisciplinary systems approach is crucial, enabling students to grasp the complex interconnections between various components of sustainability. This holistic understanding fosters innovative solutions that address multiple facets of sustainability challenges. Furthermore, collaboration between industry and academia is paramount. By working together, these sectors can leverage concrete engineering principles and novel technologies to develop and implement sustainable solutions. This partnership ensures that educational programs remain relevant and aligned with real-world demands, ultimately bridging the sustainability skills gap and paving the way for a more sustainable future.

The researchers wish to thank the experts interviewed for this research, which included several OSPE members.

[The full report on the research can be found here.](#)

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Lee Weissling, PhD, (Retired) Senior Research Officer for the Ontario Society of Professional Engineers.

Nika Zolfaghari, B.Eng., M.A.Sc., Manager of Equity and Community Inclusion at Toronto Metropolitan University's Faculty of Engineering and Architectural Science





# The Future of Engineering: Integrating Green Technologies to Build Smarter, More Sustainable Communities





The world is transitioning toward a cleaner and greener future, and engineering is at the forefront of this movement. From smart grids to energy storage solutions, engineers are developing technologies that will shape a sustainable tomorrow. Here's an overview of the key innovations paving the way, with insights drawn from experts and real-world applications.

### Smart Grid Implementation

Imagine a city where electricity flows smoothly, and power outages are almost nonexistent. That's the vision behind smart grid implementation. By upgrading our current energy distribution systems, smart grids can improve efficiency and reliability and allow for the seamless integration of renewable energy sources like solar and wind. This modernized system would provide more responsive energy usage, reducing the need for fossil fuels during peak hours.

[The Ontario Society of Professional Engineers \(OSPE\) has been advocating for the implementation of smart grids in Ontario.](#)

### Energy Storage Solutions

Solar energy is abundant during the day, and wind turbines generate power when conditions are right—but what happens when the sun sets, or the wind dies down? Energy storage solutions, such as advanced batteries and capacitors, are critical. These technologies store excess renewable energy, which can be used during low production periods. Storing renewable energy ensures that green energy is available when we need it most.

OSPE has highlighted the importance of investing in energy storage to support electrification and renewable integration across Canada.

### Smart Building Energy Systems

Now picture buildings that know how to save energy. Smart building energy systems are revolutionizing how we think about architecture. These systems use automated controls, real-time monitoring, and predictive analytics to optimize energy consumption. Whether it's adjusting the heating when no one is home or turning off the lights automatically, smart buildings are significantly reducing energy waste. According to research, smart building energy systems are already in use globally, with significant examples from both public and private sectors driving this transformation.

### Microgrids

Traditional power grids are large and centralized, but what if we could localize energy production? Microgrids offer communities the chance to generate and manage their energy locally. These self-sufficient systems operate independently or in conjunction with the main grid, providing resilience in times of natural disasters or grid failure. Canada has seen innovative projects in First Nations communities, where microgrids have brought clean, reliable power to remote regions.

Additionally, integrating renewable energy sources like solar panels and wind turbines into the main grid further enhances energy supply, contributing to a more sustainable energy landscape.



## Green Hydrogen Production

The energy sector is buzzing with excitement about green hydrogen production. This versatile energy carrier can be produced using renewable energy and has the potential to fuel everything from industrial processes to vehicles. By investing in hydrogen, we can further reduce our reliance on fossil fuels. [OSPE has been a strong advocate for developing Ontario's hydrogen strategy, recognizing its pivotal role in the energy transition.](#)

## EV Charging Infrastructure

As electric vehicles (EVs) continue to grow in popularity, there's a pressing need to expand EV charging infrastructure. Developing a network of charging stations not only promotes the adoption of EVs but also ties them into the broader energy system. Expanding EV infrastructure ensures that Canada remains on the cutting edge of transportation electrification.

## Energy-Efficient Cloud Computing

Our digital lives leave an environmental footprint, too. Green IT practices and the adoption of energy-efficient cloud computing can significantly reduce the environmental impact of data centers.

By moving towards greener digital infrastructure, we can ensure that our technological advancements contribute to, rather than detract from, environmental sustainability.



## Renewable Energy Solutions

Innovative wind energy solutions, such as vertical-axis turbines and airborne wind systems, are pushing the boundaries of renewable energy. These advancements in wind technology promise to make wind power generation more efficient and adaptable. In addition, biogas and biomass utilization offer a renewable source of energy that can reduce waste and lower carbon emissions. From landfill gas to anaerobic digestion, these bioenergy solutions are being explored worldwide.

Water is another critical resource where smart technologies can make a difference. Smart water and wastewater systems can reduce energy consumption while enhancing efficiency, contributing to the overall sustainability of our cities. By integrating smart technologies into water management, engineers can help conserve water, reduce waste, and promote sustainable living.

## Looking to the Future

The integration of innovative green technologies will be essential in building sustainable and resilient communities. Engineers are leading this transformation, developing smart grids, advancing energy storage, promoting green building systems, and much more. By embracing these innovations, we can create a future where clean energy powers our cities, and smart systems make our lives more efficient, all while reducing our environmental impact.

Through collaboration, investment, and advocacy, organizations like OSPE are ensuring that Canada remains a leader in sustainable engineering solutions.





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# Engineering Smart Communities: A Path Toward Reliable, Sustainable Energy Systems



In the push to create sustainable and resilient communities, the role of reliable and innovative energy systems cannot be overstated.

## Reliable Energy Systems

The **Ontario Society of Professional Engineers Energy Task Force** recently laid out critical recommendations for ensuring high reliability standards in electricity systems. These proposals emphasize a balanced integration of renewable energy, cutting-edge technologies, and cost-effective backup solutions that address the needs of both

urban and rural areas.

Reliable electricity is a cornerstone of any smart community, especially when facing climate extremes. Adopting stringent [reliability standards](#) like those set by the **North American Electric Reliability Corporation (NERC)**—which aim for no more than one blackout per decade—is a necessary first step to ensure that electricity systems can meet consumer demand consistently.

To achieve these reliability goals, it is vital to **expand system integration services** to manage peak demand



and ensure a stable energy output. This includes investments in **rotating inertia** for frequency stability and **reactive power control** to regulate voltage levels. These services are crucial, particularly during extreme weather conditions, which are becoming more frequent due to climate change.

## Backup Solutions

An energy system built on intermittent renewable sources like solar and wind must have robust backup solutions. The integration of **solar energy** with natural gas, hydroelectric power, or battery storage is key to ensuring that energy remains available during periods of low generation. The **Energy Task Force** recommends shorter-duration storage systems, such as **four-hour batteries**, which can extend solar energy production into high-demand evening periods, providing a critical buffer when solar output drops.

**Wind energy**, which generates power both day and night, presents an opportunity to complement solar power. However, without careful coordination, wind generation can lead to overproduction during off-peak hours, which could result in costly storage solutions or curtailment. Addressing these challenges involves optimizing wind and solar energy use, matching their generation patterns to consumer demand.

One of the challenges with renewable energy sources like wind and solar is their **low-capacity factor** compared to more traditional energy sources like nuclear. Wind and solar typically operate at a capacity factor of 15-35%, while nuclear can operate at 85-95%. This disparity requires thoughtful planning to avoid high system costs. Transmission and distribution infrastructure must be designed with these lower capacity factors in mind to avoid excessive retail electricity costs due to underutilized assets.

Additionally, backup energy generation for renewables must be addressed. For instance, **solar power** may need up to **95% backup during winter months**, while **wind energy** requires up to **87% backup** during peak summer demand. Ensuring that these backup systems are cost-effective involves exploring options like **natural gas**, **renewable natural gas**, or even **hydrogen** as emerging clean fuels.

To reduce the reliance on costly backup and storage solutions for intermittent renewables, the **Energy Task Force** recommends using dependable, high-capacity sources like **nuclear** and **hydroelectric** power for base-load demand. These technologies provide a steady, reliable flow of energy that complements the variable

output of wind and solar, ensuring a balanced energy system.

In urban areas, the task force encourages exploring **district heating systems** powered by nuclear or biomass, which can supply thermal energy more cost-effectively than converting electricity into heat. **Thermal storage systems**—both at the building and community level—are far more cost-effective than electrical storage and can significantly reduce peak load demand. These systems can also integrate waste heat from sources like data centers and industrial processes, providing a sustainable way to recycle energy.



The **Energy Task Force** stresses the importance of having dependable **emergency reserve generation**, such as **natural gas combustion turbines**, to maintain critical services like hospitals and community cooling or warming centers during power outages. This is particularly vital in extreme weather conditions, where power failures can lead to life-threatening situations.

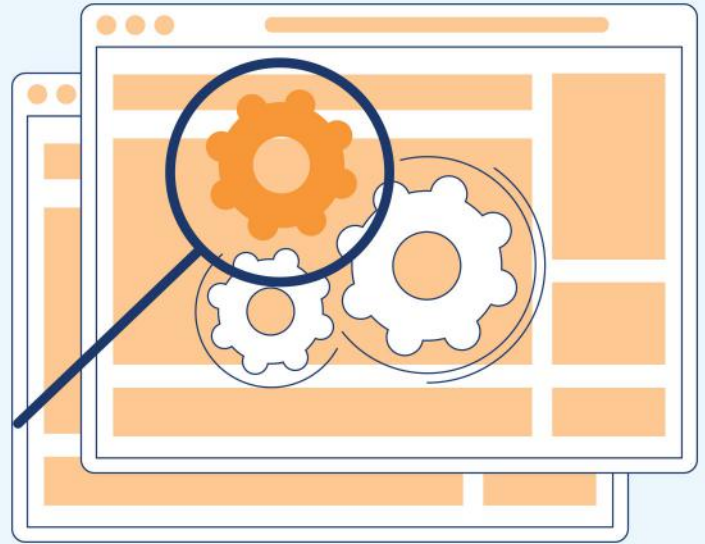
By addressing these critical areas, the **Energy Task Force** is not only helping to create smarter, more resilient communities but also providing a roadmap for municipalities and policymakers to follow in their pursuit of sustainability. These recommendations form the backbone of the **Engineering Smart Communities Working Group's** efforts to ensure that future energy systems are reliable, sustainable, and inclusive of all communities.

For further details on the Engineering Smart Communities Project and the role of energy systems, [you can access OSPE's related research and submissions on the Engineering Smart Communities page on the OSPE website.](#)



# Want to see your work published in an upcoming issue of the Voice?

We do too, which is why we are sharing some information on what we are looking for and how you can best share your research and perspective with the engineering community.



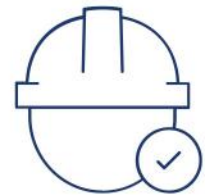
## Article Length: 800-1500 words

Anything longer probably is best published as a white paper (although an executive summary could be in the magazine to promote it).



## Subject Matter: Something Newsworthy

Submissions should emanate from research and or technical work that is engaging and interesting to an engineering audience. Common aspects to look at are the economic, social, and or regulatory impacts of particular areas of practice.



## Audience: Engineering +

Our magazine is distributed directly to all our members and another 30,000+ members of the engineering community. That is a broad audience, and we encourage submissions to be written in a way such that all can access the content. Subject matter expertise is demonstrated as much by an ability to educate, as it is to demonstrate depth of knowledge.

We invite all members to submit their interest in having work published by sending a brief message to [marketing@ospe.on.ca](mailto:marketing@ospe.on.ca). Please be sure to include your name, brief bio, and an overview of the work you wish to submit. There is no need to submit the finished work as part of your declaration of interest.

# Building Resilience: Strategies to Future-Proof Infrastructure Against Climate Risks



As the impacts of climate change become more pronounced, engineers and architects must innovate and integrate new building techniques that enhance resilience to extreme weather and environmental stress. From flood-resistant construction to energy-efficient HVAC systems, here are the top strategies being adopted to future-proof our infrastructure against climate change.

## 1. Flood-Resistant Construction Techniques

Flooding is one of the most devastating climate-related events, impacting both urban and rural communities. To mitigate these risks, engineers are developing flood-resistant construction techniques. These include elevated structures, the use of waterproof materials, where required, in conjunction with enhanced green infrastructure and the incorporation of advanced

drainage systems. Recent studies and guidelines from organizations like the Intact Centre on Climate Adaptation recommend these measures for reducing vulnerability to flood damage in buildings.

Resources such as Public Safety Canada and World Construction Today highlight innovations like foundations that echo floating bases, water-resistant seals, and the re-evaluation of land use in flood-prone areas. As floods increase in frequency, these techniques are becoming a critical part of climate adaptation strategies.

## 2. Fire-Resistant Building Materials

In regions prone to wildfires, the use of fire-resistant building materials is essential for protecting homes and infrastructure. From fire-resistant insulation to the



enhanced fire separation and protection techniques for critical structural elements, the construction industry is evolving to meet the demands of fire-prone environments. According to a study published by The Constructor, the integration of these materials can significantly reduce the risk of wildfire destruction.

Additionally, Advanced Fire Protection Services emphasizes the importance of design using fire engineering analysis to enhance our understanding of how a fire may impact the behaviour of a structure beyond just the initial ignition to improve the overall resilience of structures.

### 3. Energy-Efficient HVAC Systems

As climate change causes more temperature extremes, energy-efficient HVAC systems are becoming a priority for building resilience. These systems adapt to varying weather conditions, reducing energy consumption and maintaining comfortable indoor environments. OSPE has strongly advocated for the adoption of these advanced HVAC technologies, which not only improve energy efficiency but also reduce greenhouse gas emissions. By leveraging climate-specific designs and materials, these systems contribute to overall building sustainability and resilience.

For more information on sustainable innovations in HVAC, listen to episode 41 of OSPE's Engineering the Future podcast where host Jerome James, P.Eng. interviews Yannick Trottier, P.Eng., a building decarbonization specialist, on eco-friendly heating and cooling systems.

### 4. Seismic Retrofitting

Earthquakes remain a threat in many parts of the world, and older buildings are especially vulnerable to seismic events and seismic loading continues to increase. Seismic retrofitting is a process that strengthens existing structures to withstand the forces generated by earthquakes or developing approaches to limit the overall seismic load that a structure is anticipated to experience. There are various techniques that can be used to enhance the seismic resistance of a structure, some of which include adding shear walls, reinforcing frames, and utilizing base isolation systems to absorb seismic energy.

The implementation of seismic retrofitting programs is gaining momentum, particularly in regions like British Columbia and California where earthquakes are common.

Engineers Canada and Engineers and Geoscientists BC continue to emphasize the importance of retrofitting buildings to meet modern seismic codes to ensure occupant safety and reduce potential damage during earthquakes.

### 5. Flexible Zoning and Land Use Policies

In response to the evolving climate landscape, municipalities are beginning to adopt flexible zoning and land use policies. These policies allow for adaptive developments that can adjust to shifting climate conditions, reducing risk exposure.

Municipalities across Canada are leading the charge, with cities like Vancouver re-evaluating land use in flood zones, wildfire-prone areas, and other high-risk environments. According to Land Use Hub, integrating climate risk considerations into zoning laws is an essential step in climate adaptation. Flexible zoning also allows for more sustainable urban development, accommodating renewable energy installations, green infrastructure, and flood mitigation projects.

### A Holistic Approach to Building Resilience

The integration of innovative construction techniques, materials, and policies can significantly improve a building's resilience to climate change. By adopting flood-resistant designs, fire-resistant materials, energy-efficient systems, and seismic retrofitting strategies, engineers and architects can better protect infrastructure and communities from the growing risks of a changing climate.

These approaches are not standalone solutions but must be combined with forward-thinking land use policies and flexible planning to ensure long-term resilience. OSPE continues to work with governments and stakeholders to ensure these strategies are implemented in line with best practices, contributing to a safer and more sustainable future for all.

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By Emily Pepper, P.Eng., Chair of OSPE's Engineering Smart Communities Working Group



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# From Frosty Roads to the Final Frontier: Hamza's Journey in Ontario Engineering



From a childhood curiosity with materials to a career in forensic engineering, Hamza Alami's journey from Morocco to Canada now includes managing Ontario's icy highways while dreaming of contributing to space exploration.

"One of the major tasks I am involved with is monitoring the frost within Ontario's highways," he explains. "During the spring season, the frost within the highways starts melting. I was charged with monitoring the temperatures on the highway layers with stakeholders and reporting the results to municipalities."

While growing up in Morocco, Hamza had an early passion for science and materials that eventually led him to forensic engineering. Inspired by Carl Sagan, Hamza now intends to steer his career toward the Final Frontier.

"My personal goal is to get involved with space exploration programs as an engineer or a project manager," he says. "I want to really lead and contribute to

the mission of pushing science to its limits and exploring other worlds."

Hamza, who holds a Master's degree, Civil Engineering from the Private University of Fez (UPF), says coming to Canada in 2022 presented challenges; particularly in gaining local work experience. Hamza emphasizes the importance of developing soft skills and professional networking in overcoming them.

"In addition to technical skills, soft skills are very important. It (engineering) is the same language whether I am in Morocco, Canada, the US, or Asia. Networking and investing in your professional development are crucial."

Hamza says OSPE played a crucial role in his professional journey, providing networking opportunities and professional development resources.

"If I tell a friend to invest in an OSPE membership or program, I tell them they will get ten or fifteen times

what they invested,” he explains. “There is no other organization in Canada or Ontario that provides the same cohesive community. It is very respected by government bodies.”

Through OSPE events and mentorship programs, Hamza secured a position as an Engineering Associate for the Ontario Ministry of Transportation that matched his skills and background perfectly. “A series of events, such as the employment engineering event in Mississauga, allowed me to land a job that really fit my background and skills as a project management manager,” he recounts.

Hamza now mentors other engineers, helping them navigate the Canadian job market. “I am already engaged with a mentoring bridging program,” he says. “Each time I get an email from the coordinator, I feel pleased to provide assistance and share my expertise. Integrating new immigrants with engineering backgrounds into the workforce is very important.”

Hamza advocates for better support for internationally trained engineers, highlighting the need for bridging programs and policies. “Only 18% of internationally trained engineers are licensed,” he points out. “This number is very low. When I read other data sources, there is a huge discrepancy between engineers with Canadian degrees and those without. It is even more serious for women.”

As an internationally trained engineer who is licensed in Canada, Hamza’s journey from Morocco underscores the significant role professional organizations like OSPE play in supporting engineers. “Organizations such as OSPE were vital for me to network and to get to know the current trends in the engineering industry,” he says. “They also helped me invest in my professional development.”

Hamza’s story reflects broader themes in the engineering community, such as the importance of continuous learning, resilience, and community support. His journey showcases how engineers can overcome challenges, pursue their passions, and contribute to the advancement of engineering in Ontario. “We love solving hard problems,” Hamza says. “We see planes going back and forth over our heads, and it’s something very normal. I look forward to a future where travel into space would be very normal.”

Through his experiences and advocacy, Hamza continues to push the boundaries of what is possible, inspiring others to follow in his footsteps and contribute to the vibrant engineering community in Ontario.

## Meet our members, learn what they do and why it matters:



Emily Pepper, P.Eng.



Hamza Alami, EIT, PMP



Carl Bodimeade, P.Eng.



Leila Jafari, P.Eng.



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<sup>1</sup> Statistics Canada, "Survey of Household Spending in Canada," 2022.

<sup>2</sup> ctnews.ca, "How much money does it take to raise a child in Canada?" July 2022.

<sup>3</sup> clhia.ca, "A guide to disability insurance," 2021.

<sup>4</sup> Canadian Cancer Society, "Cancer Statistics at a Glance," 2023.

\* For complete details, see [manulife.ca/newmember](https://www.manulife.ca/newmember).

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# OSPE's Upcoming Events

MAR  
19

## Engineering Employment Event (E3)

Join us at one of OSPE's engineering job fairs. They bring together dozens of major employers and skilled engineering candidates across Ontario to network face-to-face.



MAY  
06

## Annual General Meeting

Members and guests who attend the annual general meeting get to celebrate OSPE's advocacy wins for the year, recognize incoming and outgoing Board members and conduct official OSPE business.



JUN  
05

## OSPE Classic Golf Tournament

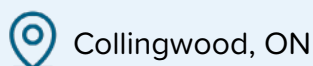
Relax, mix and mingle with Ontario's engineering community and industry stakeholders over golf and dinner. A portion of all proceeds go to the Ontario Professional Engineers Foundation for Education, which helps engineering students design the world of tomorrow!



NOV  
3-4

## The 2025 Engineering Conference

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# EngCon 2024

On October 29, 2024, the **Ontario Society of Professional Engineers (OSPE)** hosted the 7th annual **Engineering Conference (EngCon)** in Windsor, ON. This conference was marked by engaging speakers, a vibrant networking atmosphere, and a community of engineers, all passionate about the profession and eager to learn more about advancements in the Canadian engineering landscape.



OSPE CEO Sandro Perruzza giving the welcoming remarks at The Engineering Conference 2024 in Windsor, ON.



A tradeshow exhibitor grabbing breakfast as people start trickling in for The Engineering Conference 2024 in Windsor, ON.



From left to right: Heather Grondin, Jim Siler, Zaher Yousif, David Henderson, Clayton Sereres, and Dr. Hellen Christodoulou on the panel, Bridging Borders: Engineering the Gordie Howe International Bridge.



William MacGowan, P.Eng., giving his presentation, "How AI is Making Smart Buildings Greener."



Attendees of The Engineering Conference 2024 participating in a breakout session.





A group of conference attendees and tradeshow exhibitors networking.



Students from the University of Windsor at The Engineering Conference 2024 in Windsor, ON.



A conference attendee asking a question during the Q & A portion of the keynote presentation.



Rosa Gordon from Bombardier Inc. speaking on the panel, "Intersectionality in Engineering: Embracing Diversity and Inclusion." To her left is Victoria Kerr from the University of Waterloo and to her right is Theresa Nyabeze from Vale Base Metals.



Sandra Odendahl, Senior Vice President at BDC (right), interviewing Phil DeLuna, Chief Carbon Scientist and Head of Engineering at DeepSky (left) for the keynote presentation, "Why Canada is Poised to Be a Carbon Removal Superpower."



OSPE staff giving out prizes at the Ontario Society of Professional Engineers booth.

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**Engineering**  
University of Windsor





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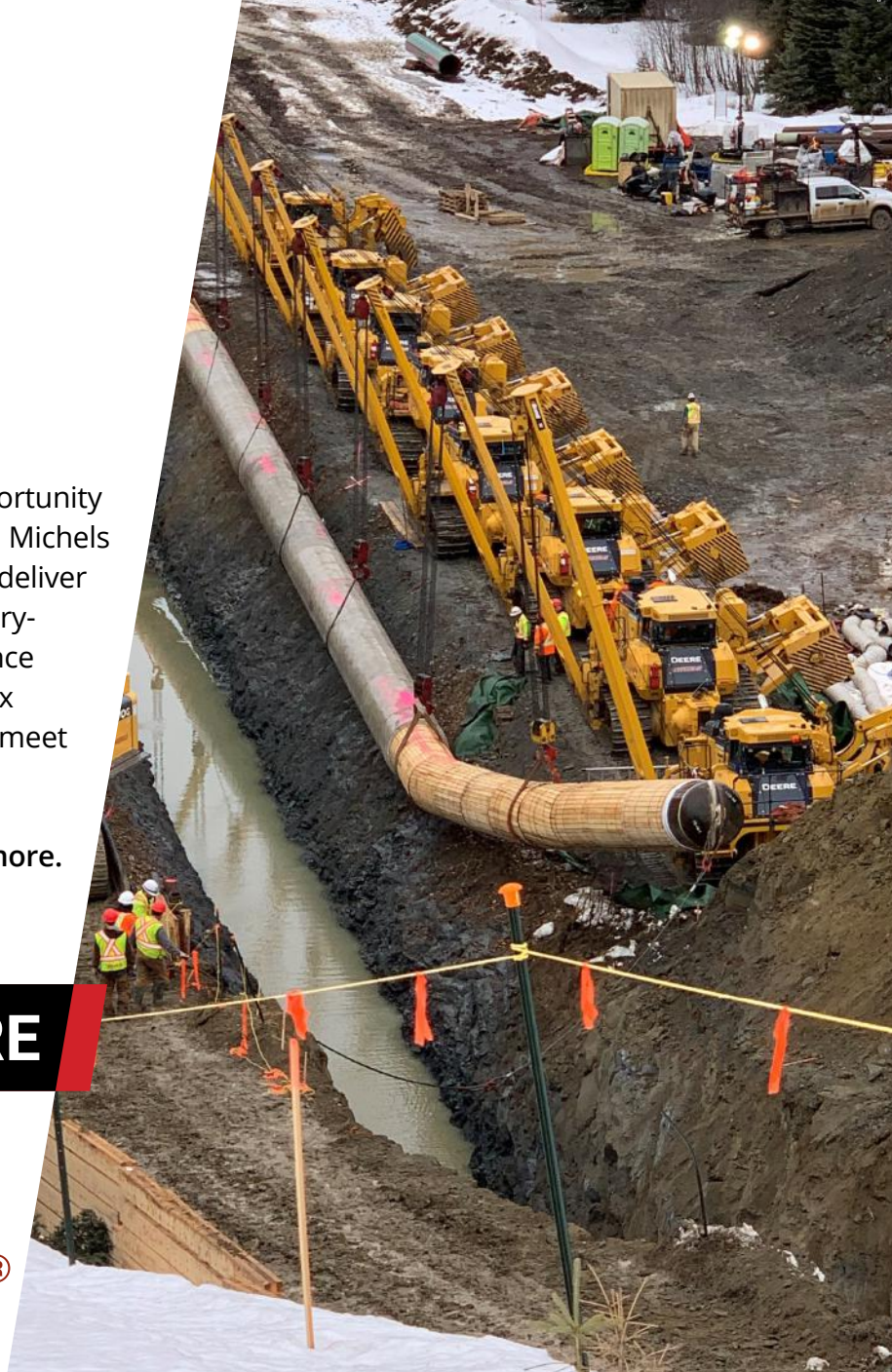
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# OPEA 2024

On Friday, November 15, members of Ontario's engineering community came together in Vaughan, ON to celebrate engineering excellence at the Ontario Professional Engineers Awards Gala. Between the awardees, family, friends, and colleagues, over 300 people attended the prestigious event.

To view winner videos please click [here](#).

## Award Recipients

### Professional Engineers Gold Medal

Dr. Zheng Hong (George) Zhu, P.Eng.

### Citizenship Award

Annette Bergeron, P.Eng.

Hon. Omar Alghabra, P.Eng.

### Engineering Medal – Engineering Excellence in Industry

Michael Kropp, P.Eng.

### Engineering Medal – Management

Inga J. Hipsz, P.Eng.

David Poirier, P.Eng.

### Engineering Medal – Entrepreneurship

Dr. Giovanni Grasselli, P.Eng.

### Engineering Medal – Young Engineer

Serena Mandla, P.Eng.

### Engineering Medal – Research and Development

Gregory Kopp, P.Eng.

Dr. Boxin Zhao, P.Eng.

### Distinguished Lifetime Achievement Award

Paul Acchione, P.Eng.



Paul Acchione, P.Eng. accepting the Distinguished Lifetime Achievement Award from event MC Bobby Umar.



Gala attendees at the 2024 Ontario Professional Engineers Awards cocktail reception.



The 2024 Ontario Professional Engineers Awards Gala attendees taking a seat and mingling before the event begins.



Violinist, Emily Misura, playing the violin at the 2024 Ontario Professional Engineers Awards Gala in Vaughan, ON.



OSPE Chair, Dave Carnegie, delivering the opening remarks at the 2024 Ontario Professional Engineers Awards Gala in Vaughan, ON.



All the 2024 Ontario Professional Engineers Award Recipients and OSPE Chair, Dave Carnegie, P.Eng. at the 2024 Ontario Professional Engineers Awards Gala in Vaughan, ON.



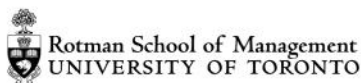
Dr. Zheng Hong (George) Zhu, P.Eng. delivering a thank you speech after accepting the Gold Medal Award at the 2024 Ontario Professional Engineers Awards Gala in Vaughan, ON.



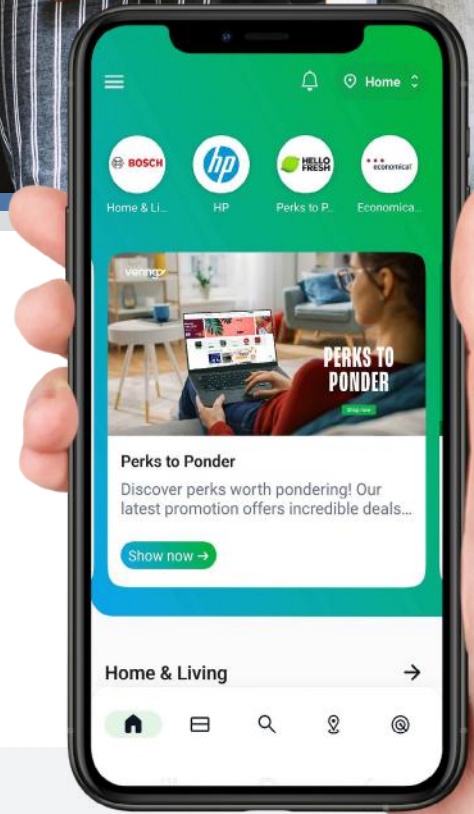
Engineering Medal in Management recipient, Inga Hipsz, P.Eng. (second from the right), and her colleagues from the University of Toronto.



# THANK YOU TO OUR PARTNERS







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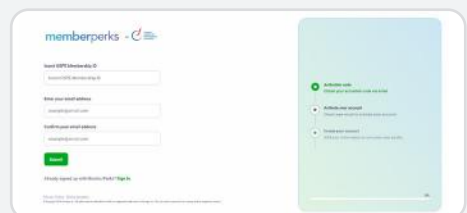
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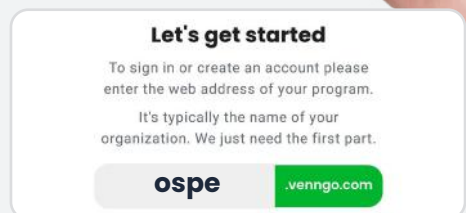
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Use your **OSPE membership ID** & your **Email address** to create your MemberPerks account.



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## EngTalks Presents **THOUGHT LEADERSHIP THURSDAYS**

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**Email us at [pd@ospe.on.ca](mailto:pd@ospe.on.ca)**

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- Construction
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- Energy
- Leadership & Management
- Mining
- Sustainability
- The Engineering Profession
- Research & Innovation
- Project Management
- Public Safety



*Note: All presenters earn continuing professional development credits for their efforts.*



# Tri-Colour Classic Basketball Game at Queens

The **Tri-Colour Classic** is a yearly student-run charity basketball game at **Queen's University**, that has quickly gained momentum, raising funds for cancer research. This year, Queen's engineering and commerce students played for a sold-out crowd of 4,800 people. They raised over \$250,000 for the **Canadian Cancer Society**, bringing the total amount raised since its inception to nearly \$500,000. The funds specifically support research at the **Hospital for Sick Children**, focusing on improving the quality of life for children affected by brain cancer treatments.

New additions to the event this year included a March Madness-style tournament, scholarships for students impacted by cancer, and a live-streamed game.





# 2025 OSPE Board Elections

The engineers who are elected to OSPE's Board of Directors are committed to ensuring that your profession is headed in the right direction – a direction where your work is valued, and your voice heard.

The Election package will be emailed to members when voting opens on Monday, **March 24, 2025**. Voting will be open until **Monday, April 14, 2025**.

The All-Candidates Virtual Town Hall, where members will have the opportunity to hear from their candidates will take place on **Wednesday, March 26, 2025, at 6:30 p.m.** The event will be recorded, and the video will be uploaded to the OSPE website.

The results of the Board of Directors election will be announced at OSPE's Virtual Annual General Meeting on Tuesday, **May 6, 2025**.

**We're looking for passionate and dedicated people like you to join our Board of Directors.**

## Positions Available

This year, members will be electing to fill four open positions. The positions will be elected for a three-year term.

## Eligibility

Only Regular Members of the Society in good standing may be nominated. Only Regular Members of the Society may nominate a candidate.

## What Potential Candidates and Nominators Need to Know

OSPE is a volunteer-led organization. Every year OSPE is looking for members who want to make a significant contribution to the direction and governance of the association with their volunteer leadership.

If this is something you have thought about, we encourage you to put forward an application for consideration by the OSPE Nominations Committee.

[See the 2025 OSPE Board Director Nomination and Election Package](#)



## Important Dates

**January 2, 2025**

Nominations open

**January 24, 2025**

Nominations close at 4:30pm

**March 24, 2025**

Ballots and candidate information sent to members – Voting Opens

**March 26, 2025**

All candidates Virtual Town Hall

**April 14, 2025**

Voting closes

**May 6, 2025**

OSPE Virtual Annual General Meeting

For more information please contact **Valeria Mueller** at [vmueller@ospe.on.ca](mailto:vmueller@ospe.on.ca).



# Prep Course for the National Professional Practice Exam

Starting February 19

This **month-long virtual course** is tailored to provide everything you need for NPPE success. With expert instruction, practical exercises, and personalized support, you'll be well-equipped to pass the exam and advance your career.

[go.ospe.on.ca/nppe-course-feb-2025](http://go.ospe.on.ca/nppe-course-feb-2025)



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**Ontario Professional Engineers Foundation for Education**





# CERTIFICATE PROGRAMS

## Emerging Leaders Certificate Program for Engineers

40  
CPD HOURS

**Date:**  
Feb 5 - Apr 23

**Price:**  
Member Price: \$1,950  
Non-Member Price: \$2,200

**ONLINE**

Developing the next generation of leaders is critical for driving business growth and sustainability. The Emerging Leaders Certificate Program for Engineers, offered by The Engineering Academy, is designed specifically for engineering professionals. This program equips emerging leaders with the skills, confidence, and tools they need to lead teams and drive strategic initiatives.

Led by expert instructors from Rzultz, who combine deep leadership expertise with an understanding of engineering challenges, this program offers interactive and engaging sessions. Participants will hone their leadership abilities through case studies, exercises, and real-world engineering scenarios, gaining practical skills they can immediately apply in the workplace.

By proactively building leadership competencies, your organization will strengthen its talent pool, improve business performance, and foster leaders who represent the diversity of your customers and communities.

## Lean Six Sigma White Belt Certificate Program

8  
CPD HOURS

**Date:**  
Mar 24

**Price:**  
Member Price: \$49  
Non-Member Price: \$119

**ONLINE**

Designed for individuals seeking to understand the core concepts of process improvement and operational efficiency, this introductory program covers the essentials of Lean and Six Sigma, illustrating how these powerful methodologies work together to enhance processes and eliminate waste. Our Lean Six Sigma White Belt Certificate Program (March) is the perfect place to start!

By the end of the course, you'll have a solid grasp of Lean Six Sigma principles and be prepared to contribute to improvement initiatives in any organization. Whether you're beginning your career in process optimization or aiming to support larger Lean Six Sigma projects, this course is your first step toward professional excellence.



Check the OSPE Events Calendar for more information:  
[go.ospe.on.ca/learn](https://go.ospe.on.ca/learn)





## JOURNEY TO P.ENG.

### PE300 – Journey to P.Eng.

**Dates:**

Jan 8, Feb 5 & Mar 5

**Price:**

\$0

**ONLINE**

This free 1-hour webinar will offer you guidance and support on the licensing process in Ontario. At the end of this presentation, participants will have a foundational understanding of:

- Submission requirements for PEO's application form
- Overview of the stages to licensure
- OSPE's membership services
- Ways in which OSPE's Career Services can benefit you in your skill development and job search techniques
- Professional Development programs that may help you in building your career in Ontario

### PE302: Competency-Based Assessment (CBA) Workshops for P.Eng. Experience Requirement

**Dates:**

Jan 6 & Feb 25

**Price:**

Member Price: \$350

Non-Member Price: \$475

**ONLINE**

How can you best navigate the P.Eng. competency-based assessment (CBA) system? Professional Engineer (P.Eng.) applicants are required to obtain a minimum of 48 months of acceptable, verifiable professional engineering experience, submitted through a CBA model. CBA is a tool, introduced by PEO in 2023, also used by other provincial regulators (BC, SK, MB, ON, NB, PEI, NL) to assess readiness for licensure that examines 34 engineering competencies across 7 categories: technical, communication, project management, professional accountability, and more.

Our workshop pair gives you the skills and confidence to successfully write your CBA's 34 engineering competencies. We've developed two alternating 4-hour workshops, each offered every few weeks (dates listed below). Each session covers different competencies while having common elements so learners can start with either one. After making progress on your CBA, join the next workshop, to reflect and ask questions then practice more competencies.

Check the OSPE Events Calendar for more information:  
[go.ospe.on.ca/learn](https://go.ospe.on.ca/learn)



# THOUGHT LEADERSHIP THURSDAYS

OSPE's Engineering Academy hosts Thursday webinars with leading experts on a diverse range of technical and non-technical topics.

## Comprehensive Guide to GFRP Reinforcing: Codes, Applications and Benefits

**Date:**

Jan 9

**ONLINE**

**Price:**

Member Price: \$0

Non-Member Price: \$59

Join this webinar to learn about the expanding role of GFRP reinforcing in infrastructure and residential construction. Learn about its compliance with CSA codes, key properties and economic benefits over steel. Explore real-world applications in bridges, transit, parking garages and more. Discover insights, examples and answers to your GFRP questions!

## CSA Certification Standards for Prefabricated Buildings

**Date:**

Jan 23

**ONLINE**

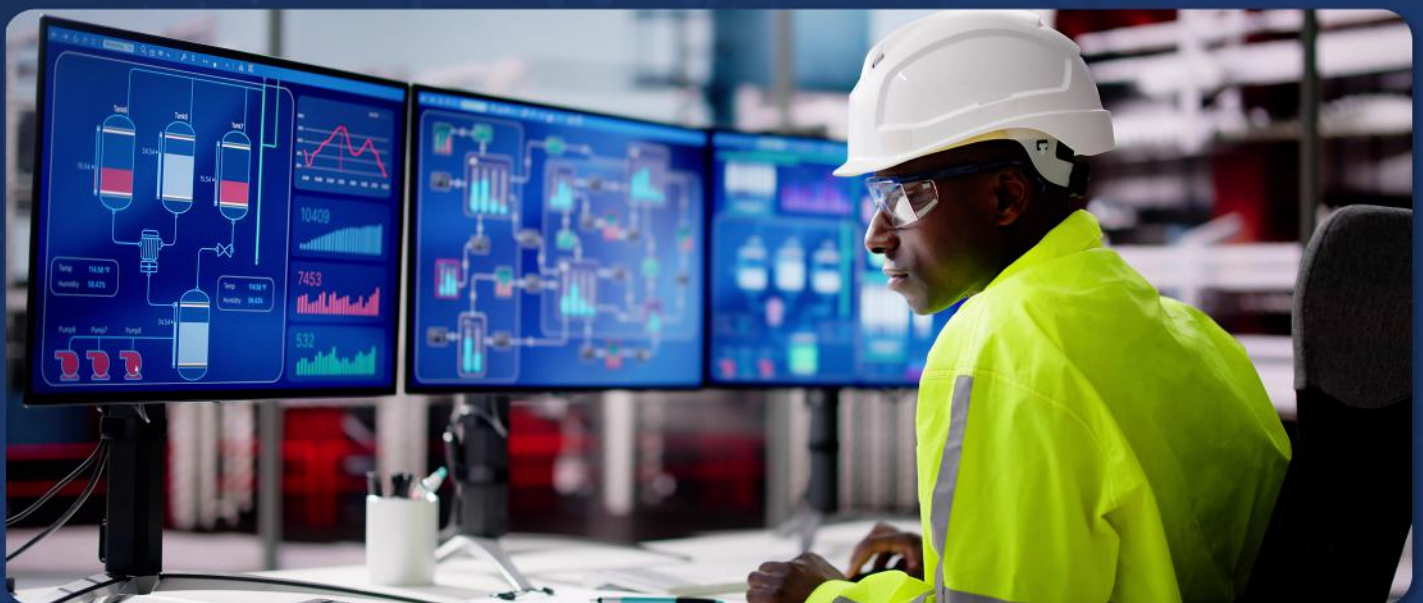
**Price:**

Member Price: \$0

Non-Member Price: \$59

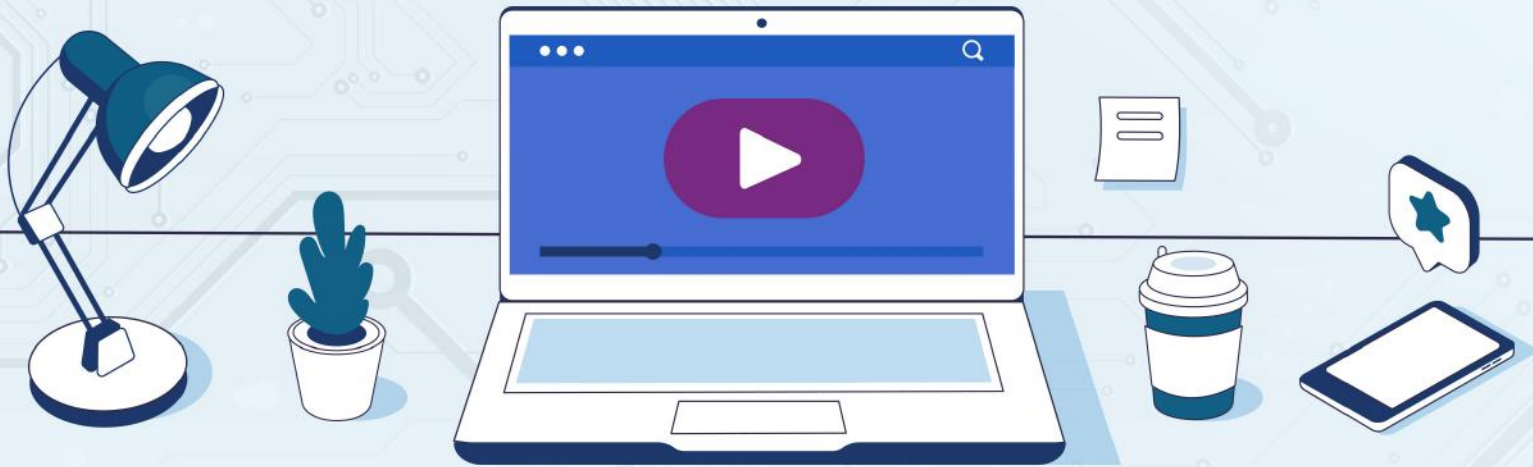
Planet Earth is presently headed toward CO<sub>2</sub>-driven thermal extinction of large land animal life forms. This process can potentially be stopped, but only by parties who understand the relevant physics and who act promptly. In this presentation, I will indicate the nuclear fuel issues that must be addressed now to limit further injection of CO<sub>2</sub> into Earth's atmosphere and then I will review the corresponding nuclear hardware requirements.

Immediate major changes in government policy are required, particularly with respect to all aspects of funding and reprocessing of used nuclear fuel.



Check the OSPE Events Calendar for more information:  
[go.ospe.on.ca/learn](https://go.ospe.on.ca/learn)

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2025

# Ontario Professional Engineers Awards

## RECOGNIZE A GREAT ENGINEER IN YOUR COMMUNITY!

Since 1947, the **Ontario Professional Engineers Awards (OPEA)** have recognized professional engineers in Ontario who have made outstanding contributions to their profession and their community. The Ontario Society of Professional Engineers is proud to honour the very best of the Ontario engineering community at an annual awards gala in November. This annual gala brings industry innovators, business leaders and policy makers

Recognize an engineer in the areas of:

- **Innovation**
- **Community Service**
- **Entrepreneurship**
- **Research**
- **Leadership**
- **And more!**



Please see back for more information. Learn more: [opeaawards.ca](http://opeaawards.ca)







## What is OSPE?

The **Ontario Society of Professional Engineers (OSPE)** is the voice of the engineering profession in Ontario. We represent the entire engineering community, including professional engineers, engineering graduates and students who work or will work in several of the most strategic sectors of Ontario's economy.

## Who is eligible to be nominated?

All P.Eng. licence holders of Professional Engineers Ontario (PEO) in good standing, who have demonstrated achievements significantly above the standards of the profession, with the exception of members serving on PEO Council, the Board of Directors of the Ontario Society of Professional Engineers (OSPE) and the OSPE Awards Committee (OAC), are eligible to receive an Ontario Professional Engineers Award (OPEA). A licence holder from one of the excluded groups above may be nominated for an award after 12 months have elapsed from their participation in the group.

## Who can Nominate?

Nominations may be made by any P.Eng. licence holder of Professional Engineers Ontario (PEO). The nominee must not be aware of the nomination and self-nomination is not allowed. All nominations must be submitted using the Awards Force platform.

## Deadline for Nominations

Wednesday, February 25, 2025



Learn more: [opeaawards.ca](http://opeaawards.ca)

## Award Types

### The Gold Medal

This is the OPEA highest honour, recognizing conscientious commitment to public service, as well as technical excellence, and outstanding professional leadership.

### Citizenship Award

This award recognizes a professional engineer's contributions to public service. Those who earn this award have given freely of their time, professional experience, and engineering expertise to the benefit of humanity.

### The Engineering Medal - Entrepreneurship

The award recognizes professional engineers for applying new technologies or innovative approaches that have enabled new companies to get started, and/or assisted established companies to grow in new directions. The engineer should have demonstrated the initiative, energy, and spirit it takes to seek out new ideas and to take a leading role in fostering and promoting them.

### The Engineering Medal - Management

The award recognizes professional engineers who are managing and directing engineering projects or enterprises where innovative management practice has contributed excellence in engineering achievement.

### The Engineering Medal -Engineering Excellence in Industry

This award recognizes excellence in the practice of engineering in industry, where the innovative application of engineering knowledge and principles has solved a unique problem, led to advanced products, or produced above-average results based on work-related contributions and achievements from the last four (4) years.

### The Engineering Medal -Research and Development

The award recognizes professional engineers using new knowledge in developing useful, novel applications, or advancing engineering knowledge or applied science, or discovering or extending any of the engineering or natural sciences.

### The Engineering Medal - Young Engineer

The award recognizes outstanding young Ontario engineers in industry, who have made exceptional achievements in their chosen fields and are active in communities both personally and professionally.

\*NOTE: The Nominee must be 35 years of age or younger by the submission deadline date.

### Engineering Achievement of the Year

The award recognizes a professional engineer, or group of professional engineers, who have given freely of their time, professional experience, and engineering expertise - to improve the engineering profession in Ontario.



# MEMBER PROFILE



## Chris Crozier, P.Eng.

### The Role of Vision, Humility, and Perseverance in Growing a Company

This summer, Crozier Consulting Engineers celebrated its 20th anniversary at the TPC Toronto at Osprey Valley golf course in Caledon, Ontario. Over a hundred employees, clients and partners in good spirits mingled in the clubhouse that is part of a larger redevelopment of the property for the 2025 Canadian Open in which Crozier was lead engineer.

The night kicked off with a speech from the man at the centre of the bustle of activity, longtime OSPE member Chris Crozier, P.Eng., founder and CEO of Crozier. In his speech, Chris looked back fondly on the humble beginnings of the company. It was 2004, and Chris along with his founding partner, Kevin Morris P.Eng., entered their first office at 110 Pine St. in Collingwood, ON.

Chris had 5 kids at home, and he had been a loyal Water Resource Engineer and Project Manager, working with a consulting engineering firm for 12 years before venturing out on his own.

He had plenty of engineering knowledge and an entrepreneurial bug which led him to open a boutique consulting engineering firm serving clients in the

Collingwood area. Fast forward to today and the firm now boasts two consecutive years on The Globe and Mail's ranking of Canada's Top Growing Companies and Mediacorp Canada Inc.'s ranking as one of Canada's Top Small & Medium Employers.

"We set out to start a company that not only supported the growing needs of surrounding communities, but also a workplace where people could be proud of the work they do, build lasting relationships, and have fun with their colleagues," said Chris in a recent press release. "Twenty years in and our little company has grown to over 300 employees across five offices. Our staff are engaged in our communities, tackling ever more complex projects, and doing so as a strong, cohesive group."

Chris's opinion, contrary to some business mindsets, is that much of Crozier's success can be credited to the humility and patience of his team. In an interview with OSPE, Chris especially emphasized the power of being a servant leader.

"Our best people are also some of the humblest people in the industry. They become servant leaders, and the fact is that people just gravitate to them," said Chris. "There's no ego there."

And in putting one's ego aside, you can also exercise more patience.

Reflecting on some challenges he's faced throughout his career, Chris shared that he often rejected the advice to act fast and make impulsive moves in favour of taking a step back.

"I think tremendous businesspeople are ones that are deliberate. They're not reactive, they'll assess the situation, pause and dwell on it [before acting]."

One great example of his leadership and vision can be seen in the hiring and career path of Nick Mocan,

a professional engineer who began at Crozier as an ambitious student hire and has worked his way up to being appointed the company's President in 2020.

"Chris Crozier has the ability to see through challenges and foster inspiration in those around him," said Nick Mocan, P.Eng., President, Crozier. "His mentorship, vision, and unwavering belief in people and the firm have shaped not only my career, but the way I lead."

In OSPE's interview, Chris said that the greatest characteristics that a leader can have are: humility, inspiration, a positive attitude, determination, consideration, and patience. All these he observes in Nick, but again, he possesses these qualities himself as well.

You can see these qualities exemplified in some of the corporate initiatives that Chris has implemented. For example, in 2021 Crozier launched its First-Time Home Buyers' Assistance Program showing consideration for his employees' livelihoods. The program has already helped 10% of Crozier employees buy their first homes in the last three years. The result of programs like this, that come from an attitude of servant leadership, are increased loyalty and supportive corporate culture.

Not only have these characteristics helped Chris in his business, but they've buoyed him through the hardest moments in his life too.

"The biggest struggle and fight I ever experienced was when I had cancer. When my wife and I went to my

second appointment, the doctor told us that the first diagnosis was wrong, and the situation was much more dire [than we thought]. We drove home that night. We stopped at a restaurant. We cried together. But I never once thought about giving up," said Chris.

When Chris was in the hospital, he was well known for his tenacity. He'd book the TV room and use it to take meetings with the board of directors, and other executives.

To Chris, giving up wasn't even a consideration. Though it was certainly challenging to battle cancer, support a family, and run a successful business, he was determined.

And now he's able to stand in front of a room of employees, clients and partners, whose loyalty and support have helped grow the business over the last 20 years and give a toast. A toast to Crozier's humble beginnings, to the employees who have grown so much since the company's inception, to the brilliant work that's been done and to the future of Crozier as the firm continues to expand into new markets across Canada

Through his visionary leadership and unwavering commitment, Chris Crozier has not only driven innovation but also empowered countless engineers to realize their potential. At OSPE, we are proud to celebrate members like Chris, who pioneer enduring companies, build opportunities for Ontario's engineers to thrive, and embody the true spirit of engineering excellence. He is a shining example of what Ontario engineering can achieve at its best.







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<sup>2</sup> Internal statistics of The Personal: Approximate number of policyholders who renewed their policies when their policy came up for renewal from January 1, 2023, to September 30, 2023. The rate does not include mid-year term cancellations and terminations.