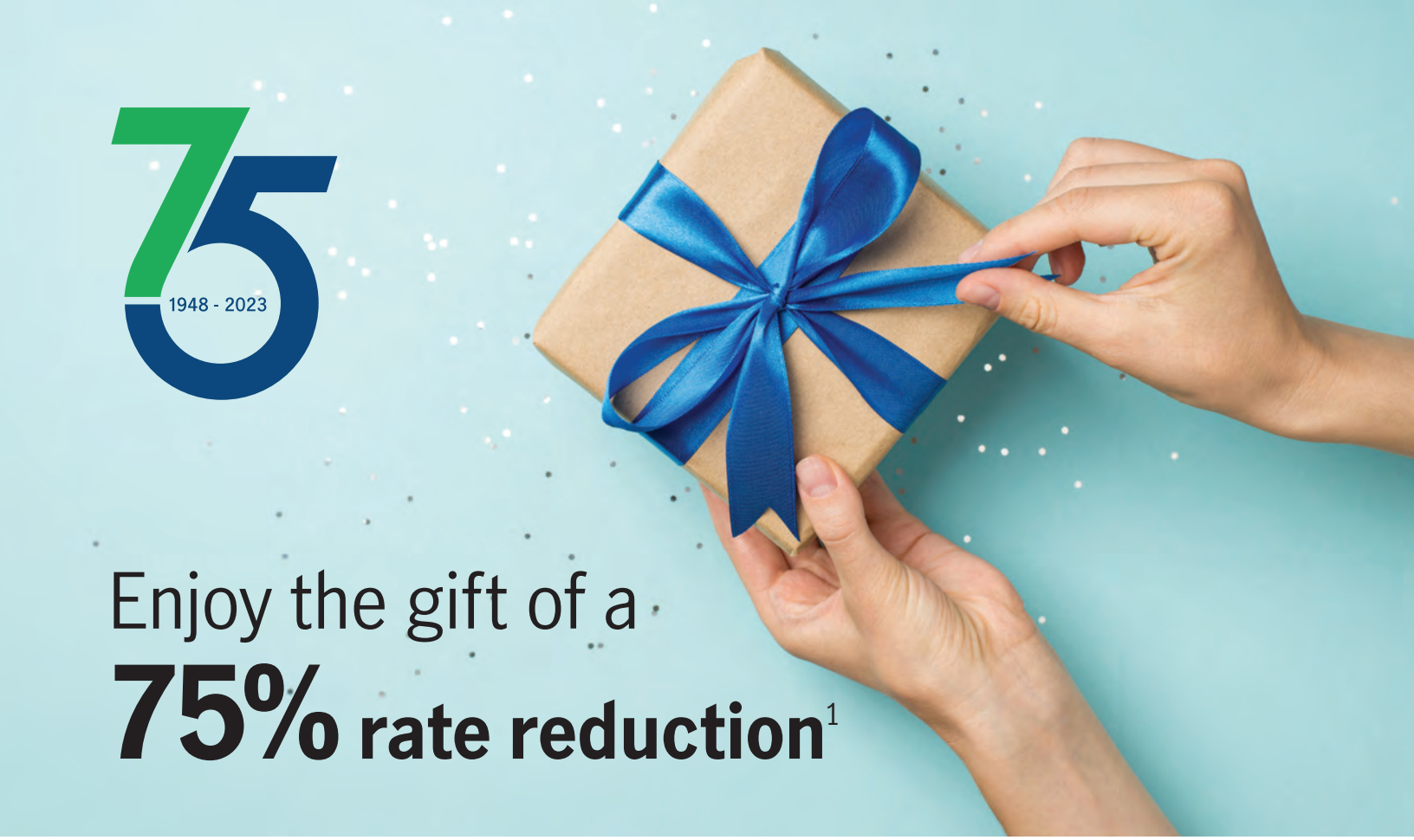
APEGS
Association of Professional Engineers & Geoscientists of Saskatchewan

THE PROFESSIONAL EDGE

ISSUE 200 • JUNE 2023

2023 SALARY SURVEY

2023 Annual Meeting and Professional Development Conference



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APEGS
Association of Professional Engineers & Geoscientists of Saskatchewan

Regulating the professions. Protecting the public.

On the cover:

Ken From, P.Eng., FEC, FGC (Hon.) was the breakfast keynote speaker at the 2023 Annual Meeting and Professional Development Conference

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The next issue of *The Professional Edge* will be in December.

APEGS has reduced the number of print issues of *The Professional Edge* from six per year to two and is supplementing them with monthly e-newsletters.

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JUNE 2023

President's Message

Greg Vogelsang, P.Eng., P.Geo., FEC, FGC

Getting started in a new role is always an exciting time. I would like to thank John Desjarlais for his service as APEGS' president as I now step into the role for the next year. APEGS as an organization has an important role in this province. To be a leader of this organization with an opportunity to express what the professions of engineering and geoscience mean to Saskatchewan is deeply meaningful.

What the world needs is often made possible, in part, through the work of engineers and geoscientists. When major developments unfold, such as the greater demand for clean energy and electronics as well as the geopolitical conflicts such as the one in Ukraine, we in the professions pay attention.

Both the Canadian and Saskatchewan governments have released critical mineral strategies in the last six months. Accomplishing what is contained in those strategies requires engineers and geoscientists. It takes people with the right expertise, experience and certainly the motivation to scale up our exploration, extraction, processing, manufacturing and recycling of those minerals so that our country and our province are valued and sought-out suppliers of those minerals, so the people of the world have clean energy and electronics.

The Canadian strategy says the value chain for critical minerals includes five segments: geoscience and exploration; mineral extraction; intermediate processing; advanced manufacturing; and recycling. Each of those segments will rely on the work of geoscientists and engineers. While governments can support creating a more competitive business environment and those in business can make investment decisions, we will be there, too, to apply the principles of engineering and geoscience to explore, mine, process and manufacture while ensuring we are safeguarding life, health, property, economic interests, the public interest or the environment.

We have all heard about the supply chain disruptions introduced when Ukraine was invaded and that includes disrupting the global supply of potash, to which Saskatchewan contributes. The Saskatchewan Mining Association (SMA) says the province produces 33 per cent of the world's potash supply, with Belarus and Russia producing another third.

Some buyers of potash, especially in the European Union and the U.S., went looking for suppliers other than Russia. Potash expansions planned in Russia and Belarus are expected to be delayed because of the conflict. This created opportunity for Saskatchewan, and we have heard from producers in the province about their intention to increase their production to seize that opportunity. Engineers and geoscientists are required in this space as well to accomplish that goal.

Which brings us back to APEGS. As you know, in our country, the engineering and geoscience professions are regulated in the public interest by self-governing professional licensing bodies. Any professionals undertaking engineering or geoscience work in Saskatchewan must be registered with APEGS, the trusted self-regulatory body for all licensees in Saskatchewan.

APEGS ensures that engineering and geoscience professionals working in this province uphold professional practice and ethical standards so the public can be confident that professional engineers and geoscientists have the right education, ethics and skills to protect the public interest and the environment.

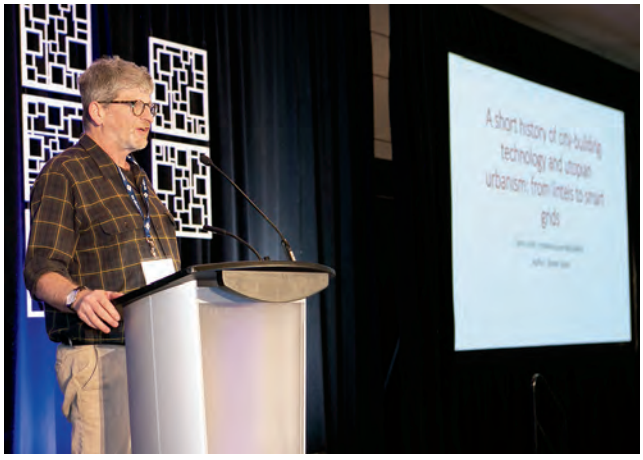
Members of APEGS have a professional obligation to stay informed and maintain competence within their respective professions. In this issue of *The Professional Edge*, you will read about the keynote speakers as well as some of the professional development and ethics sessions held during APEGS 93rd Annual Meeting and Professional Development Conference. This event is an opportunity for members to gain knowledge and enhance their credibility to best work in the public interest.

I hope you found this event to be of value in your professional lives. If you were unable to attend, I hope you will take the next opportunity to do so because, not only do you benefit professionally, but I also believe you will find personal fulfilment from the opportunity to interact with others in our professions who live and work in this province.

2023 Annual Meeting and Professional Development Conference

The *Engineering and Geoscience Professions Regulatory Bylaws* requires that the annual meeting of the Association of Professional Engineers and Geoscientists of Saskatchewan be held in the first six months of each year, so it is customarily held on the first Saturday in May.

This year's events were a professional development conference on Friday with the theme, Saskatchewan's Energy Transition (several sessions are featured on pages 10 to 16) followed by a reception that evening and the annual meeting on Saturday morning. (The awards banquet was moved from Saturday evening after the annual meeting to March for Engineering and Geoscience Week, and the award recipients are featured on pages 20 to 26.) In addition, we offered virtual attendance at select professional development sessions and the annual meeting.



John Lorinc, the lunch keynote speaker at the 2023 professional development conference, speaking on how smart cities fit into the history of urban infrastructure.

93rd annual meeting

The 93rd annual meeting of the association was called to order in person and virtually at 9 a.m. Saturday, May 6, 2023 with 167 (90 in person and 77 virtual) voting members in attendance. The business of the meeting included:

- Minutes from the May 7, 2022 annual meeting
- Business arising from minutes
- Message from the president
- Reports from executive director and registrar, public appointee, boards/committees
- Bylaw amendments
- Audited financial statements
- New business – motions from the floor
- 2023 election results
- Council induction

The annual report for 2022 is available at https://www.apegs.ca/about/publications/annual-reports and in print by contacting the APEGS office.

APEGS engaged Insightrix Research Inc., an independent third-party research firm, to conduct the 2023 council elections. Insightrix issued ballots on March 13, 2023 and polling day was on April 11, 2023.

The Executive Director and Registrar reported that the total number of votes cast was 1,627 (1,612 electronic, 15 mail) being 10.83 per cent of the 15,021 total ballots sent out. There was one spoiled ballot.

New Council

The president, president-elect, immediate past president and vice-president hold office for a term of one year after having served as a council member for at least a three-year term. All other councillors hold office for a three-year term with the ability to run for a second three-year term.

Greg Vogelsang, P.Eng., P.Geo., FEC, FGC
PRESIDENT
(1-YEAR TERM)

Erin Moss Tressel, P.Eng., P.Geo., FEC, FGC
PRESIDENT-ELECT
(1-YEAR TERM)

Ian Farthing, P.Eng.
VICE-PRESIDENT
(1-YEAR TERM)

John Desjarlais, P.Eng., FEC, FGC (Hon.)
PAST PRESIDENT
(1-YEAR TERM)

Rahim Ahmad, P.Eng.
(1ST YEAR)

Carolyn Emperingham, P.Eng.
(3RD YEAR)

Jason Gasmo, P.Eng
(1ST YEAR)

Gavin Jensen, P.Geo., FGC
(3RD YEAR)

Danae Lemieux, P.Eng.
(2ND YEAR)

Trent Nelson, P.Eng.
(3RD YEAR)

Kevin Ness, P.Eng., FEC
(2ND YEAR)

Ashok Thakkar, P.Eng., FEC
(3RD YEAR)

Richele Andreas
PUBLIC APPOINTEE

Vacant
PUBLIC APPOINTEE

Appointments to National Organizations

Kristen Darr, P.Geo., FGC, FEC (Hon.) Geoscientists Canada • Ernest Barber P.Eng., FEC, FGC (Hon.) Engineers Canada

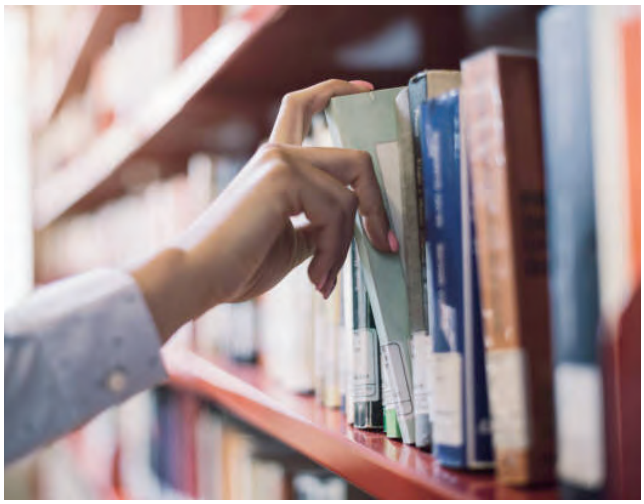
Bylaw Amendments

At the annual meeting on May 6, 2023, the members present passed motions to amend the following from The Engineering and Geoscience Professions Regulatory Bylaws and The Engineering and Geoscience Professions Administrative Bylaws.

- Regulatory Bylaw 23.2 – Continuing Professional Development (CPD) Program
- Regulatory Bylaw 12 – Maintenance of membership
- Regulatory Bylaw 13 – Licences required
- Administrative Bylaw 28(3) – Separate out the Professional Practice Exam Fee

The amendments are aligned with improving clarity to the administration of the continuing professional development (CPD) program and upholding changes to support the professional practice exam.

Not all members who have had their licence suspended by the registrar for non-compliance with CPD are taking the necessary steps to have the suspension removed prior to renewals (paying their annual fees). This is misaligned with the intent of the program. The existing bylaws do not require members to be compliant with the CPD program to maintain their membership in good standing. The proposed bylaw amendments define what it means for a member to be noncompliant with the CPD program and describe what is required for members to be compliant



with the CPD program to maintain their membership in good standing, which makes them eligible to renew both their annual membership and licence.

Amendments to Regulatory Bylaw 23.2 and Appendix 5 will allow council to approve changes to the CPD Program document rather than requiring bylaw amendments if changes are being contemplated to the program.

Before the proposed bylaw amendments can come into force, APEGS must submit them to the minister responsible for The Engineering and Geoscience Professions Act and then to the Gazette for publishing.

More information about the amendments is available at www.apegs.ca/assets/proposed-bylaw-amendments.pdf.

Brad Hayes, PhD, P.Geo., FGC spoke on the 21st Century Energy Transition at the 2023 professional development conference.

‘Humanity, we have a problem’

Canada’s Energy Future and the Role of Engineers and Geoscientists

BY MARTIN CHARLTON COMMUNICATIONS

Ken From, P.Eng., FEC, FGC (Hon.) has been thinking a lot about what he considers to be a super wicked problem.

It is a problem he hopes young engineers seriously consider as they start their careers in what he sees as an ideal time to be an engineer. He told the room he hopes to “spark a bonfire” of thinking with his attempt to point out the consequences of the current narrative around climate change and energy.

From said there is a strong desire to decarbonize but if we move too quickly, we can introduce new problems. He pointed out there are three types of problems. Simple problems have a cause and solution. Complex problems have multiple causes and multiple solutions. A wicked problem will also have multiple causes that involve social or cultural issues, making the problem very difficult, if not impossible, to solve because its causes are complex and interconnected.

From showed a slide that showed Mike Toman, Research Manager at World Bank, said that, “Climate change is an issue that presents great scientific and economic complexities, some very deep uncertainties, profound ethical issues, an even lack of agreement on what the problem is.”

He provided details about Canada’s emissions as well as Saskatchewan’s before outlining Saskatchewan’s energy systems and the energy demand by sector in this province. He sees a lot about Canada’s energy use that should make Canadians proud.

Energy transition is an inaccurate phrase, From believes. He prefers the term transformation because it means improvements are being made rather than moving from one to another. From pointed out that changes take time with some taking centuries. He described how the world has added energy sources as the demand for energy has grown, with technology and economic advantages prompting those changes, but now we are looking to subtract to achieve net zero.

Government policy is driving changes now with politicians and activists putting forward a narrative with a clear message. Fossil fuels are bad and we must stop using them. That, he said, has changed the conversation about energy.

From points out that framing the issue to say that we must be net zero creates a “trilemma” between energy affordability, energy security and energy transition. There are many ways to reduce emissions, but few energy systems can be functional and net zero, so, expecting to find a “silver bullet” is not wise. Wisdom, he said, is knowing when to avoid perfection. “Do not demolish the old house before the new one is built,” said From.

He also pointed out this thinking prompts people to explore “distractions,” such as direct air capture, carbon credits, ammonia for energy and hydrogen. He said getting distracted could get society in more trouble by drawing focus from what we can do to clean up what we already use. He reminded engineers that they are the ones to design technology requiring energy and the world’s energy demands keep growing.

But also, our way of life in Canada is wasteful, From stated. We waste food (which took energy to produce) and we purchase large vehicles to park in concrete parkades. Energy consumption would come down if people showed more control rather than sustaining our current way of life. He said action is needed to prevent devastating damage and included himself among those who could make different lifestyle choices.

The timeframe for that devastation is far out, but From said the magnitude is so high that action must be taken now. Humans want instant gratification, so, we don’t always recognize the need to do something now when the benefit is obscure and in the future.

Doing what is necessary to care for the climate is the same as someone taking medications now to avoid serious health repercussions later in life. By acting now, we can avoid having to do “really big stuff” later. He said the public often does not understand how engineers make decisions about risk and he encouraged engineers to speak publicly about how to avoid these consequences.

He said this is an exciting time to be a young engineer to work on solving humanity’s biggest problems. He said there are so many opportunities to make energy sources and their uses better as the world insists on consuming more as the population grows and governments make policies to encourage investments in unproven sources. Historically, engineers solve these problems to create equity and a better life for all. He again asked that we don’t destroy the old house before the new one is built.

How Smart Cities Fit Into The History Of Urban Infrastructure

BY MARTIN CHARLTON COMMUNICATIONS

As cities saw value in using smart city technology to improve municipal operations, John Lorinc was drawn into reporting on them.

The Toronto journalist received an Atkinson Fellowship in Public Policy in 2019 and spent a year researching his book, *Dream States: Smart Cities, Technology, and the Pursuit of Urban Utopias*. It focuses on the development of sets of technologies that enable humans to live together in concentrated areas as well as the long-standing desire to improve and perfect cities.

Smart technology offers an "inherently utopian promise" that technology could observe activity in a city and then apply sophisticated computing to find improvements. Large hardware suppliers and global tech firms as well as large municipalities, such as Barcelona, New York City and Songdo, South Korea, advanced it. The applications were for mobility (such as adaptive traffic control), government operations (like providing citizens information), security/policing (including facial recognition), energy/climate (such as smart lighting), democratic engagement (including virtual public engagement tools) and planning and development (with computer-assisted design).

Lorinc explains the evolution of smart cities is the latest chapter in an 8,000-year-old story about cities. He said the first part of *Dream States* is about civic technology that allowed cities to grow and make them liveable. He referenced key structural innovations in architecture, some of which we take for granted now, including glass and rebar. Then there is civil engineering and urban planning with the introduction of concrete, cement, bridges, roads, asphalt along with street grids, subways and steam engines.

He explained how an active civil engineering community in London between the 1600s and 1800s made that city a proving ground. Entrepreneurs recognized they could capitalize on springs near the River Thames following the Great Fire of London in 1666. Networks of pipes were created to deliver water. Wealthier citizens could subscribe to a fire company to have a fire extinguished, which the insurance industry appreciated. This interconnected and scalable system became the basis of those used to deliver electricity, natural gas, cable networks and the internet.

Then, there was London's Great Stink of 1858. People dumped sewage into gutters that drained into the Thames before Joseph Bazalgatte, a civil engineer, created a network of underground sewers and intersectors while public health science exploded with improvements, too.

Electrical infrastructure and urban energy systems brought forward streetlights to created a sense of security to inspire nightlife.

Before the late 19th century, cities were filthy, crowded and chaotic, making them difficult places to live. Advancements reflected a growing desire to perfect and improve urban life.

Many ideas have been implemented to make cities better but each delivered unintended consequences. The garden cities of English urban planner Ebenezer Howard located commercial activity in one area, recreation in another and homes in a third leading to land-use regulations and zoning, but also contributing to urban sprawl.

There was Le Corbusier's ideas about the radiant city. The Swiss-French architect appreciated high-rises and grand boulevards, but that discouraged activity at the street level. Then, Frank Lloyd Wright encouraged the broadacre city, which sprawled out to suburbs with the amenities of cities, creating a dependency on cars. The new urbanism of the 1980s and '90s had similarities to Howard's ideas, but developers interpreted it as simply high-end neo-traditional residential architecture in newly built areas.

Lorinc contrasted the ideas of Robert Moses, the New York City commissioner, who valued top-down planning and modernist superblocks with Jane Jacobs', a U.S.-Canadian journalist and activist who promoted dense, working-class neighbourhoods with street life.

Then, there is Richard Florida, an urban studies theorist known for his concept of the creative class regenerating urban life, so, cities provide economic opportunities, but are also where creativity, capital, innovation and research and development come together.

This background helped Lorinc understand and explain smart cities, which he said are a clash between two big forces – urban utopianism and the evolution of urban technology – which raises questions for citizens, particularly about the information municipalities collect about citizens and privacy.

An Overview of Small and Micro Modular Reactors

BY MARTIN CHARLTON COMMUNICATIONS

Those looking for an overview of nuclear reactors with greater detail about small and micro modular reactors (SMRs and MMRs) and Saskatchewan's role in the supply chain and fuel cycle learned a lot from the presentation done by Dr. Esam Hussein, P.Eng.

He is a professor and former Dean of the Faculty of Engineering and Applied Science at the University of Regina.

Nuclear reactors are considered carbon-free and provide reliable baseload power, making them attractive options for places, such as Saskatchewan, which are considered small to medium energy jurisdictions.

Before describing the types of reactors that exist, Hussein provided some basic knowledge about fission splitting the uranium atom, criticality, as well as the types of reactors – thermal and fast fission. He said there are 422 nuclear reactors in operation in the world and 56 reactors under construction in China and India, according to the Power Reactor Information System (PRIS) database.

Hussein explained how much energy small reactors (SMRs), Micro Modular Reactors (MMR) or very small modular reactors (vSMR) generate. He also explained that modular reactors aim to reduce the cost and construction time of developing a nuclear reactor. In March 2022, the Saskatchewan government announced a joint strategic plan along with the governments of Ontario, New Brunswick and Alberta outlining the path forward on small modular reactors (SMRs).

He provided information about the 11 SMR/MMR systems for which vendors currently have pre-licensing engagements with the Canadian Nuclear Safety Commission. These 11 include the GE-Hitachi Nuclear Energy MWRX-300, which SaskPower announced in June 2022 it had selected for potential deployment in Saskatchewan in the mid-2030s after completing a thorough assessment of several Small Modular Reactor (SMR) technologies. Ontario Power Generation (OPG) also selected the GE-Hitachi BWRX-300 for its Darlington New Nuclear Project in Ontario. He explained it is a boiling water reactor (BWR) with a light water coolant and neutron moderator that is inherently safe. He said there are a good number of these types of reactors in the world, so there is a lot of operating experience available to those who choose them.

Another system he explained was the eVinci micro-reactor. In May 2022, the Saskatchewan Research Council (SRC) and Westinghouse Electric Canada signed a Memorandum of Understanding (MOU) to advance very small modular reactors (vSMRs), also known as micro-reactors, in Saskatchewan. They said at that time they would jointly develop a project to locate that type of reactor in Saskatchewan for the development and testing of industrial, research, and energy use applications.

Hussein explained the applications for SMRs and MMRs. These applications include being used as part of the grid or off-grid to generate electricity for remote communities. They can be used for district heating or process heat for industry. They can be used to produce hydrogen or desalinate seawater. They can be nuclear spent-fuel burners or nuclear-fuel breeders. They can provide baseload energy for renewables and serve as a backup to them. They can become part of a microgrid or an aggregation that a community chooses.

He explained all nuclear power plants in Canada require a licence from the Canadian Nuclear Safety Commission proving that they meet requirements, provide safety measures, that their safety systems are technically and scientifically sound and undertake appropriate measures to protect people, security, the environment and meet international obligations. He reviewed the Canadian Nuclear Safety Commission's Design requirements for new nuclear power plants, outlining the three phrases.

To conclude, he went through what he sees as Saskatchewan's role in the supply chain and fuel cycle, particularly northern Saskatchewan. The province is the world's second-largest uranium producer (Kazakhstan is first) but produces the world's highest grade triuranium octoxide (U_3O_8). Saskatchewan has a role in the frontend of the fuel cycle (which is mining and milling, conversion, enrichment, and fabrication) as well as the backend (which is the temporary storage, reprocessing, and recycling before the waste produced is disposed).

He said reactors could benefit northern Saskatchewan Indigenous communities. MMRs are an application that can be used for remote communities and mining operations, such as those in northern Saskatchewan, where the Canadian Shield could be used to locate spent fuels.

Lithium Exploration in Southern Saskatchewan

The Brief History, Present and Exciting Future

BY MARTIN CHARLTON COMMUNICATIONS

Gavin Jensen, P.Geo., FGC, with the Saskatchewan Geological Survey stated the importance of Saskatchewan's natural resource sector to our economy and quality of life and said finding new industries and opportunities within the province ensures that continues.

Jensen said Australia leads the world in lithium production with some also in South America. Zach Maurer, Executive Director, Arizona Lithium, called it a "monumental feat" that the global supply capacity of this resource doubled in a few years, but projections about demand by 2030 show a lot more production is necessary.

Maurer explained that the battery materials supply chain has "gone crazy" in recent years with auto manufacturers committing to electrifying their fleets. Battery manufacturers are building facilities in North America. He said this "massive" downstream investment in North America comes after years of watching the rest of the world move ahead on this.

He said this investment is great, but if North America relies on importing resources, increasing our domestic production isn't fixed. There is one lithium mine in North America – an evaporation pond in Nevada which Maurer said produced less than half of one per cent of the global supply in 2022.

They each explained how they contributed to lithium exploration in Saskatchewan. While describing 3.5 billion years of Saskatchewan's geological history, Jensen explained how oil and gas brines in two basins – Williston and Alberta – migrate into Saskatchewan. In 2011, he wanted to sample brines from oil and gas wells to understand their chemistry. Interest in lithium was developing at the time. Fast forward 10 years, the Canadian government released its list of critical minerals, which includes lithium.

He described his research work visiting wellheads in Saskatchewan to collect samples of oil well water. He found the highest lithium values in the Duperow Formation in southeast Saskatchewan. In recent years, more sampling by EMP Metals Corp., Arizona Lithium, and Grounded Lithium Corp. provided more information about lithium concentrations in the province. The highest concentration recorded in a brine in Saskatchewan and Canada to date is 259 mg/l.

Lithium got Maurer's attention in 2016 – as did Jensen's research. After earning a geology degree at the University of Regina, he researched resources we would need in the future. Saskatchewan's lithium concentrations intrigued him, so Maurer proposed a master's study at the U of R to understand the origin and evolution of lithium so its commercial potential in Saskatchewan's brines could be quantified and he could develop a fundamental understanding of the resource.

Maurer worked to understand where lithium would be most concentrated and why there because drilling wells is expensive. He expanded beyond the six previously publicized rock layers in the Duperow Formation to understand over 24. In 2018, he "cracked that code" and a year later, incorporated Prairie Lithium to develop a brine project south of Weyburn and west of Estevan. The area's infrastructure, including highways, powerlines, fresh water and natural gas make it one of the most accessible lithium brine resources on the planet.

In November 2021, Prairie Lithium became the first in Canada to drill an exploration well for lithium at a cost of well over $2 million. That vertical well perforated eight zones to test the vertical distribution of lithium and proved the lithium in that formation is vertically isolated.

A second well 20 kilometres south was a re-entry in a geothermal well, perforating the same intervals. Its lithium concentration correlated with the first well. A third well is seven km to the north. They drilled another 150 metres in an oil well that was no longer producing to find slightly lower concentrations. Maurer said more work is needed to fully understand the economic and production potential of the Duperow aquifer, but these wells show lateral continuity of lithium concentrations within the formation.

Maurer said Prairie Lithium was sold to Arizona Lithium, a larger lithium exploration development company, this year.

Maurer said significant investments have been made into direct lithium extraction technology (DLE) for chemical processing of this resource. It selectively removes lithium from the brine. To go into production, Maurer said you need to understand chemical engineering, geology and hydro geology and geophysics, combining that knowledge to choose the appropriate DLE for different brines.

Opportunities and Challenges

Building the Rare Earth Element Supply Chain

BY MARTIN CHARLTON COMMUNICATIONS

By the end of next year, the Saskatchewan Research Council expects its Rare Earth Processing Facility will be operational.

The fully integrated minerals-to-metals rare earth processing facility, the first of its kind in North America, is still under construction in Saskatoon. Dr. Muhammad Imran, P.Eng., the Vice-President, Rare Earth Elements Division, Saskatchewan Research Council, spoke about the opportunities and challenges faced by Saskatchewan, SRC and industry to develop a rare earth elements (REE) supply chain and the role of the facility to provide an industry model for future REE resource expansion in the province.

Rare earth metals are a key ingredient used to manufacture permanent magnets which are used in electric vehicles, wind turbines, electronics, and more. Imran went through the current and future demand for permanent magnets and explained that no one in North America is manufacturing permanent magnets or separating rare earth elements. China currently dominates the rare earth industrial sector.

To be able to manufacture the magnets, the elements must first be mined and then processed. There are several steps in that process. But, setting up a secure and reliable supply chain to accomplish that is difficult. REE prices are volatile and fluctuate in a six-month cycle. Companies focused on one part of the stream – upstream, midstream or downstream – are challenged to quickly get their businesses up and running. If a company doesn't have enough capital when prices drop, it is done.

In addition to explaining the demand, he went through why Saskatchewan is well positioned to establish an REE processing industry, from mining to magnets. The province has plentiful REE deposits and considerable mining expertise and talent. Canada has the fifth-largest rare earth mineral resources in the world. Most are still under exploration, but the potential is there to produce REE concentrate within the next five to 10 years.

The Government of Saskatchewan released the 2030 Growth Plan in 2019, which said Saskatchewan has world-class resources of rare earth elements. To accelerate the development of cost-effective extraction technology, it said it would create the first North American REE processing plant to deliver individual high purity REE.

SRC has a strong history in mining and oil and gas with knowledge and experience pertaining to upstream, midstream and downstream. Imran said the facility will be trying to provide industry "footsteps to follow." The concept for the facility, at a fundamental level, is that it will be built at a demonstration scale to allow for the commercialization of the technology. Imran said SRC is building relationships to make sure that, from piloting to commercializing, there is a smooth transition and that the technology works for commercial uses.

While rare earth elements are present in vast quantities in the world, they are not often found in significant concentrations. Deposits suitable for commercial extraction – which contain about two to four per cent rare earth elements – are rare. What comes out of a mine must be concentrated to 90 per cent.

SRC's Monazite Processing Unit (MPU) will produce total rare earth oxides by separating the REE from the impurities. That mixture is fed to a Separation Unit that separates the elements from one another. In the third unit, a Metal Smelting Unit, some of those elements are converted to metals so they can be used to manufacture permanent batteries. These three units are to process 3,000 metric tonnes per year of monazite concentrate.

He explained a few of the challenges SRC had to overcome. The first was that it hoped to acquire some technology from China, but exports of the technology they required from that country were restricted. SRC looked for another supplier, but no one could provide a performance guarantee. So, SRC took on the challenge of designing and fabricating the solvent extraction cells they needed. The work was done in Regina.

He also explained that REE processing work is very labour intensive. In China, the labour is available, but here, it would have been difficult to find enough operators. In one process, those operators would be needed to ensure the proper separation of oil and water. That process can take months. During that time, money is not being made, which creates another challenge. SRC found a solution with an artificial intelligence application developed through custom software to drop the labour requirement from 80 operators to five and the length of the process from months to a day.

21st Century Energy Transition

The Global Challenge of our Time

BY MARTIN CHARLTON COMMUNICATIONS

Energy transition is about energy and not reducing greenhouse gas emissions, but Brad Hayes, PhD, P.Geo., FGC said that does not mean society can ignore emissions.

Hayes is president of Petrel Robertson Consulting. He said concern about emissions and their effects is well deserved. There is no point denying, but he stated that energy is life. Everything humans do uses energy – from growing food to manufacturing to transportation.

He said that reality is captured in the United Nations Sustainable Development Goals report. Hayes said those 17 goals are meant to outline what we need for everyone to have a modern life, prosperity and peace.

Most of the goals, he said, are straightforward – quality education, gender equality, clean environment, and water to drink. All people are likely to agree these goals are important.

He drew attention to Goal 7, which is to ensure access to affordable, reliable, sustainable and modern energy. Hayes would argue humanity can't accomplish the other goals without this one being achieved. He said we have many sources of energy – fossil fuels, biomass, wind, solar and more, but around 80 per cent of the energy we use comes from fossil fuels. This has come down primarily because of nuclear energy and hydro electricity.

He also pointed out Goal 13, which is taking urgent action to combat climate change and its impacts, another goal Hayes would say can't be achieved without Goal 7 because energy is life.

A transition has been underway in global primary energy consumption since 1800. A graph he displayed showed that by 1900, coal and biomass made up the world's energy supply. From there, we've added other energy sources. Renewables joined the mix in recent years.

He provided data from Dr. Vaclav Smil, Distinguished Professor Emeritus in the Faculty of Environment at the University of Manitoba. The graph he displayed showed the years that four different energy sources were each able to supply five per cent of the global energy demand. For coal, that was 1840. For oil, it was 1915. Natural gas was 1930 while modern renewables was 2012.

The graph also showed how much energy each source supplied over the next 60 years. So, coal supplied 50 per cent of the global demand 60 years after 1840. Oil supplied 40 per cent after 60 years after 1915. Natural gas supplied 25 per cent 60 years after 1930. Hayes said part of the graph showed that the more sources you add, the lower the absolute importance of that source became.

He also pointed out that with each source of energy added, demand has not dropped. It increased. He said trying to increase the supply of energy while at the same trying to replace sources creates an even bigger challenge.

He went through the many sources of energy – fossil fuels, nuclear fission, hydroelectricity, wind and solar, and geothermal – listing the benefits and challenges of each one. Hayes said humanity is going to need many, many solutions and there are no silver bullets to take us from where we are today to a better way in the future.

He asked what we need to think about to get there. First, the world's population continues to grow and the distribution of people is changing. Second, everyone in the world wants an energy-rich lifestyle. He said it is only in energy-rich societies, such as Canada, that people are focused on climate change. Populations in other nations are focused on achieving the modern lifestyle we enjoy.

Third, he said that even when we agree on improving energy infrastructure, it takes time and effort to do the job correctly. Fourth, he pointed out how people aren't changing their behaviours. For example, the top-selling vehicles in the U.S. are big, full-scale pickup trucks when often a more efficient vehicle would be suitable for the driver's needs.

Hayes said change is necessary. He said plans focused solely on reducing emissions are not energy transition plans because they don't address energy availability, security and affordability. He went on to say the change we can achieve will be what we all agree to accomplish while we must recognize the fact that humanity impacts the environment. Finally, he stated that a prosperous society with adequate energy can focus on improving the environment. A society starved for energy cannot.

The Ethics of Infrastructure Failure

BY MARTIN CHARLTON COMMUNICATIONS

Chris Roney, P.Eng., is a practising engineer based in Kingston, Ont. He has served on the Complaints Committee of the Professional Engineers Ontario (PEO) for 25 years and has been a part of many investigations of engineering failures. All 12 engineering and geoscience regulatory bodies in Canada have fairly similar codes. Breaches are considered professional misconduct for each of those regulatory bodies (excluding Ontario). Roney explained a code of ethics contains underlying principles to use when making daily decisions, providing engineers guidance and strength to do the right thing, even under pressure.

Other professions have a duty to their client or patient, for example, but not engineers. Roney reminded that an engineer's paramount duty is to the safety, health and welfare of the public, environment and workplace. He said engineers have a duty to advise their employer and client when an engineering decision that is overruled may result in breaching their duty to safeguard the public. In some cases, it may be necessary to inform the regulator.

He encouraged engineers to recognize their strengths, but also their limitations. He explained the stages he sees in an engineer's career. A graduate feels they know everything, but once they start a job, they recognize they know nothing. They learn and their confidence grows as they become senior engineers. Roney said the value of experience is that it allows an engineer to identify solutions more quickly and helps them judge where to focus their engineering, but it shouldn't take the place of doing proper due diligence and analysis to verify hypotheses.

He spoke about how culture played a role in the 1986 NASA Challenger disaster. The solid rocket boosters of the Challenger had O-rings to contain the hot, high-pressure gases produced by the burning solid propellant. NASA engineers were concerned about the O-rings and inspections following earlier flights found they were failing to entirely contain the gases (and it was worse when the temperature was low).

Photo credit: NASA

The space shuttle Challenger lifted off from Pad 39B Jan. 28, 1986 at 11:38 a.m. (EST) with a crew of seven astronauts and the Tracking and Data Relay Satellite (TDRS). An accident 73 seconds after liftoff claimed both crew and vehicle.

The morning of the launch, which was a record cold day, engineers argued against launching, but upper management overruled them. Roney explained that a culture known as the "Normalization of Deviance" had developed within NASA. Gradually, unacceptable practices and standards became acceptable.

Then, there was the collapse of a stage for a Radiohead concert in Toronto in June 2012, which killed the band's drum technician and injured three others.

An engineer was to check the structure for the intended loads, certify the structural drawings for the stage and review its assembly before the concert. This demountable stage had been used countless times over the years with no reported issues, but an investigation found the design had been pushed further than it had gone in the past. That initial design did not contemplate changes made over years, so it was unreasonable to rely on it. The engineer argued the client was knowledgeable and the crew assembling the stage were experts, but their report was considered deficient.

Roney also went through the collapse of the Algo Mall in Elliot Lake, Ont. In June 2012, a connection of one steel beam to its supporting column gave way. Two bays of the rooftop parking level collapsed into the mall. Nineteen people were hurt and two were killed.

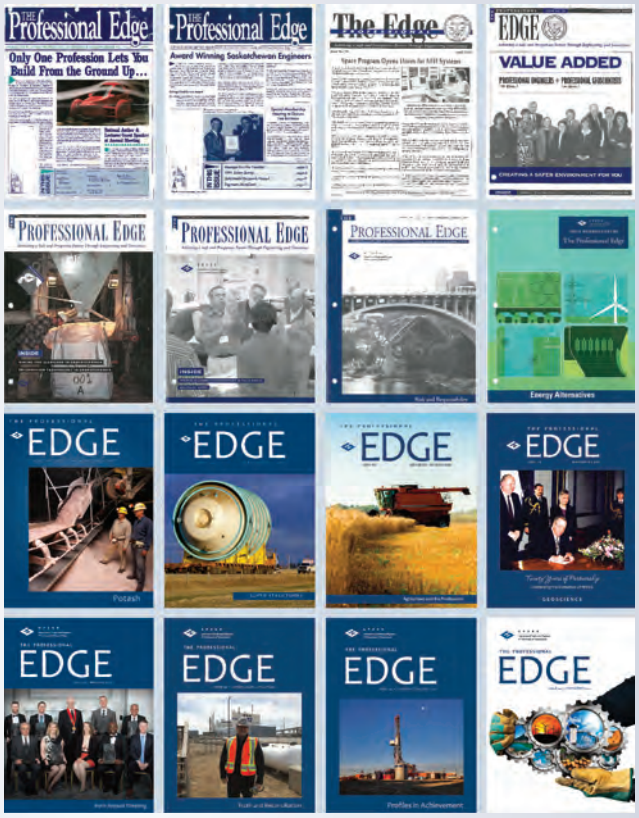
Roney encourages all Canadian engineers to download and read the entire Report of Elliot Lake Inquiry for what he calls an "amazing story of human failure from cover to cover." Roney assisted PEO with drafting recommendations for the Commission of Inquiry.

While the collapse was sudden, the roof had leaked since the mall opened in 1979. Many engineering investigations had been done, but not always by structural engineers. Reports were amended to satisfy owners' interests. Ownership changed and reports weren't passed on. The last engineer to provide a report was on suspension for an earlier incident. Insufficient attempts were to deal with problems, but none addressed the root issue – no waterproofing membrane on the roof deck.

The collapse drew media attention that questioned the credibility of engineers. A forensic investigation was done. It was not just the engineers who failed, but only an engineer was charged and held accountable.

Roney recommended engineers be clear and direct in their reports because those reading them will want to interpret the contents in a way that best benefits their own interests. However, an engineer must understand logical and scientific consequences on behalf of clients and the public. That, he said, is why engineers are needed by the world.

200th Issue



The Professional Edge has been telling the stories of Saskatchewan engineers and geoscientists for decades to reach this milestone issue – number 200.

The Professional Edge Tells Your Stories

MARY-LYNN CHARLTON, MARTIN CHARLTON COMMUNICATIONS

I have had the great honour of working on the editorial content of *The Edge* since 1989 when APEGS contracted out the editorial duties.

What I've learned from my more than 30 years of experience with *The Edge* is that engineers and geoscientists are inherently modest about their contributions to the province. But their work has been critical in helping Saskatchewan transform from a have-not province into the emerging economic force it is today.

Over 200 issues, one common theme in *The Edge* has been the role engineers and geoscientists play in the overall success of the province of Saskatchewan.

In 2004, then-APEGS President Ken From stated in his President's Message (published in *The Edge*) that engineers and geoscientists must use their skills to build Saskatchewan's economic future. And, as told in the stories appearing in 200 issues of *The Edge*, that is what has happened.

The three great forces of the Saskatchewan economy – food, fuel and fertilizer – would not be the economic drivers they are without the work and wisdom of the members of APEGS.

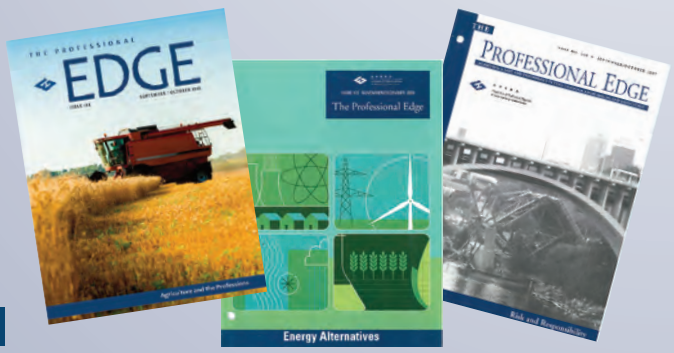
Milestones encourage us to stop and reflect. As *The Edge* moves to fewer issues a year, down from six to two, it is a good time to consider how this magazine has contributed to the professions being understood and appreciated for what they deliver the people of this province.

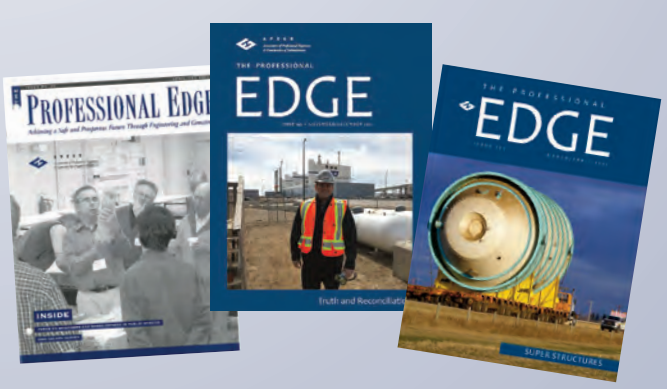
Storytelling is one of the best tools we have for increasing understanding and building engagement, especially as it relates to the complex topics APEGS members tackle daily.

The Professional Edge storytelling has helped APEGS members understand each other. *The Edge* is also read by other key audiences, such as MLAs and government officials, helping them make sense of the complexities APEGS members tackle and the problems they solve to the benefit of all who live in Saskatchewan. As self-regulating professions, it is important to be clearly understood by that audience.

As *The Edge* winds down to twice a year, and we celebrate issue 200, let's look back at decades of stories celebrating the contributions of engineers and geoscientists:

- Water Management – finding water, managing water, water management strategies and protecting our water quality.
- Oil and gas exploration, management and environmental strategies.
- Road and highway safety.
- Profiles of achievement highlighting the professions' annual success stories.
- Mineral exploration.
- Prairie fire research and fire protection strategies.
- Documenting and understanding emerging fields of practice.
- Prairie adaptation to climate change – structures, roads and food production.
- Nuclear, natural gas, hydro, coal, renewable, biodiesel, polygeneration development, management and research.
- Regina's Big Dig.
- Saskatoon's bridge reconstruction, maintenance and design.
- Understanding the professions' ethics with a Saskatchewan lens.
- Engineering and distilling beer and spirits.
- APEGS members acting as mentors, role models and sponsors for the next generation of professionals.
- Engineering new food and non-food uses for our agriculture production.
- Science-fiction-like technology to see and interpret Saskatchewan's resources.
- APEGS' role in truth and reconciliation.
- Geological mapping.
- Utilizing the synchrotron in all aspects of the Sask. economy.
- Researching and adapting renewable resources into the province.
- Mobility for members of the professions – the Saskatchewan context.
- Technology, maintenance and sustainability of our infrastructure.
- Research, innovation and vision from academics as it directly relates to Sask.
- Risk and responsibilities for practising engineering and geoscience in Sask.
- Meeting and understanding the professions' climate responsibilities.
- Saskatchewan's contributions to the space industry.
- Success stories relating to the professions' diversity.
- Professional development Saskatchewan stories.
- How the professions practise in Saskatchewan public/private partnerships.
- The professions and their hard work in K-12 Saskatchewan classrooms.
- APEGS' members work bringing automation in all aspects of our economy.
- Understanding the role of Sask. engineers and geoscientists in a global pandemic.
- Documenting and celebrating the Saskatchewan partnership of engineering and geoscience.





2023 APEGS Awards

APEGS celebrated the award recipients listed below with a banquet and ceremony on March 2, 2023 as part of Engineering and Geoscience Week. APEGS Awards recognize professional excellence and showcase exemplary competence and conduct to promote awareness of the role of APEGS in protecting the public and in fostering professional excellence among members. To view the video of each recipient, visit apegs.ca under Members/Honours & Awards.

Recipients of 2023 APEGS Awards

Brian Eckel Distinguished Service Award
Not awarded this year since there were no applicable nominations.

Outstanding Achievement Award
Wayne Timm, P.Eng.

McCannel Award
Dr. Shahid Azam, P.Eng.

Exceptional Engineering/Geoscience Project Award
Mosaic K1/K2 Shaft Decommissioning Project

Environmental Excellence Award
Saskatchewan Research Council – Project Cleans

Promising Member Award
Rahim Ahmad, P.Eng.

Friend of the Professions Award
Doug Wakabayashi

Upon recommendation from APEGS in honour of exceptional contributions to the engineering or geoscience profession, the following members received a certificate of fellowship and the privilege of using the designation of fellow or honorary fellow of Engineers Canada, FEC or FEC (Hon.), or the privilege of using the designation of fellow or honorary fellow of Geoscientists Canada, FGC or FGC (Hon.):

- John Desjarlais, P.Eng., FEC, FGC (Hon.)
- Andrea Fisher, P.Eng., FEC
- Jeremy Gabel, P.Eng., FEC
- Grant Gingara, P.Eng., FEC
- Gavin Jensen, P.Geo., FGC
- Ian Sloman, P.Eng., FEC

Outstanding Achievement Award

Honours members who show technical excellence and achievement in engineering and/or geoscience in Saskatchewan.

WAYNE TIMM, P.ENG.

Wayne Timm, P.Eng.

Wayne is a Principal Engineer at SaskPower. He obtained a Bachelor of Science degree in Electrical Engineering from the University of Saskatchewan in 1982. In 1985, he became a member of the Association of Professional Engineers of Saskatchewan.

During his 40-year career with SaskPower, Wayne has worked in many areas, mainly related to electric power generation. He started at the Poplar River Power Station in Coronach. He then moved to Estevan, as part of the commissioning team for the Shand Power Station. As Shand was winding down, he also worked on the Rafferty Dam pumphouse and the Estevan Constructed Wetlands, as well as the life extension of the Boundary Dam Power Station. He then moved to Regina working on the Y2K project and in the Generation Engineering office. From there, he moved to Saskatoon and was the electrical lead for the Cory Cogeneration Project. After Cory, he moved to Nipawin as part of the Northern Hydro management team. In 2013, he was asked to go back to Estevan to be part of the commissioning team for the Boundary Dam Carbon Capture plant. After the carbon-capture project was completed, he moved to Regina and is currently Principal Engineer in the Generation Technical Services Department.

Wayne has been an active member of the Institute of Electrical and Electronics Engineers (IEEE). He was a member of the IEEE Hydroelectric Power Subcommittee while working in Nipawin and was involved in IEEE standards related to governors and controls for hydroelectric facilities. He is currently a member of the working group that is revising IEEE 666, Design Guide for Electric Power Service Systems for Generating Stations.

Wayne has served in several positions in his church and community. He lives with his wife, Sandy, in Regina and they have three adult children.

McCannel Award

Honours service to APEGS and to the professions as a whole.

SHAHID AZAM, PHD., P.ENG.

Shahid Azam, PhD., P.Eng.

Shahid is Professor in Environmental Systems Engineering at the University of Regina. He has worked internationally for more than 30 years in the fields of geotechnical and geoenvironmental engineering in academia, consulting and government. He has developed sustainable (cost-effective, environmentally friendly and socially viable) methods to address a wide range of engineering issues for various sectors of the Canadian economy. Specifically, he focuses on understanding and improving the behaviour of problematic earthen materials such as expansive clays and collapsible soils, mining slurries and waste tailings and wasterocks and caprocks. Through his research, Shahid has devised advanced testing methods and modelling protocols to manage civil infrastructure, develop natural resources, assess carbon storage and adapt to climate change.

Shahid has trained dozens of graduate students and post-doctoral fellows and has authored or co-authored more than 150 publications in peer-reviewed journals, international conferences and similar outlets. He is routinely invited to deliver keynote lectures and to serve on expert panels for a variety of industrial projects. Likewise, he has been involved in consulting and technology transfer projects in Canada, Chile, Saudi Arabia and United States.

Shahid is an active member of learned societies and serves on the editorial board of technical journal. He has received several prestigious awards for his research contributions including the Geoenvironmental Award in 2012 from the Canadian Geotechnical Society.

Exceptional Engineering/ Geoscience Project Award

Recognizes accomplishments in engineering and/or geoscience.

MOSAIC K1/K2 SHAFT DECOMMISSIONING PROJECT

Brian Mattie, P.Eng.

Nathan Morgan, P.Geo.

Brittany Chubey, P.Eng.

Shawn Haeusler, P.Eng.

The Mosaic Company operates potash mining and milling facilities – known as K1 and K2 – near Esterhazy, Sask. The K1 and K2 mines were connected underground via mine workings and were managing localized brine inflows from surrounding formations since 1985. Mosaic had incurred significant grouting and brine pumping costs to keep the mines functioning for the last 35 years. The new K3 mine was developed to overcome this issue and eliminate these costs.

With the K3 mining operations coming online and ramping up production, Mosaic commenced with the closure and decommissioning of its mining operations at K1 and K2. The largest portion of the decommissioning effort was the engineering design and installation of the shaft plugs and closure of the shafts (shaft decommissioning).

Based on the K3 construction program schedule, mining was scheduled to stop in the first half of 2022 at which time all K1 and K2 mill ore supply would come from K3. In June 2021, the decision was made to close the K1 and K2 mines due to larger than anticipated brine inflows. The engineering design for the plugs and construction access, along with the installation, were advanced almost a full year ahead of schedule. This work was expedited to ensure the plugs could be constructed safely, prior to the brine level reaching the plug zone. Concrete shaft plugs were installed mid-shaft in the K1 and K2 shafts. These plugs were installed to stop the possibility of artesian flow to surface which had the potential to contaminate freshwater aquifers in the area.

The following accepted the award on behalf of each of their respective project teams:

- **Brian Mattie, P.Eng.**, Project Manager, Thyssen
- **Nathan Morgan, P.Geo.**, Project Manager, RESPEC
- **Brittany Chubey, P.Eng.**, Project Manager, Hatch
- **Shawn Haeusler, P.Eng.**, Project Manager, Mosaic

Environmental Excellence Award

Recognizes the exceptional achievements by an individual or team related to environmental protection and preservation.

SASKATCHEWAN RESEARCH COUNCIL – PROJECT CLEANS

David Sanscartier, P.Eng.

Bo Yun, Engineer-in-Training

Ian Wilson

Vince Zimmer, P.Eng.

The former Gunnar uranium mine and mill was operated from 1955 to 1963 and closed with little decommissioning, which left several mining and milling legacies, including a flooded open pit of uranium-impacted water, 90 hectares of unconfined tailings, waste rock deposits, impacted soils, asbestos-containing structures and underground mine openings.

In 2006, the Government of Saskatchewan engaged the Saskatchewan Research Council (SRC) to manage the Gunnar project (from assessment to post-remediation monitoring) along with 36 other abandoned uranium mines and mills. Gunnar is a remote site with no road access located on the shore of Lake Athabasca, near Uranium City, northern Saskatchewan. The objectives of the project are to contain and stabilize tailings to minimize risks posed by radiation, minimize contaminant release from the site, dispose of hazardous materials and contour the landscape like the natural surrounding terrain.

To achieve these objectives, SRC has been working with multiple stakeholders, regulatory bodies and local Indigenous people. The Environmental Impact Statement (EIS) and remediation designs were approved by both federal and provincial regulators and remediation started with the tailings cover construction in 2016. Construction of engineered covers has been completed at three areas while two areas remain to be covered. Several components have been completed such as permanent closure of mine openings, hazardous material landfill construction and most of the radiation soil covers and legacy debris management. Mitigation of environmental impacts of remediation activities has consistently met regulatory expectations through leadership and teamwork by SRC, contractors, consultants and local Indigenous and non-Indigenous people and an environmental monitoring program meeting the project's EIS commitments.

The intent of the Gunnar project is to provide significant long-lasting environmental, public safety and socio-economic benefits in the area and allow traditional land use of the site by local communities.

The following accepted the award on behalf of SRC:

- **David Sanscartier, P.Eng.**, is a Senior Engineer in the Environment and Biotech Division at the Saskatchewan Research Council.
- **Bo Yun, Engineer-in-Training**, is a Project Engineer in the Environment and Biotech Division at the Saskatchewan Research Council.
- **Ian Wilson** is a Business Unit Manager, in the Environment and Biotech Division, at the Saskatchewan Research Council.
- **Vince Zimmer, P.Eng.**, is the Project Engineer for Gunnar Other Site Aspects at the Saskatchewan Research Council.

Promising Member Award

Recognizes exceptional achievements in the early stages of a professional member's career in Saskatchewan.

RAHIM AHMAD, P.ENG.

Rahim Ahmad, P.Eng.

At 16, Rahim moved from Surrey, B.C., to Warman, Sask., which was Canada's fastest-growing municipality at the time. Watching the community develop around him had a significant impact on Rahim and it was in Warman that his passion for engineering blossomed.

Rahim completed his Civil Engineering degree at the University of Saskatchewan and joined Associated Engineering in 2013. Since joining Associated, he has grown his technical expertise through a diverse portfolio of municipal and industrial engineering projects, including subdivision developments, raw water intakes, lift stations, water treatment plants and lagoons.

Beginning in Associated Engineering's field services group as an Engineer-in-Training, Rahim's technical abilities and natural interpersonal skills helped him progress swiftly from a Resident Engineer to a Principal Project Engineer and Project Manager responsible for completing detailed designs, the successful delivery of multidisciplinary projects and client satisfaction.

Rahim has grown his business acumen and leadership skills by serving as the acting manager of Associated Engineering's Fort McMurray, Alta., office, a role he undertook from August 2020 to March 2021. Rahim's leadership potential and achievements in Consulting Engineering were recognized by the Association of Consulting Engineering Companies – Saskatchewan who awarded him the 2022 Young Professional Award.

As a busy father, husband and engineer, Rahim spends the little free time he has volunteering in various capacities throughout Saskatoon. Rahim currently serves as a Director on the Board of the Saskatoon Open Door Society, as the Saskatoon Co-ordinator for the Association of Consulting Engineering Companies – Saskatchewan's Future Leader's network and one of three External Affairs Secretaries for the Ahmadiyya Muslim Jama`at in Saskatoon.

The Government of Saskatchewan recently recognized Rahim's talents and community service by awarding him the honour of the Queen Elizabeth II Platinum Jubilee Medal.

Rahim is a passionate rising professional engineer and leader within the profession and the greater Saskatoon community.

Friend of the Professions Award

Recognizes exceptional achievements or unique contributions by a non-member in the promotion of the professions.

DOUG WAKABAYASHI

Doug Wakabayashi

Doug has worked in communications and public relations with the Government of Saskatchewan since 1999. He has worked with the Ministry of Highways in increasingly senior roles since 2003.

During his time at the Ministry of Highways, he has worked on numerous major infrastructure projects including the Regina Bypass and the twinning of Highways 1, 11 and 16. His work has been recognized by the Canadian Public Relations Society and the International Association of Business Communicators. He has also been a member of two teams that have received the Premier's Award for Excellence in the Public Service.

Doug is active in the community, volunteering with Scouts Canada and coaching a variety of youth sports.

Renewed Strategic Plan

In 2021, APEGS released a strategic plan for the first time. Recognizing that the environment around us is rapidly changing, the council reviewed the strategic plan in 2022 and took steps to pivot slightly from the plan that was approved in 2021. Throughout the second half of 2022, the council and management made progress in amending the strategic plan. The renewed plan is prepared and in place for 2023-2025.

The focus of the plan is on a commitment to continuous improvements in our registration processes, registrant competence and compliance with the act, prohibition efforts for unlicensed practice of the professions, and in other areas of regulation and developing the practice through professional development in a manner that is in the public interest.

APEGS has also evolved the governance structure to set the direction and ensure effective oversight of core responsibilities. Throughout 2022, there has been significant progress in the council setting the tone at the top of the strategic plan with the direction cascading throughout APEGS' boards, committees, and staff. This is a different approach. The language that has been used as these changes have been implemented is turning the organization upside-down. Self-regulation still exists with the participation of the registrants of the profession on the council and committees, but the manner through which the work is carried out is aligned with respect to the council and leadership steering the organization in the same co-ordinated direction.

The council also reviewed the vision, mission, and values of APEGS. These important parts of the strategy had not been reviewed for several years. The council felt this was an important step for APEGS to deliver on its commitment to regulatory excellence and evolve operations in a way that maintains public confidence.

APEGS' vision, mission, and values not only support what we do but how we deliver on our purpose — ensuring regulation of engineers and geoscientists in Saskatchewan remains strong during a time of significant change.

STRATEGIC PLAN

APEGS
Association of Professional Engineers & Geoscientists of Saskatchewan

Regulating the professions. Protecting the public.

VISION

APEGS is a leader in providing progressive regulation that unites the needs of the public with the practice of its members towards the betterment of society and sustainable professions.

MISSION

APEGS regulates the professions of engineering and geoscience in the public interest. APEGS is responsible for registration and compliance, member competence, regulation, and developing professional practice.

VALUES

Humility

We embrace the limits of our individual knowledge. We believe there is value in the insights and perspectives of peers and those outside the professions to create meaningful solutions for the public and our members.

Integrity

We conduct ourselves transparently, honestly, and ethically, and in good faith. We consistently work toward a mutual relationship of trust with the public and our members.

Inclusivity

We value the perspectives and contributions of all people, and we incorporate the needs, experiences, and perspectives of a diverse public into our decision-making processes.

Responsibility

We ensure our members practise their chosen professions in an accountable way that demonstrates a commitment to public well-being and member competence.

Innovation

We champion innovative approaches to regulation.

THREE-YEAR GOALS 2023-2025

Registration

- Increase and expand membership of eligible practitioners
- Assess membership categories to ensure appropriate representation of practice
- Improve transparency, effectiveness, and efficiency of registration processes

Member Competence & Compliance and Enforcement

- Assess the current continuing professional development (CPD) program to determine its effectiveness in ensuring member competence and proficiency
- Enhance relationships with member firms to ensure they support member competence initiatives
- Ensure confidence in the CPD program compliance systems
- Increase prohibition and enforcement efforts for unlicensed practice

Regulating the Professions

- Enhance member education on regulation
- Develop key performance indicators to continuously evaluate the effectiveness of the organization
- Improve transparency of the investigation and discipline procedures
- Improve the usability of the online register
- Ensure effective corporate and/or entity regulation

Developing the Practice of the Professions by the Members in the Public Interest

- Improve the organization's capacity to understand and address public expectations and interests
- Monitor relevance of professional development opportunities to align with shifting public expectations and interests

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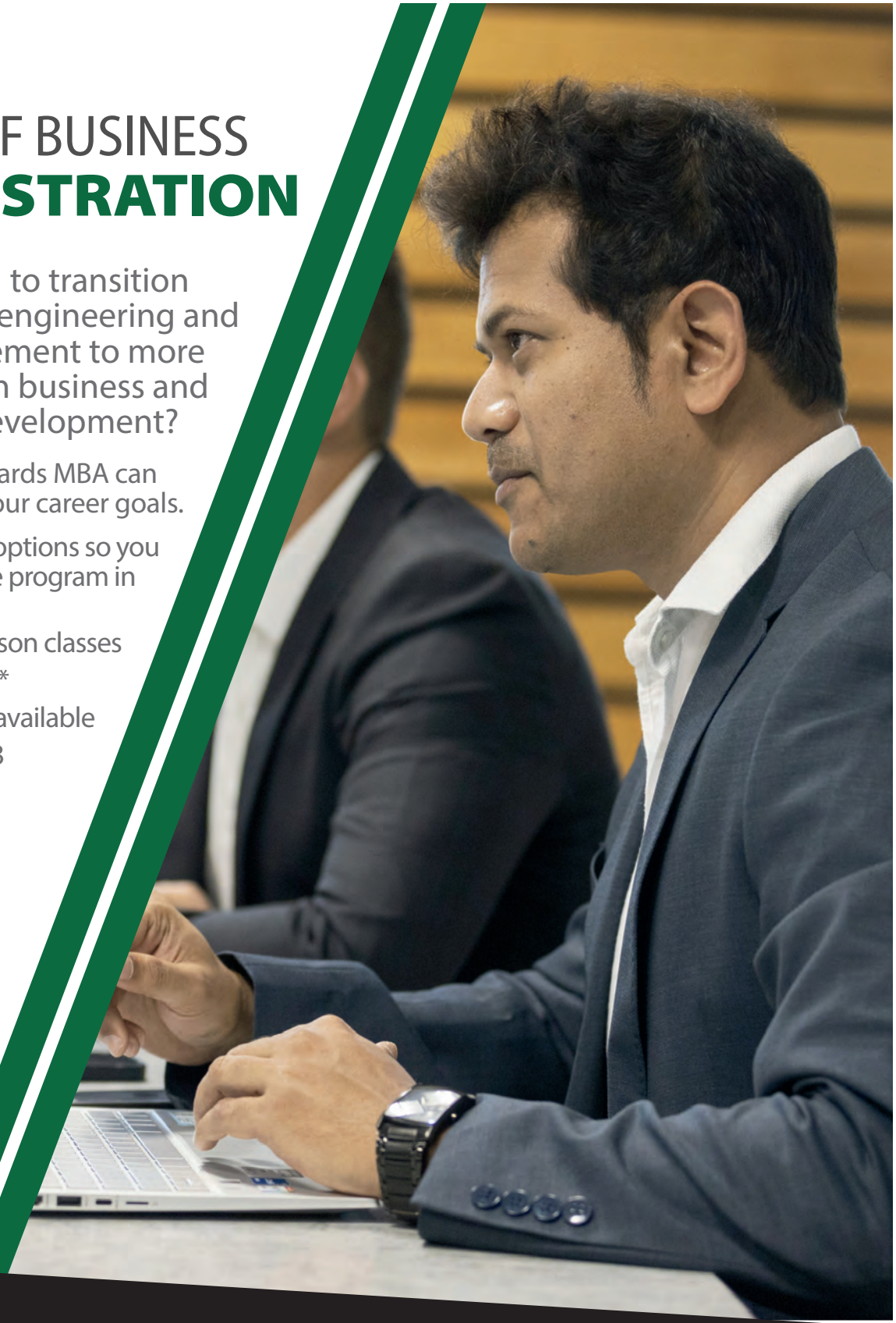

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UNIVERSITY OF SASKATCHEWAN

Call for APEGS Awards Nominations

Engineering and geoscience professionals do great work that benefits everyone in the province. Help APEGS recognize and foster professional excellence and showcase exemplary competence and conduct by nominating a friend, colleague, employee or client for the 2024 APEGS Awards.

APEGS celebrates award recipients with a banquet, which will be on **Thursday, March 7, 2024 in Regina** as part of Engineering and Geoscience Week.

We are seeking nominations for the following awards:

Brian Eckel Distinguished Service Award

Outstanding Achievement Award

McCannel Award

Exceptional Engineering/Geoscience Project Award

Environmental Excellence Award

Promising Member Award

Friend of the Professions Service Award

If you know someone who has done something outstanding, this year or over the course of their career, please make sure we hear about it.

Learn more about each award at apegs.ca under Members/Honours & Awards.

Nomination is quick and easy!

Complete the form at apegs.ca under Members/Honours & Awards.

Email the form to apegs@apegs.ca.

The deadline to submit nominations for 2024 is Oct. 1, 2023.

2023 APEGS Salary Survey Summary Results

The Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) contacted 6,943 Professional Engineers, Professional Geoscientists, Engineers-in-Training, Geoscientists-in-Training and Licensees living in Saskatchewan. A total of 1,541 members completed the survey representing a 22.2 per cent response rate. Surveys were completed in February and March 2023 and salaries reported were as of Dec. 31, 2022. Insightrix Research Inc. compiled and tabulated all results. The detailed report, which includes analysis by gender, can be found on the APEGS website under the 'About' menu.

Professional designation (P.Eng. and/or P.Geo.), supervision scope and job environment are the top three predictors of salary.

The work of engineering and geoscience professionals contributes to the public well-being and economic stability of Saskatchewan. The goal of providing current market salary information for engineers and geoscientists is to help ensure that the province retains proficient and competent services in engineering and geoscience. Making this information available provides guidance to both employers and employees to assess current compensation for professionals at various levels of education, experience, and responsibility. The salary survey also has the additional benefit of providing students, career counsellors and other interested persons with information on employment in the engineering and geoscience professions in Saskatchewan.

Annual Salary by Final Year of Graduation (B.Sc.)

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
1976 & Prior	12	0.9%	$144,287	$40,000	$96,250	$144,722	$180,000	$300,000
1977†								
1978†								
1979†								
1980†								
1981†								
1982†								
1983†								
1984†								
1985†								
1986†								
1987	12	0.9%	$153,706	$10,000	$102,500	$181,699	$191,989	$248,000
1988	12	0.9%	$182,422	$120,000	$147,000	$185,416	$207,919	$240,000
1989†								
1990†								
1991†								
1992	11	0.8%	$141,939	$90,000	$100,000	$130,000	$177,100	$220,000
1993†								
1994	16	1.2%	$164,287	$18,000	$138,415	$155,000	$184,500	$320,000
1995	15	1.1%	$167,404	$110,000	$139,000	$160,000	$190,000	$250,000
1996	18	1.3%	$178,374	$75,000	$175,000	$187,500	$205,000	$275,000
1997	16	1.2%	$150,161	$43,680	$131,225	$147,500	$177,750	$230,000
1998†								
1999	19	1.4%	$146,390	$75,000	$112,590	$140,000	$160,000	$250,000
2000	22	1.6%	$135,495	$77,000	$109,000	$127,320	$147,000	$210,000
2001	30	2.2%	$144,857	$71,000	$108,781	$141,500	$165,108	$240,000
2002	29	2.1%	$145,153	$60,000	$128,000	$144,000	$172,000	$215,000
2003	23	1.7%	$145,328	$100,169	$120,000	$140,000	$174,500	$185,000
2004	41	3.0%	$142,961	$85,000	$112,000	$140,000	$167,000	$210,000
2005	46	3.3%	$135,060	$70,279	$112,000	$131,750	$153,000	$210,000
2006	34	2.5%	$135,666	$86,000	$113,000	$132,500	$164,000	$185,000

2007	46	3.3%	$117,922	$60,000	$101,500	$115,500	$135,000	$152,000
2008	58	4.2%	$124,109	$50,000	$108,000	$124,000	$141,780	$190,500
2009	53	3.8%	$121,915	$76,000	$105,000	$120,000	$135,000	$170,000
2010	54	3.9%	$124,576	$84,344	$105,000	$119,500	$145,000	$176,000
2011	59	4.3%	$116,215	$74,000	$95,000	$114,000	$135,684	$180,000
2012	67	4.9%	$104,314	$63,100	$90,522	$106,000	$120,000	$142,623
2013	66	4.8%	$104,884	$70,144	$92,250	$105,000	$115,500	$135,000
2014	56	4.1%	$100,632	$72,759	$86,891	$99,150	$108,000	$144,800
2015	73	5.3%	$101,627	$74,000	$86,000	$98,000	$111,000	$142,000
2016	44	3.2%	$95,482	$68,000	$80,000	$90,624	$107,250	$140,000
2017	58	4.2%	$86,302	$60,000	$75,000	$86,500	$100,000	$110,000
2018	68	4.9%	$83,757	$60,000	$74,125	$82,000	$91,500	$110,000
2019	66	4.8%	$78,733	$58,000	$70,000	$76,500	$87,000	$101,000
2020	65	4.7%	$75,386	$58,000	$67,000	$72,000	$83,962	$98,500
2021	63	4.6%	$71,278	$55,000	$67,000	$70,500	$75,382	$92,000
2022	49	3.6%	$71,257	$60,000	$65,000	$69,800	$79,500	$86,000

†Not available due to reporting rules (insufficient data)

Annual Salary by Designation

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
P.Eng.	900	62.8%	$129,651	$80,000	$100,209	$122,000	$150,000	$207,999
P.Geo.	62	4.3%	$131,974	$85,000	$102,018	$122,500	$160,000	$190,000
P.Eng. and P.Geo†								
Engineering Licence	13	0.9%	$131,425	$79,000	$100,000	$119,184	$139,840	$250,000
Engineer-in-Training	408	28.5%	$78,704	$58,000	$67,410	$74,880	$86,000	$110,000
Geoscientist-in-Training	35	2.4%	$83,069	$55,575	$75,000	$85,000	$94,800	$108,000
Geo Licensee†								

†Not available due to reporting rules (insufficient data)

Annual Salary by Discipline

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Agriculture and Forestry	32	2.2%	$105,924	$59,000	$82,375	$98,400	$134,250	$172,000
Biological and Biomedical†								
Chem./Ceramic/Metallurgical	66	4.6%	$123,304	$70,000	$92,000	$110,500	$145,000	$229,000
Civil	301	21.1%	$105,726	$62,688	$78,800	$97,200	$125,000	$188,831
Electrical/Eng. Physics	197	13.8%	$121,487	$65,686	$87,000	$117,000	$151,000	$190,120
Environmental	85	6.0%	$103,117	$60,320	$75,000	$95,163	$118,000	$172,070
Geo., Mining, Petro. Eng.	142	9.9%	$126,733	$72,800	$97,370	$118,500	$148,300	$212,000
Geosciences	76	5.3%	$120,628	$70,000	$91,400	$112,000	$150,000	$190,000
Mechanical and Industrial	371	26.0%	$115,819	$62,000	$80,000	$106,500	$142,000	$205,000
Software Engineering	34	2.4%	$103,568	$56,993	$82,500	$97,423	$125,000	$150,000
Other	122	8.5%	$106,846	$63,000	$80,000	$99,800	$120,000	$183,000

†Not available due to reporting rules (insufficient data)

Annual Salary by Function

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Corporate Mgmt.	118	8.3%	$169,371	$99,300	$131,337	$165,000	$198,000	$296,034
Project/ Operations Mgmt.	460	32.3%	$117,207	$66,028	$87,550	$111,000	$140,000	$188,714
Project Administration	30	2.1%	$101,139	$60,000	$91,520	$98,000	$120,000	$134,000
Design	392	27.6%	$98,554	$62,000	$74,000	$90,000	$114,000	$160,000
Research/Planning	58	4.1%	$110,370	$60,000	$85,000	$103,009	$132,000	$177,007
Inspection/Quality/Resident	37	2.6%	$89,286	$54,500	$65,000	$75,000	$110,500	$160,000
Operating /Maintenance	144	10.1%	$119,787	$70,000	$92,125	$110,500	$144,950	$190,120
Teaching	20	1.4%	$151,261	$87,405	$100,252	$157,463	$190,341	$228,834
Marketing/Sales	13	0.9%	$105,509	$45,000	$78,000	$105,000	$133,500	$160,000
Reg. Approvals/Enforcement	41	2.9%	$99,451	$65,495	$82,000	$96,700	$117,000	$148,000
Exploration	42	3.0%	$110,378	$70,000	$80,900	$101,000	$128,000	$170,000
Other	73	5.1%	$100,863	$55,575	$75,920	$95,000	$112,000	$177,000

Annual Salary by Industry

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Consulting Service	334	23.3%	$104,833	$61,440	$74,000	$93,000	$124,900	$190,000
Resource Ind. Oil & Gas	74	5.2%	$122,374	$67,380	$92,000	$119,250	$148,500	$187,800
Resource Ind. Except Oil & Gas	260	18.1%	$131,516	$75,000	$98,768	$128,169	$152,000	$212,000
Procurement/Construction	122	8.5%	$106,307	$62,500	$77,000	$100,000	$128,376	$180,000
Manufacturing Durables	149	10.4%	$97,129	$60,000	$71,000	$90,000	$110,860	$165,000
Manufacturing Non-Durables	48	3.3%	$131,207	$80,000	$102,625	$119,963	$149,812	$230,000
Service For Profit	16	1.1%	$108,224	$45,000	$80,625	$106,891	$130,000	$206,237
Service Not For Profit	120	8.4%	$107,269	$69,164	$86,492	$106,058	$120,750	$172,0000
Utilities	193	13.5%	$127,306	$69,396	$93,000	$122,000	$153,000	$204,150
Educational Services	36	2.5%	$132,249	$50,000	$94,250	$114,737	$185,250	$233,852
Agriculture and Forestry	26	1.8%	$93,036	$67,500	$74,000	$83,850	$104,000	$150,000
Other	50	3.5%	$92,771	$55,000	$75,382	$86,850	$101,970	$168,000

Annual Salary by Sector

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Public Sector	418		$116,254	$69,120	$88,000	$109,000	$138,000	$190,455
Private Sector	1,003		$113,395	$62,000	$80,000	$103,000	$137,500	$198,000

Total Salary (full-time positions)

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Base Salary	1,428		$114,143	$63,000	$82,000	$105,000	$137,697	$193,800
Salary incl. bonus			$137,515	$66,003	$88,910	$118,000	$165,000	$290,000

Salary Changes (full-time positions) (not including bonus, not all survey years listed)

	MEDIAN SALARY	% INCREASE	MEAN SALARY	% INCREASE
2013	$90,000	0.59%	$98,030	1.88%
2014	$94,500	5.00%	$102,475	4.53%
2015	$97,000	2.65%	$105,111	2.57%
2016	$96,000	-1.03%	$104,628	-0.46%
2017	$97,000	1.04%	$107,130	2.39%
2018	$96,485	-0.53%	$104,743	-2.23%
2019	$97,500	1.05%	$107,287	2.43%
2020	$99,265	1.81%	$107,298	0.00%
2021	$98,022	-1.25%	$108,008	0.65%
2022	$104,000	6.10%	$112,940	4.57%
2023	$105,000	0.96%	$114,143	1.07%

Regression Analysis

A lasso regression model was used to establish a framework for predicting salaries for engineers and geoscientists working in different industries. This process was used to:

- Identify how closely factors are associated with salaries;
- Identify Boolean components (such as receipt of professional designation) influencing salary; and
- Create a linear formula that effectively predicts salaries while minimizing model overfitting

The model explains about 62 per cent (61.6%) of variance in salary. A formula was produced which members of APEGS can easily use to estimate their salary.

FACTOR	COEFFICIENT
(Constant)	$ 42,779.14
Duties (A)	$ 109.13
Experience (C)	$ 378.54
Recommendations (D)	$ 104.19
Supervision Received (E)	$ 13.28
Leadership Authority (F)	$ 113.27
Supervision Scope (G)	$ 818.20
Job Environment (I)*	$ 594.53
Absence from Base of Operations (J)	$ 399.12
Accident and Health Hazards (K)	$ 526.43
Professional Designation(s)	$ 9143.10

To calculate the approximate projected salary, input the points for each variable in the following formula:

Formula for expected salary (SE) without bonus:

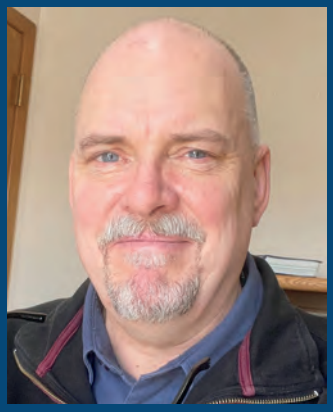
SE = 42,779 + 109*A + 379*C + 104*D + 13*E + 113*F + 818*G – 595*I + 399*J + 526*K

Add $9,143 if you have acquired professional status within your field (P.Eng. and/or P.Geo.)

Additional Notes

- Use of professional seal was excluded from the model due to this factor being not applicable for some respondents.
- 10-fold cross validation was used to select a lambda value for the lasso model.
- Higher ratings for factors with an asterisk (*) are associated with lower wages.

Member Profile



Dale Dolan, P.Eng.

I was born on the March 18, 1960, and raised to adulthood in Girvin, a village in Saskatchewan that ceased to exist in 2005, having been absorbed by the RM of Arm River. (I can't say why it ceased to exist. I was paying attention to something else at the time, but that alone shouldn't indicate personal responsibility, should it?)

Anyway, I went to elementary school in Girvin until 1970, at which time the school was permanently closed (which was perhaps writing on the wall for the future of the village). After that, I received the remainder of my elementary and high-school education in Davidson, achieving adequate literacy but only marginally-acceptable handwriting skills.

Following a very short (less than two weeks) stint in the Canadian Armed forces (during which I achieved proficiency in nothing at all), I attended the University of Saskatchewan, graduating in 1982 with a degree in Civil Engineering. Finding dirt and water mystifying substances on which to base a career, I chose structural engineering as my chosen field of endeavour.

The construction sector of the Western Canada economy utterly collapsed in the summer of 1982 and permanent, full-time employment was difficult to come by. I returned to the U of S in 1985 and received a Master of Civil Engineering degree in 1987, having been inordinately and undeservedly fortunate enough to have had Dr. Karim Nasser as my supervisor. My thesis has made fascinating reading for the five to seven people who have perused it since.

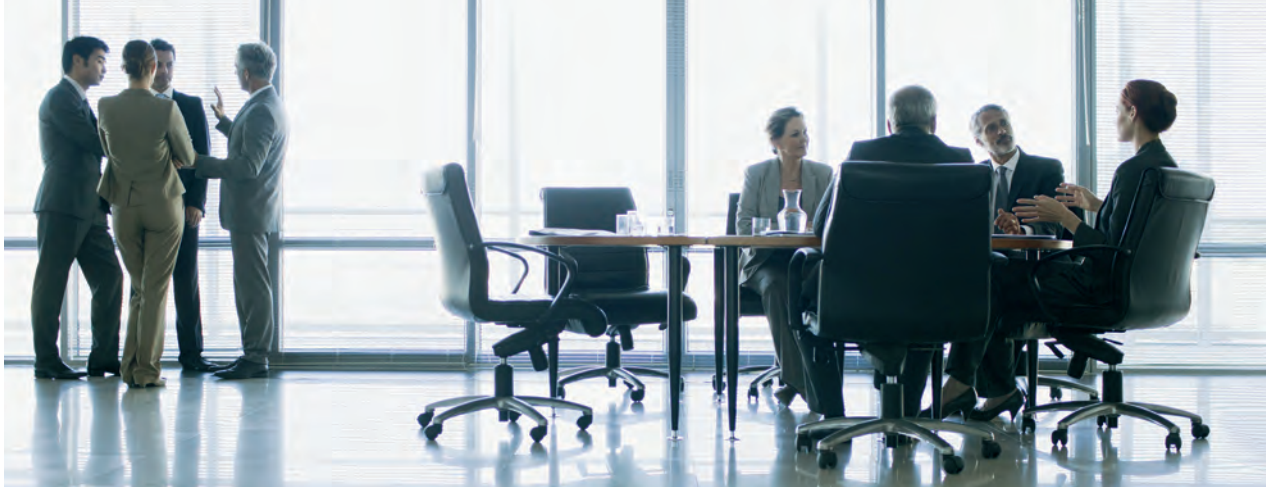
My career since then has been uniformly to serve the public as a consulting structural engineer, first with Brownlee Beaton Kreke in Saskatoon, then with Reid Crowther and Partners in both Regina and Kelowna. I then worked for myself for a protracted period in Kelowna and then, in 2007, back in Saskatchewan.

In 2008, as is well known, the construction sector of the entire world utterly collapsed (again, I cannot think I was solely to blame), and I sought gainful employment with employers more stable than myself. In 2017, I took the opportunity to travel to New Zealand, and spent four-and-a-half years in Palmerston North with Silvester Clark Ltd. working with a fantastic team on some very challenging projects and acting as a mentor to several promising young engineers.

Returning to Saskatchewan in late 2021, I continued to work for my New Zealand employer until June 2022, at which time I accepted employment with Wood PLC in Saskatoon, my present employer.

I married my wife, Cheryl, in 1991 and she has stood by me with patience and love through all the turbulence and uncertainty we've weathered. We are very happy to be living in Davidson where I can leave the house to run as many as four discrete errands and still return home inside of 20 minutes.

Outside of work, I enjoy making a fool of myself and have had several opportunities to do so before an audience, having performed in several local community theatre productions over the years. Thus far, I have avoided the impact of rotten fruit commonly attendant upon such events.



Regulation of Firms

APEGS is developing a new program to license and regulate entities practising engineering and geoscience in Saskatchewan based on Association of Professional Engineers and Geoscientists of Alberta's (APEGA) and Engineers and Geoscientists British Columbia's (EGBC) permit to practise.

Current status

On March 2, 2023, the council approved the recommendations that APEGS develop a new program that requires entities to have policies and procedures about practice areas, ethics, professional development, and quality management.

Recommendations

After thoughtful consideration, the following elements were identified as appropriate for the regulation of firms under a quality management-based framework for APEGS:

1. Regulation should apply to all entities (corporations, nonincorporated practitioners, firms, agencies, institutions, government, etc.) offering (the provision or sale of) engineering and geoscience-based goods and services in Saskatchewan.
2. Entities require policies and procedures about:
   - Practice areas or scope of engineering and/or geoscience in which the firm operates.
   - Code of conduct and ethical practice, including how they align and reinforce behaviours in keeping with APEGS' code of ethics.
   - Continuing education and professional development, including how they align with APEGS' continuing professional development program and help employees remain competent in their roles and practice areas.
   - Quality management in areas including but not limited to retaining project documentation, checking work, authenticating documents, direct supervision, and project execution.
3. APEGS' program should align with the programs of other engineering and geoscience regulators in the above noted aspects and in their cost structures.

The implementation of this model will evolve the need for permission to consult as well as have a compliance program to support firms in continuous improvements as required.

Reason for the change

The work is important in fulfilling this mandate by ensuring that, as a regulator responsible to the people of Saskatchewan, APEGS demonstrates accountability and transparency, as firms will be required to meet appropriate standards of practice. Action on the recommendations will not only serve to better protect the public and the environment, but APEGS will also be better positioned to support both firms and individual members in mitigating risk through a collaborative auditing process, which will support individuals by making sure both firm and individual obligations are met.

Timeline

To create, implement and deliver this new program requires the appropriate policies, systems and human resources as well as changes to either APEGS' bylaws and/or the Engineering and Geoscience Professions Act. Therefore, APEGS expects to implement the program in three years.

For more information

Go to the "Contact Us" page on the APEGS website and enter "Regulation of Firms" in the subject line.

Continuing Professional Development

The Continuing Professional Development (CPD) Program requires APEGS members to complete ongoing continuing education activities to promote and improve their proficiency. It encourages members to engage in lifelong learning to protect public health, safety, and welfare. The program framework provides tools for members to assess their current skills, knowledge, and abilities, determine activities to maintain or enhance those skills and report completed activities online to APEGS as professional development credits. For more information, navigate to the CPD menu at apegs.ca.

Update - 2022 CPD Reporting Compliance Review Results

The 2022 CPD reporting cycle has ended and APEGS is pleased to say that the annual compliance rate has improved. Here's a look at the final compliance statistics as of April 3, 2023:

YEAR	2020 VALUE	2020 PER CENT	2021 VALUE	2021 PER CENT	2022 VALUE	2022 PER CENT
Members who reported No CPD	429	3%	172	1%	71	1%
Members who reported but not compliant	739	6%	263	2%	180	1%
Compliant	11,298	91%	12,415	97%	12,953	98%
Total Number of Records	12,466	100%	12,850	100%	13,204	100%

Members who are not in compliance with the CPD Program may have their licence administratively suspended. Effective April 3, 2023, 49 members received a licence suspension and are now unable to practise in Saskatchewan until they take the necessary steps to have the suspension removed. As a result of being under administrative suspension, 42 members were unable to obtain their licences by Jan. 31, 2023 and were ceased as members of the Association.

To ensure you are working with a member in good standing, please refer to the APEGS public Register of Engineers and Geoscientists at https://register.apegs.ca.

Featured Professional Development Opportunities

APEGS is introducing 4 Seasons of Reconciliation in partnership with the First Nations University of Canada. This online course provides an education in line with the Truth and Reconciliation Commission's 94 Calls to Action. The intent is to promote a renewed relationship between Indigenous Peoples and Canadian settlers through transformative multi-media learning.

Online Ethics Modules

APEGS has free one-hour online ethics modules available to assist members in obtaining their ethics credit for the year. The modules are not mandatory and are offered as one option available to members.

Our current ethics module topics are:

- Module 1 - Professionalism and Ethics
- Module 2 - Conflict of Interest
- Module 3 - Investigation and Discipline
- Module 4 – The Ethics of Continuing Professional Development

An additional resource was launched on Jan. 1, 2023. The Law and Professional Practice in Engineering and Geoscience educates engineering and geoscience professionals about Canadian and Saskatchewan laws and can help them understand when to seek professional legal advice to protect the public and the environment. Completion of this module would satisfy the annal CPD ethics requirement and eligible for three hours of Formal Activity credit.

For more information and to access the modules, please visit the CPD menu at apegs.ca.

Looking for more Professional Development Training?

Do you need help finding available professional development opportunities? The Professional Development Committee continuously sources professional development options which may be of interest to APEGS members.

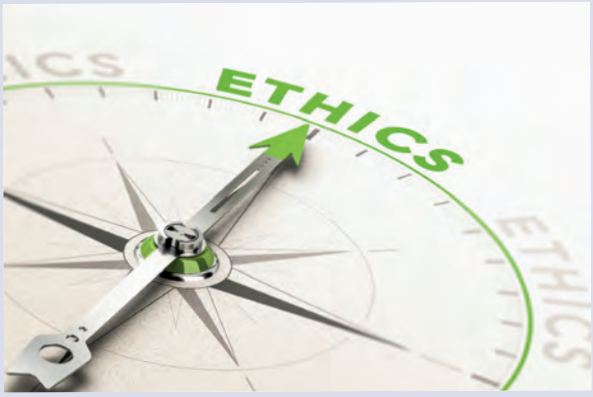
Links to these courses are organized by industry and is available on the APEGS website. Visit the Professional Development Courses section under the CPD heading on the APEGS website for more details.

Does Your Next Meeting Need an Ethics Topic?

Join the APEGS ethics moment email list to receive a new ethics topic and related discussion questions for use at any of your upcoming meetings. A new ethics moment is emailed out once a month.

When an ethics moment is included in the minutes of a meeting, along with the start and end times of the ethics moment discussion, this time can count as part of the member's annual ethics requirement.

If you would like to be added to this email list, please email cpd@apegs.ca.



Christopher Jason
DIRECTOR OF TECHNOLOGY

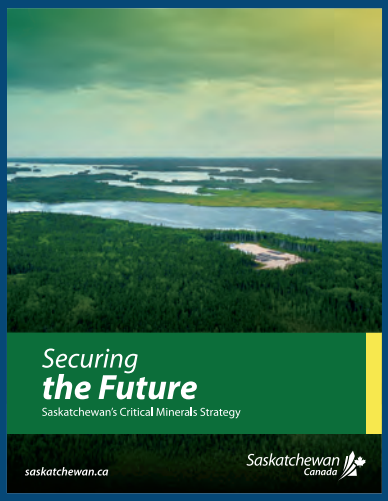
New Staff Member

APEGS welcomed Christopher Jason in December 2022 as the Director of Technology leading our technology initiatives aligned with strategic priorities and supporting both IT service deliveries for business as usual and digital transformation.

Christopher brings over 23 years of technology leadership experience across various industries. He has led successful digital transformation initiatives, from setting IT governance leadership vision for strategic digital enablement, developing a technology maturity roadmap, and implementation. He came from the Government of Saskatchewan where he was responsible for managing cyber security and risk management aspects of all executive government-wide initiatives. Prior to that he has held various leadership roles in IT companies, such as IBM and Alcatel-Lucent, around digital transformation, information technology enterprise architecture, cyber security, ITSM, network, mobile applications and cloud services. He has a track record of leading organizational change management initiatives while deploying innovative technologies to improve operational efficiencies for businesses.

Christopher holds a master's degree in business administration and has completed many certifications in IT, including ISO 27001 lead auditor, CMMI assessment team member and ITIL. He is passionate about disruptive technology, entrepreneurship, innovation and continuous improvements.

News From The Field



Critical mineral strategy a first for Saskatchewan

CKOM – A new strategy - a first for Saskatchewan - lays out goals for the exploration, development and production of critical minerals in the province over the next seven years.

The minerals named in the strategy include uranium, potash, lithium, cobalt and copper. Rare earth elements included are cerium, lanthanum, praseodymium and neodymium. These minerals are needed in vital products and industries that sustain the global economy and support the planet's clean-energy security.

Doubling Saskatchewan's stake in Canada's critical minerals exploration sector — from 8.5 per cent to 15 — by 2030 is a goal of the strategy. Saskatchewan's Energy and Resources Minister Jim Reiter announced it in late March in Saskatoon.

Three programs that support that goal were expanded in the 2023-24 budget. The first is that Saskatchewan's mineral exploration tax credit upped from 10 to 30 per cent, tied for the highest mineral incentive in Canada.

The targeted mineral exploration incentive has also been enhanced from $750,000 to $4 million annually to attract further investment in hard rock mineral exploration drilling in the province.

Also, a further $2.4-million investment is being made to improve geoscience technology and automation to provide the best information to explorers and stakeholders.

Other goals in the strategy, called "Securing the Future," are to double the number of critical minerals produced in Saskatchewan by 2030; continue to grow Saskatchewan's production of potash, uranium and helium; and establish Saskatchewan as a rare earth element processing hub.

Reiter said Saskatchewan is home to 23 of the 31 critical minerals named by Canada and this is the time for Saskatchewan to capitalize on them. Trade and Export Development Minister Jeremy Harrison said no other place in North America has Saskatchewan's large, high-quality deposits. In a time of "geo-political volatility and disruption of supply chains," Saskatchewan is ready to be the "steady, sustainable supplier" the world needs, Harrison added.

Searching for lithium in northern Saskatchewan

northeastNOW – As lithium gains the world's attention, the search for it is broadening in Saskatchewan to northern Saskatchewan.

Saskatchewan already has lithium projects, such as Prairie Lithium's efforts to extract lithium from underground brine water in southeast Saskatchewan.

However, if lithium is to be mined in northern Saskatchewan, it would be found in rocks in the Precambrian shield.

"In the geology of northern Saskatchewan, there's certainly the right types of rocks at certain locations that could potentially have… lithium," said Kevin Ansdell, professor of geological sciences at the University of Saskatchewan.

Andsell said the most likely locations are in rocks called pegmatites, which are a type of igneous rock and exploration is occurring in many parts of Canada, including eastern Manitoba, northwestern Ontario and northern Quebec.

Ryan Morelli, P.Geo., the province's Chief Geologist, is optimistic about what could be found in northern Saskatchewan.

"Although this exploration in the north is in its very early stages and in a much different geological environment, there is good potential for discoveries," he added.

Warren Stenyer, CEO of Vancouver-based ALX Resources, is among those exploring. He said the provincial government's announcement that it is tripling the Saskatchewan Mineral Exploration Tax Credit should help spur more interest. His company has two projects, Reindeer Lithium Project east of La Ronge and Crystal Lithium Project, northeast of Stoney Rapids.

Should a mine be developed, Andsel reminds others of the environmental assessments, regulations, consultations and remediation planning that is involved. He also points out that lithium mines don't have any bigger challenges than many other types of mines.

U of R engineering prof recycling masks

CBC Saskatchewan – Single-use face masks are the current focus of a University of Regina professor who has been researching how to recycle waste for decades.

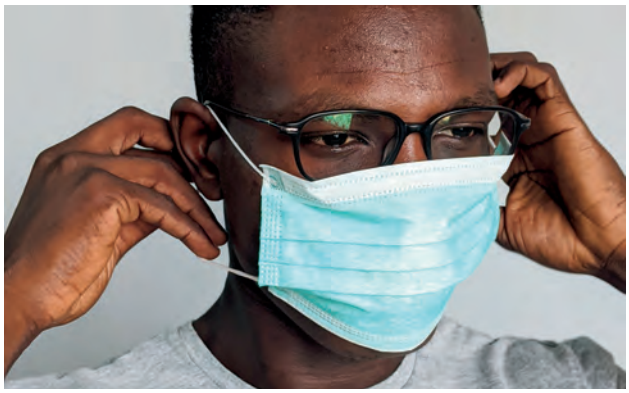
"I grew up on a farm, so we're used to taking baler twine and barbed wire to fix things," said Denise Stilling, P.Eng. "Re-purposing and re-using is part of my DNA as a Saskatchewan farm girl."

Stilling, a mechanical engineering associate professor, has experimented for years with melting down waste products like old tires and grain bags into new materials like pavement blocks.

"Once the pandemic hit, and you saw all these masks littering the sidewalks and coming in our waterway, that's when I went — let's do masks."

Many of the single-use masks are made with polypropylene plastic, which doesn't break down for hundreds of years.

In a basement lab at the University of Regina, there are more than a dozen garbage bags and Tupperware containers full of used masks. Stilling gathered them from receptacles on campus.



She waits a significant amount of time before using them so that the virus can die off, and she can safely handle the material.

The masks are shredded and mixed with material like sand or old rubber before being put in a mold and baked at 200 degrees Celsius. Stilling then tests that material for stretchiness and strength.

The engineer says this is a great opportunity to repurpose the masks into everything from cutting boards to jewelry and paving bricks, but she is still working on different recipes. Stilling said she's doing her part to help the environment by coming up with the prototypes and the materials. She hopes others like entrepreneurs or governments can take on the next step: doing something with it.

Stilling doesn't do the work alone. She's recruited graduate students since the fall of 2021 to run tests and experiment with combinations.

Some say this work is important since their generation will be forced to deal with plastic pollution.

"Right now, there's more awareness among people regarding pollution," said Anaamalaai Annamalai Senthilnathan, a 24-year-old graduate student helping with the experiments.

"Most places are banning single-use plastic and finding alternatives. That's one solution, but what are we going to do with the plastic that exists right now? We have to recycle it."

Processing improves Saskatchewan lentils

CTV News – University of Saskatchewan researchers have determined how to make red lentils more nutrious and greener.

Saskatchewan produces the vast majority of the two million tonnes of lentils

produced in Canada in an average year. That is why chemical and biological engineer Venkatesh Meda, P.Eng., and his team have been working with microwaves and infrared heat to increase the nutrient density of red lentils more nutrient-dense, using fewer greenhouse gases to process. The microwave heats the lentil from the inside out, while the infrared simultaneously dries the outside of the lentil.

"We utilized a combined microwave vacuum and microwave infrared technology for roasting, and heating application to basically improve the structural and functional properties of lentils," said Meda.

This process has made 96 per cent of the starch and 80 per cent of the protein in the lentils more digestible. As the world's population grows, there will need to be more options for sustainable protein. Meda says this form of processing lentils has three major benefits.

"This is one masterpiece in the recent years that we have worked on, utilizing the lentils that are grown in Saskatchewan for its potential economic returns, for its potential nutritional benefits, for its added opportunity for environmental protection in terms of soil nitrogen," he said.

"So we're looking at ecosystem health improvement by encouraging farmers to produce more, and eventually consume more, which is happening in the rest of the world right now."

He sees this process creating an opportunity for Saskatchewan.

"There is absolutely a role for legume crops to be blended into a protein powder, snack bars for those who are hiking in the mountains, athletes with a sports diet, and kinesiology practitioners," said Meda.

"As well as export potential for some of those 'made-in-Saskatchewan' products which we have to promote tourism as well as attract more investors to this province."

After thousands of hours of tweaking the process and equipment to suit their project, Meda and his team have more work ahead. The next step is to scale up the process, improve the flavour, and find out if this unique roasting process can be applied to other legumes and oilseeds with similar benefits.

Women seek allies in engineering

The StarPhoenix – Two University of Saskatchewan mechanical engineering graduates are calling for more allies to support women in engineering.

Leena Thomas, P.Eng., and Jocelyn Peltier-Huntley, P.Eng., wrote a piece in recognition of the 33rd anniversary of the Montreal Massacre when a gunmen entered a mechanical engineering class at the École Polytechnique and murdered 14 women in the room.

Thomas and Peltier-Huntley say they faced challenges practising their profession because they are women. When they began their careers, each believed that they were wanted and could achieve their dreams if they worked hard. It was the message they received as university students. Each separately returned to university to pursue graduate work that tries to make sense of their lived experiences as women in a male-dominated profession.

Women make up only 14 per cent of practising engineering professionals in Canada. They ask how this can be changed.

Speaking up about sexism is not easy and the two point out that for women, it can be especially risky. They say that women know that by speaking up when organizations fail to protect against sexist biases, they risk their careers, not the careers of those who perpetuate harm. Studies have shown that straight, white, able-bodied men who speak up for others face less personal risk to their careers.

They say women in engineering need allies to stand with them in solidarity and push for equitable systems and policies that remove barriers to make workplaces better for everyone. Allyship is the practice of being inclusive. Allyship involves being both proactive and reactive. Those who have taken allyship training are more likely to recognize the subtle and not-so-subtle instances of workplace sexism and other forms of discrimination, which helps with reacting in the moment. They wonder how their careers might have been different if they had more allies who stood in solidarity with them when they experienced misogyny.

They point out that everyone, including men, benefits from inclusive workplaces, where all feel psychologically safe to be their true authentic selves. Changing expectations around parental leave, caregiving and career ambitions will broaden the appeal of the profession to more people and bring benefits to every organization.

Program encourages Indigenous students

USask – Indigenous students are being connected with mentors in science, technology, engineering and mathematics (STEM) industries for early career experiences through a new University of Saskatchewan program.

The program - known as the Indigenous Student Achievement Pathways (ISAP) STEM+ – will focus on building mentorship and work experiences for Indigenous students interested in STEM-connected careers, helping them to build their resumes. It is a two-year pilot sponsored by the International Minerals Innovation Institute (IMII).

Sarah Gauthier, P.Eng., will facilitate the program. Gauthier worked as an engineer in the mining and natural resource sectors for 14 years and taught at the USask College of Engineering for four. Gauthier and her husband co-founded the engineering consulting company Missinipi Water Solutions, Inc. She is of Nihithaw (Cree) and French/Scottish-Canadian ancestry and a member of the Lac La Ronge Indian Band.

Gauthier had a mentor who was a practising female engineer. She describes her as critical to her own experience navigating industry opportunities as an undergraduate.

"I wanted to know what it was like, what she was actually experiencing in the workplace," Gauthier said. "I think with some time and perspective, it's easier to think about the big picture and how to navigate those systems."

"You want to find a mentor or sponsor or someone in an organization who can really support you and recognize your value and worth," she added. "That helps you transition through the organization, and through your own choices."

"Our hope with this program is that we can really see what kind of mentorship opportunities students are finding most useful," said ISAP team lead, Dr. Sandy Bonny.

"If employers are more intentional about nurturing these kinds of developmental student positions, they will be building their capacity to support more diverse individuals in their careers as well."

Gauthier is working to prepare mentored internships for this summer. Bonny said the internships could be in offices, labs, warehouses or in the field. Positions could build a range of skills from data-systems, communications and human resources to graphic design, environmental mitigation and site monitoring.

Students are invited to follow ISAP on Facebook or Instagram. Any Indigenous undergraduate or graduate students in STEM degree programs, or those interested in STEM-connected careers, are welcome to attend events, tours and gatherings offered through ISAP STEM+.

Saskatchewan's methane reporting studied

CTV Regina – New research by a team at Carleton University suggests that Saskatchewan heavy oil production is emitting four times more methane gas than reported to government.

Methane is a greenhouse gas emitted during heavy oil production. It's 25 times more powerful than CO_2. The researchers say the government is employing older measuring techniques to measure it at heavy oil sites.

"Reporting at heavy oil sites is commonly based on estimates from something called a gas oil ratio and so there's been lots of suspicions that these are uncertain, potentially quite inaccurate," said Matthew Johnson, engineering professor at Carleton University.

The university researchers believe the most accurate information possible is important to assessing emissions reduction. They employed what they say is new technology to monitor nearly 1,000 production facilities in the Lloydminster, Sask. area. They say their technology provides the most accurate readings yet.

"It's an aerial measurement, shoots a laser down to the ground and quantifies methane. We've coupled that with onsite measurement on the ground," said Johnson.

The Saskatchewan government will assess the new information but is confident in the data that it now receives. An engineer with the Saskatchewan government says methane is difficult to measure and results can vary day to day.

"Completely different approach obviously with aerial technology that they use to go out and do this study," said Debby Westerman, P.Eng., resource management for Saskatchewan Energy and Mines.

"It's not unusual for these types of wells to have very variant amounts of gas coming out of them."

News Beyond Our Borders

Ontario man allegedly posed as engineer

Global News – Hundreds of charges have been laid against a man who allegedly conducted crane safety inspections in Ontario while posing as a licensed engineer.

The Professional Engineers Ontario (PEO) allege Jay Lawrence Harding used a forged seal and the title of a licensed professional engineer. It laid 352 charges against him in March.

It is alleged he conducted "at least 80 inspections" and "non-destructive tests" of cranes and lifting devices in the Region of Waterloo in 2021 under the name AJ Hoist Inspections, a name which he incorporated after moving to New Brunswick in 2022.

"PEO believes that Mr. Harding may have falsely represented himself as a professional engineer in respect of crane and lifting device inspections for other entities, posing a broader risk to public safety," a release from PEO reads.

The PEO is still looking to speak to more people who have been in contact with or used the services of a person possessing certification bearing the following names: "J.L. Harding", "J. Harding", "Jay Harding", "AJ Ontario Hoist Inspections", or AJ Hoist Inspections."

None of the allegations against Harding have been proved in court as of April.

Calls for Iron Ring ceremony to be modernized

Environmental Science and Engineer – Engineers Canada, as well as some provincial and territorial engineering regulators, are calling for changes to the private iron ring ceremony for Canadian engineering graduates.

A 10-page letter was sent to the Corporation of the Seven Wardens. Its signatories includes organizations such as Professional Engineers and Geoscientists of Newfoundland & Labrador; Association of Professional Engineers and Geoscientists of Alberta; Association of Professional Engineers of Yukon; Association of Professional Engineers of the Province of Prince Edward Island; and the Ontario Society of Professional Engineers.

They view the ceremony as outdated, calling for change during a roundtable discussion at the 2022 Canadian Engineering Education Association Conference. Attention was paid to the ceremony's text, written by Rudyard Kipling.

They want the ring ceremony to "reflect contemporary engineering responsibilities and values" and includes a series of recommendations about how to modernize the ceremony.

"[…] The ceremony itself is steeped in outdated and harmful worldviews, including colonialism, racism, and sexism," states the letter to the Wardens. The letter adds that the ceremony "does not grant true agency to engineers," failing to "embody a comprehensive understanding of engineering ethics." It says the ceremony's "lack of clarity and transparency" in both the ceremony's text and in the structures and processes of the Corporation itself.

"While it is clear that the ring itself confers no legal authority, we believe that it is important for the ceremony to present an accurate picture of how engineering responsibility has changed," the letter states.

Readings and symbolism in the ceremony that are inherently Christian and patriarchal have made some participants uncomfortable, the letter says. Complaints have been made about the ceremony's secrecy, with concerns about participants being discouraged from discussing the ceremony and not being allowed to invite friends and families unless they are "obligated engineers."

A similar call for change to the Wardens was made in 2020.

The Corporation of the Seven Wardens says a Ritual Review Committee was formed in early 2022. The Wardens noted in a statement that Kipling's ceremony text was revised in the past to address "gender neutrality and the removal of religious words and phrases."

That statement says it recognizes the signatories' urgency while pointing to the ceremony's long history, saying updating it will take "thoughtful input and careful consideration."

"The current Ritual served its purpose for nearly 100 years – the Corporation wishes that the outcome of the Committee's work be relevant and enduring for the next 100 years."

Known as the Ritual of the Calling of an Engineer, it has been unique to more than 500,000 Canadian engineering graduates for nearly 100 years. The ceremonies take place across Canada at 25 separate groups, called Camps, and feature the presenting of an iron ring, though often stainless steel, as a symbol of professional duty and obligation. It is to be worn on the little finger.

Oilpatch activity tied to Alberta quake

Canadian Press – Alberta's energy regulator is defending its finding that the largest recorded earthquake in that province was caused by oilpatch activity.

Obsidian Energy, a Calgary-based oil and gas producer, challenged the regulator in a news release. The Alberta Energy Regulator attributed the 5.6 magnitude quake on Nov.29, 2022 to the company's deep disposal well about 40 kilometres southeast of the town of Peace River. It knocked people to their knees and rattled both windows and nerves.

"Since we have not seen any data or other evidence for the (regulator's) conclusions, we cannot — and do not — agree with these conclusions," said the president of Obsidian.

"We have requested data from the (regulator) and intend to engage independent third-party experts to help us better understand (its) reasoning."

A timeline came out three days after Obsidian Energy's release. It shows the regulator's conclusion was based on months of study, analysis from outside experts and the evidence of multiple seismic shocks and aftershocks. It is not suggesting rules were flouted.

The Alberta Energy Regulator says the pattern of temblors since last fall clearly points to a water disposal well. Oilpatch techniques, like disposal wells that inject wastewater kilometres underground, can induce earthquakes. One area disposal well has pushed more than a million cubic metres of water underground.

"The connection between the earthquake sequence and the disposal well injecting into the deeper Leduc Formation was clear," says a timeline of the research conducted by the Alberta Geological Survey, a branch of the Alberta Energy Regulator.

Initially, provincial geoscientists concluded this quake was naturally caused. It was too deep to be from energy activity, they said. Nor did it line up with company data on the timing of water disposal.

"However, further work was needed to characterize the event," the timeline says.

Scientists placed sensors around the earthquake site to capture data from aftershocks and outline underground strata. That data was given to a third party for analysis.

The regulator's conclusions were backed up by an independent study by seismologists at Stanford University, the University of Alberta and Natural Resources Canada. It did not see that study before releasing its finding.

Obsidian did not comment on the regulator's timeline. But in its March 27 release, it maintains it has followed the rules.

"The company's water disposal well is both approved and licensed by the (regulator)," it said.

"Obsidian Energy ensures that all of our operations are in compliance with regulatory requirements and operates the water disposal well at pressures far below licensed rates. Obsidian Energy's … well has operated safely for more than a decade, as have, to the best of the company's knowledge, similar water disposal wells operated by other oil producers in the vicinity."

An environmental protection order was issued to Obsidian on March 23. The company must submit plans to reduce the frequency and magnitude of the events and increase monitoring.

One of the seismologists behind the university study said the induced seismicity could have implications for Alberta's plans for large-scale injection of carbon dioxide into similar wells to reduce greenhouse gas emissions. He said events around Obsidian's well should cause governments to require much more extensive seismic monitoring around carbon capture and storage.

Most of Artemis 2 team engineers

CBC/Space.com/NASA – Three of the four astronauts announced as part of Artemis 2 earned engineering degrees.

This is the first crewed mission on NASA's path to establishing a long-term presence at the moon for science and exploration through Artemis. The astronauts won't be landing but will orbit for 10 days.

"We need to celebrate this moment in human history," said Pilot Victor Glover of Artemis 2. "Because Artemis 2 is more than a mission to the moon, and it's more than a mission that has to happen before we send people to the surface of the moon. It is the next step on the journey that gets humanity to Mars."

The crew revealed in early April will be testing key components to prepare for Artemis 3 which is to have humans back on the moon in 2025 – a first since 1972. NASA aims to put humans on Mars in the late 2030s to early 2040s.

Artemis 2 commander Reid Wiseman earned a bachelor's degree in engineering from Rensselaer Polytechnic Institute and an engineering master's from Johns Hopkins University.

Like Wiseman, Glover became a fighter pilot in the U.S. Navy. He received a bachelor's degree in engineering from

California Polytechnic State University and then earned three engineering master's degrees — one apiece from Air University at Edwards Air Force Base, the Naval Postgraduate School and Air University. He has one spaceflight under his belt, during which he participated in four spacewalks.

Artemis 2 Mission Specialist Christina Hammock Koch earned bachelor's and master's degrees in engineering from North Carolina State University. She worked as an electrical engineer at NASA's Goddard Space Flight Center in Maryland and the Johns Hopkins University Applied Physics Laboratory, contributing to the development of science instruments for multiple robotic NASA missions.

Like Glover, she joined NASA as a member of the 2013 astronaut class. She finished training in 2015 and a few years later was assigned to her first spaceflight, a long-duration mission to the ISS. Koch spent 328 days aboard the orbiting lab, longer than any other woman has on a single mission. And in October 2019, Koch and Jessica Meir performed the first-ever all-female spacewalk outside the ISS. That pioneering excursion was one of six that Koch conducted during her time aboard the orbiting lab. Artemis 2 will be Koch's second spaceflight.

The only Canadian in the crew, Artemis 2 Mission Specialist Jeremy Hansen, is not an engineer. He joined the Air Cadet Program when he was 12, and then went on to study space science at the Royal Military College in Kingston, Ont., earning a bachelor's degree in honours space science and a master's degree in physics He eventually became a pilot, flying CF-18s in Cold Lake, Alta. He is still a colonel in the Royal Canadian Air Force.

Hansen was recruited by the CSA in 2009 along with David Saint-Jacques. They are half of the four active Canadian astronauts that includes Jennifer Sidey-Gibbons and Joshua Kutryk.

Edmonton company prepares satellite for launch

CTV – Edmonton-based Wyvern Space hopes launch its first satellite into space early next month will help cement the emerging sector in the city.

The company will send its hyperspectral imaging satellite, Dragonette 1, into orbit for four years.

It will be the second satellite CEO Chris Robson sends into space. He was part of the AlbertaSAT club that designs, builds and tests new CubeSats while a mechanical engineering student at the University of Alberta.

Robson and three other University of Alberta alumni founded Wyvern in 2018 to contribute to building the space industry in Edmonton. It employs 30 people who hope to send two more satellites into orbit this year.

"There's not really a space industry in Alberta," Robson said.

"If you wanted to work in the space industry, definitely before the pandemic anyway, you would have to go, and you'd have to find a space company in another province, typically Ontario, Quebec or Manitoba."

Dragonette 1 – which is about the size of two loaves of bread – will capture hyperspectral optical data to be used for agricultural and environmental monitoring. After it's launched using a SpaceX transporter at Vandenberg Space Force Base in California, Wyvern will manage collecting and processing of imagery.

Hyperspectral imagery is more useful than other simple-colour images, Robson explained, as the satellite can analyze a greater spectrum of light. He gave the example of a photo showing a farmer's field. A standard colour satellite would show it is brown, suggesting it may be unhealthy. Hyperspectral images can provide insight into chemical properties, better describing what is happening.

The satellite will complete an orbit around Earth once approximately every 100 minutes. It was designed by Wyvern in Edmonton and built by a contractor in Scotland.

Plastic embedding in Brazilian rocks

CNN – Rocks made from plastic debris have been discovered in the volcanic Trindade Island of Brazil.

Melted plastic has become intertwined with rocks on the island, which has geology that has fascinated scientists for years. Researchers say it is evidence of humans' growing influence over the Earth's geological cycles.

"This is new and terrifying at the same time, because pollution has reached geology," said Fernanda Avelar Santos, a geologist at the Federal University of Parana.

Santos and her team ran chemical tests to find out what kind of plastics are in the rocks called "plastiglomerates" because they are made of a mixture of sedimentary granules and other debris held together by plastic.

"We identified (the pollution) mainly comes from fishing nets, which is very common debris on Trinidade Island's beaches," Santos said.

"The (nets) are dragged by the marine currents and accumulate on the beach. When the temperature rises, this plastic melts and becomes embedded with the beach's natural material."

Trindade Island is one of the world's most important conservation spots for green turtles with thousands arriving each year to lay their eggs. The only humans on Trindade are members of the Brazilian navy, which maintains a base on the island and protects the nesting turtles.

"The place where we found these samples (of plastic) is a permanently preserved area in Brazil, near the place green turtles lay their eggs," Santos said.

The discovery stirs questions about humans' legacy on the Earth, says Santos.

"We talk so much about the Anthropocene, and this is it," Santos said, referring to a proposed geological epoch defined by humans' impact on the planet's geology and ecosystems.

"The pollution, the garbage in the sea and the plastic dumped incorrectly in the oceans is becoming geological material … preserved in the Earth's geological records."

Coal mine to become renewable energy stream

Global News – TransAlta is partnering with Australian company Montem Resources in a project to turn Tent Mountain's historic coal mining operation — and its water-filled mining pits — into a new stream of renewable energy.

"The sheer volume of potential storage that is sitting in that water and the cost to run the pumped hydro facility compared to other facilities, the capital outlay that will need to go into the project up front… is really unique," said Blain van Melle, the executive vice-president of Alberta business at TransAlta.

"On a list of pumped hydro projects that you could find around the world, this one ranks near the top."

Metallurgical coal was discovered at Tent Mountain in the early 1900s. Small-scale mining made way for the first open cut pit in 1948.

But operations were suspended in 1983 and coal policy changes in 2021 led owners to rethink the mountain's potential.

Pumped hydro electric storage works a little like a rechargeable battery. When energy demand is low, excess wind and solar power is used to pump water from a lower reservoir and store it in an upper reservoir. When energy demand is high, the system is reversed and gravity does the work. The water then flows through turbines to generate power.

"When you have a lot of wind blowing overnight and nobody really using power, there's not a lot of ways to store that power," said van Melle.

"This will allow us, during periods of low demand and high renewable generation, to essentially have a large battery to store that power and then give it back to consumers into the grid during peak periods."

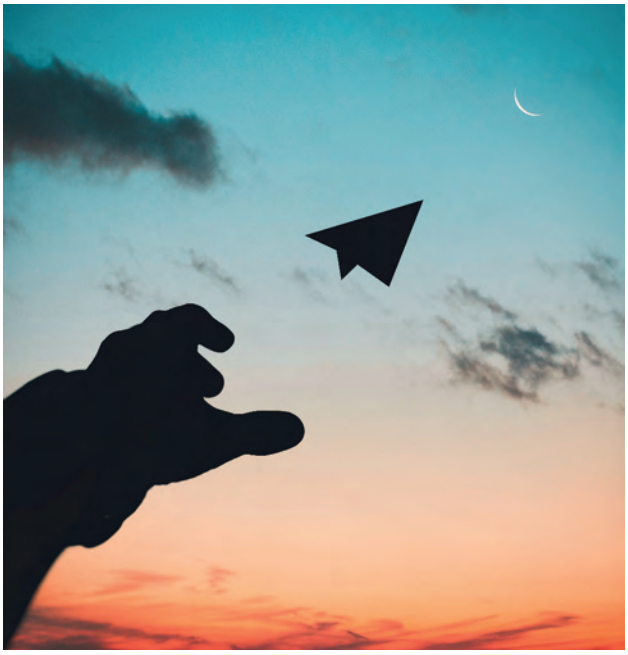
Conservationists are pleased that coal mining is no longer part of the plans for Tent Mountain, but are eyeing the project with cautious optimism while it waits to see environmental impact assessments.

"Although a renewable energy complex would be better than a coal mine, it could still have adverse environmental impacts," said Devon Earl with the Alberta Wilderness Association.

"Pumped hydro storage generally takes more electricity from the grid than it adds, and we're concerned about siting industry in alpine areas, which are particularly sensitive to disturbance and difficult to reclaim, so any development could have a really high impact even in preliminary stages."

TransAlta said the project could power up to 400,000 homes in the future, but it's still early days. Financing, engineering and regulatory work will continue over the next few years, making way for possible construction by 2026 and what could be Canada's first pumped hydro plant by 2030.

Record-breaking paper airplane



CNN – The world record for the farthest flight by paper airplane has been broken by three aerospace engineers with a paper aircraft that flew 289 feet, 9 inches, nearly the length of an American football field.

They beat the previous record of 252 feet, 7 inches (77 metres) achieved in April 2022 by a trio in South Korea. The record had not been broken in over a decade before that.

"It's a good tie-in to aerospace and thinking along the lines of designing and creating prototypes," said Dillon Ruble, a systems engineer at Boeing and now paper airplane record holder. He worked alongside Garrett Jensen, a strength engineer also with Boeing, and aerospace engineer Nathaniel Erickson. The trio are recent graduates who studied aerospace engineering and mechanical

engineering at Missouri University of Science and Technology.

The team put in nearly 500 hours of studying origami and aerodynamics to create and test multiple prototypes.

The team had decided that A4 (slightly longer than typical letter sized paper) was the best and that their best chance at beating the world record would be with an airplane design that focused on speed and minimized drag, so that the plane could fly a far distance in a short amount of time.

They were inspired by various hypersonic aircrafts. The Guinness paper plane record for duration of flight had been 29.2 seconds. On its record-breaking distance flight, their plane was in the air for roughly six seconds. Ruble credits their initial steps of increasing the wingspan and decreasing the aspect ratio in producing this type of plane.

"Full-scale and paper airplanes have vast differences in their complexity, but both operate on the same fundamental principles," said Ruble.

"Some of the same design methodologies can be applied to both. One of these methods was our trial-and-error design process. For instance, we would theorize about a fold we could change on our plane, fold it, throw it, and compare the distance to previous iterations to determine if the change was beneficial."

To find the best technique when it came to throwing the paper airplane, the team ran various simulations and analyzed slow-motion videos of their previous throws.

"We found the optimal angle is about 40 degrees off the ground. Once you're aiming that high, you throw as hard as possible. That gives us our best distance," Jensen said.

Ruble added that this tedious method of back-and-forth trials served as a testament to the importance of rigorous prototyping in the real world. The engineers put their final design to the test on Dec.2, 2022, in Crown Point, Indiana, where the record was achieved on Ruble's third throw.

"We hope this record stands for quite a while — 290 feet (88 metres) is unreal," Jensen said. "That's 14 to 15 feet over the farthest throw we ever did. It took a lot of planning and a lot of skill to beat the previous record."

Research to encourage designers' use of cross-laminated timber

https://www.ualberta.ca/folio/2023/03/engineering-expert-helps-builders-adopt-innovative-timber-for-construction.html

University of Alberta – The number of tall wood buildings in North America is expected to increase in the coming years as cross-laminated timber, or CLT, becomes a leading contender in the race for sustainable building,

CLT consists of at least three layers of wood panel glued together at perpendicular angles, with enough strength to support structures up to 18 storeys high.

Since CLT is relatively new, some designers of larger buildings are hesitant to adopt it, says Ying Hei Chui, a University of Alberta specialist in mass timber construction. Many are unsure of its properties and how to put panels and beams together to ensure structural integrity.

That's where Chui's research comes in. He and his team provide designers with the information they need to use CLT with confidence, supported by a $4-million grant from the Natural Sciences and Engineering Research Council.

"There's really no difference between where you would use CLT and where you would use steel and concrete — it's just a different way to design," says Chui, NSERC Industry Research Chair in Engineered Wood and Building Systems in the Faculty of Engineering.

"But not a lot of research has been done to evaluate the performance of the material in tall buildings," he adds, where the forces exerted between materials are much higher than in lower buildings. He is aiming to fill that gap. The more knowledge Chui can supply to designers about the properties of CLT and the forces exerted between components, the more likely they will be to consider using the material.

First developed in Europe about 30 years ago, it has a much lower carbon footprint compared with other common building materials. According to a recent market analysis report, the global market for CLT will grow to more than $2 billion in 2028 from just over $800 million in 2021.

Because wood is softer than concrete and steel, it might take more fasteners to attach wood components. Also, designers tend to be more conservative when dealing with a new material, he says, that can drive up costs.

"Let's say the engineering analysis recommends the need to use perhaps 10 bolts to attach a beam to a column. The designer might not be comfortable with that and will go with 16 instead. That means your material costs go up, especially if the beam and column sizes have to increase to fit all these fasteners."

However, CLT does have one other crucial cost-saving advantage, says Chui. Prefabricated wood panels can be assembled in the factory for a faster process and a much quicker return on investment, whereas steel and concrete construction has to be done largely on site.

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Calendar of Events

Below are some featured events. Please see the Events calendar online for a full list of events: **https://events.apegs.ca/**

ACEC-SK Leadership Certification Program – Course Three
July 26, 2023
https://www.acec-sk.ca/events/acecsk_leadership_certification_program.html

iPolytek – Innovation through Systems Thinking: *A framework for formulating great ideas and implementing changes that work*
Online / June 30, 2023
https://www.apegs.ca/event/ipolytek-innovation-through-systems-thinking-a-framework-for-formulating-great-ideas-and-implementing-changes-that-work-online-course

iPolytek – How Sustainable is PV Solar Power? *An Intro to Life Cycle Analysis and Planetary Boundaries*
Online / July 6, 2023
https://www.apegs.ca/event/ipolytek-how-sustainable-is-pv-solar-power-an-intro-to-life-cycle-analysis-and-planetary-boundaries-online-course

iPolytek – Big Data, Algorithms and Machine Learning Explained
Online / July 26, 2023
https://www.apegs.ca/event/ipolytek-big-data-algorithms-and-machine-learning-explained-online-course-2

Polytek – The Blockchain: *Beyond Cryptocurrency*
Online / August 2, 2023
https://www.apegs.ca/event/ipolytek-the-blockchain-beyond-cryptocurrency-online-course-2

Global Tech Summit
Toronto, ON
August 7-8, 2023
https://www.apegs.ca/event/global-tech-summit

iPolytek – Energy Efficiency: An Investment Opportunity
Online / August 18, 2023
https://www.apegs.ca/event/ipolytek-energy-efficiency-an-investment-opportunity-online-course-2

LEED Green Associate Training
On demand or live webinars on:
September 9, 2023
September 30, 2023
https://leadinggreen.com/online-leed-green-associate/

Saskatchewan Geological Society Great Southwest Geological Field Trip
September 15-20, 2023
https://www.apegs.ca/event/saskatchewan-geological-society-great-southwest-geological-field-trip

GeoSaskatoon 2023
Saskatoon, SK
October 1-4, 2023
https://www.apegs.ca/event/geosaskatoon-2023

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