ANNUAL REPORT

May 1, 2022
–
April 30, 2023

McGill | Faculty of Engineering

TISED
Trottier Institute for Sustainability in Engineering and Design

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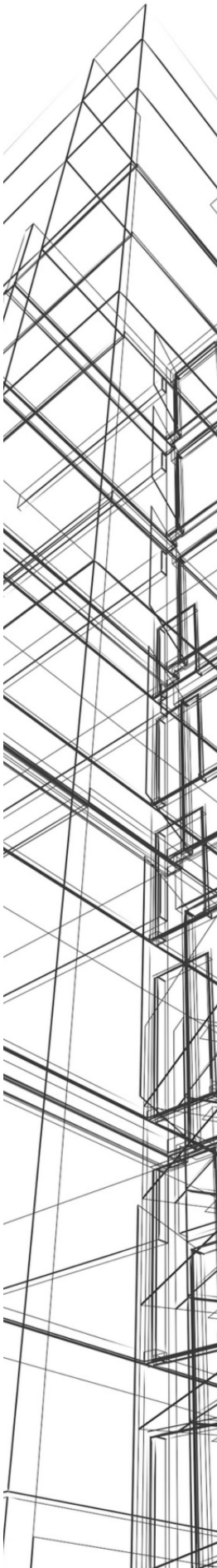
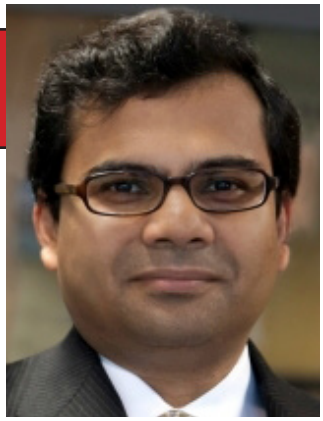


Message from TISED's Director



Dear Friends and Supporters of TISED,

It gives me great pleasure to introduce TISED's 2022-2023 Annual Report. This past year has been marked by significant achievements, continued dedication to our mission and our commitment to advancing sustainability through research, education, and outreach efforts.

The presence of Dr. Bruce Lourie, President of the Ivey Foundation, as TISED's Scholar-in-Residence during the past year energized in our research efforts. Dr. Lourie's focus on technologies for electrification and decarbonization, policy frameworks, and his collaborations with several TISED members, has expanded our understanding pathways to sustainability solutions. His research workshop engaged a diverse group of experts and highlighted underemphasized climate technologies, setting the stage for a keynote talk titled "Climate Solved: Canada's Pathways to a Net Zero Economy," scheduled for early June 2023.

TISED is committed to educating future engineers, urban planners, and architects by offering interdisciplinary sustainability-focused courses. The official approval of our Master of Engineering program in Sustainability in Engineering and Design marks a significant milestone, and we are excited to welcome our first cohort of students in Fall 2023. This program will play a pivotal role in shaping the future of sustainability education. We are thrilled to welcome Prof. Sarah M. Jordaan as an Associate Professor at TISED and the Department of Civil Engineering. As part of her appointment, Prof. Jordaan will teach two SEAD courses and will serve as the first Graduate Program Director (GPD) of TISED's new program.

I extend my gratitude to all our members, supporters, and partners for their unwavering support, and I look forward to a successful and healthy 2023-2024 for all.

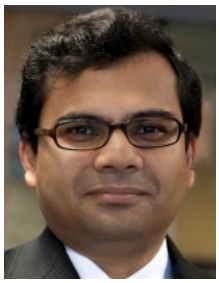
Subhasis Ghoshal

Professor and Director, Trottier Institute for Sustainability in Engineering and Design

Governance

TISED creates ad hoc committees and working groups established for project and event-specific initiatives. TISED is in the process of finalizing its Advisory Board (Board) to guide the strategic direction of the institute; invitation to prospective Board members were sent in early 2023 and the Board is expected to be finalized by December 2023. The first meeting of the Board will take place in Spring 2024.

Academic Staff



Prof. Subhasis Ghoshal,

Director

Prof. Laxmi Sushama,

Trottier Chair in Sustainable Engineering and Design

Prof. Jeffrey Bergthorson,

Associate Director & Panda Faculty Scholar in Sustainability in Engineering and Design

Prof. François Bouffard,

John M. Bishop and Family Faculty Scholar in Sustainable Engineering and Design

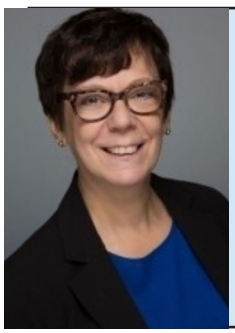
Prof. Sarah M. Jordaan,

Graduate Program Director, TISED Master's Program

Administrative Staff

Monika Skonieczny,

Manager



Irene Toffolo,

Administrative Coordinator

Parisa Hassani,

Digital Communications

Membership

62
Members

TISED Members by Department or School

16 Civil Engineering	4 Bioengineering
7 Chemical Engineering	9 Mining & Materials Engineering
5 Architecture	6 Mechanical Engineering
11 Electrical & Computer Engineering	4 Urban Planning

New Members:

Prof. Sarah Jordaan
Assistant Professor,
Civil Engineering & TISED

Prof. Sarah Jordaan's research focuses on quantifying the trade-offs between the environment and economy in energy decision-making. Her research group, Energy Technology and Policy Assessment (ETAPA), specializes in life cycle assessment, techno-economic analysis, and technology innovation. Through her research, Dr. Jordaan seeks to identify solutions for decarbonizing the electric and transportation sectors while promoting other sustainable development goals. In addition, her educational courses aim to equip students from various disciplines with the knowledge and skills to address complex energy and environmental challenges. Many of her students and scholars have gone on to pursue advanced academic education or work in government and industry.

Learn More

James Forbes
Assistant Professor,
Mechanical Engineering

James Richard Forbes is an Associate Professor of Mechanical Engineering at McGill University. He holds a B.A.Sc. degree in Mechanical Engineering from the University of Waterloo and completed his M.A.Sc. and Ph.D. degrees in Aerospace Science and Engineering at the University of Toronto Institute for Aerospace Studies. James is actively involved in research on navigation, guidance, and control (GNC) techniques for robotic systems. He focuses on both theoretical advancements and the practical application of these theories to real-world problems. His expertise and interests lie in the development and implementation of GNC methodologies for various robotic applications.

Learn More

RESEARCH

The Trottier Chair in Sustainable Engineering and Design conducts first-rate climate research and continues to have significant influence on climate research and on adaptation strategies of private and public institutions.

The TISED Chair continued to promote interdisciplinary research to address engineering sustainability challenges. By addressing a number of critical knowledge gaps and developing new approaches, the research informed federal programs led by partners such as the National Research Council's initiative to develop a new climate risk information system for the St. Lawrence River and Gulf to economic development.

Selected Publications

1. Faki, A.*, L. Sushama, G. Doré, 2022. Regional-scale investigation of pile bearing capacity for Canadian permafrost regions in a warmer climate, Cold Regions Science and Technology, DOI:10.1016/j.coldregions.2022.103624

2. De Toldi, T.*, S. Craig, L. Sushama, 2022. Thermal mass for passive cooling: global limits, ideal quantities, and embodied emissions. Buildings and Cities, DOI: 10.5334/bc.156

3. Angeles, E.*, M. Balci, M. Kumral, L. Sushama, 2022. Quantification of relationship between greenhouse gas emissions and equipment management in mineral industries. Process Integration and Optimization for Sustainability, DOI: 10.1007/s41660-022-00239-1

4. Ruman C.*, A. Monahan, L. Sushama, 2022. Climatology of Arctic temperature inversions in current and future climates. Theoretical and Applied Climatology. DOI: 10.1007/s00704-

5. Girihagama, L., M.N. Khaliq, P. Lamontagne, J. Perdikaris, R. Roy, L. Sushama, A. Elshorbagy, 2022. Streamflow modelling and forecasting for Canadian watersheds using LSTM networks with attention mechanism. Neural computing and Applications, DOI: 10.1007/

Scholars-in-Residence Program (SiR) & Visiting Professors

The Scholar-in-Residence program supports scholars and experts in conducting collaborative research with an emphasis on advancing sustainability in one of TISED's strategic areas.

Dr. Bruce Lourie, President of Ivey Foundation, began his six-month tenure as TISED's Scholar is Residence on January 1, 2023. During his stay at TISED, Dr. Lourie focused on; i) exploring technologies that can play major roles in electrifying and decarbonising the global economy, but that are not yet part of the mainstream conversation on energy sustainability ii) considering the policy framework that can aid the implementation of those technologies with the goal of achieving sustainable energy and net zero efforts at scale in Canada and iii) the technology and policy intersection of large-scale deep building retrofits.

Dr. Lourie hosted a Research Workshop on April 18-19, 2023 brought together key experts and (see p. 7) highlighted climate technologies that are currently underemphasized in the public "conversation" about net-zero and sustainability. Dr. Lourie will deliver a keynote talk, titled "Climate Solved: Canada's Pathways to a Net Zero Economy", which will be hosted in early June 2023.

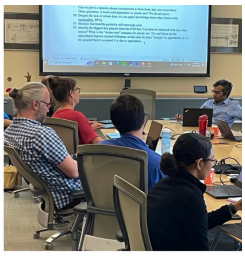
Research Workshop Program

The Research Workshop Program (RWP) facilitates discussions on cutting-edge advances in technology and design as well as policy frameworks and interventions required to advance sustainability. Over the last year, TISED hosted two RWPs.

August 22-23, 2022

Workshop Title: Assessing the environmental footprint of plastics in agriculture
Organizers: TISED Members Prof. Subhasis Ghoshal & Prof. Nathalie Tufenkji and Associate TISED Member Prof. Thilo Hofmann, University of Vienna

Number of Participants:	
7 External	5 Remote
10 McGill	
22 Total	



Publication: Journal publication "***Plastics can be used more sustainably in agriculture",*** Nature: Communications in Earth and Environment (Accepted September 2023)

April 18-19, 2023

Organizer: Dr. Bruce Lourie, TISED Scholar in Residence
Workshop Title: *Arrows in the Quiver: Spotlighting Unheralded Climate Fighting Technologies*

TISED Supported Research Initiatives

TISED supports strategic research applications and initiatives of its members that align with TISED's goals and mission. In fall 2021, TISED comitted support for Prof. Luis Miranda-Moreno's application to ECCC's Climate Action and Awareness Fund – Advancing Climate Change Science & Technology entitled "Urban mobility and emission inventories in a changing climate: an integrated modelling framework"; in November 2022 it was announced that the application was successful.

Through their project, Prof. Miranda-Moreno's team aims to develop decision-support tools that will allow policy makers to evaluate the impact of urban transportation alternatives as climate mitigation strategies. Read More.

A workshop titled "***Advances in Intelligent Traffic Management***" is scheduled for October 2023.

OUTREACH

TISED engages in public outreach initiatives through invited speaker series, policy panel discussions and our annual symposium. In order to maximize accessibility and impact, our events are hosted in a hybrid fashion with recordings available on TISED's YouTube channel for future viewing.

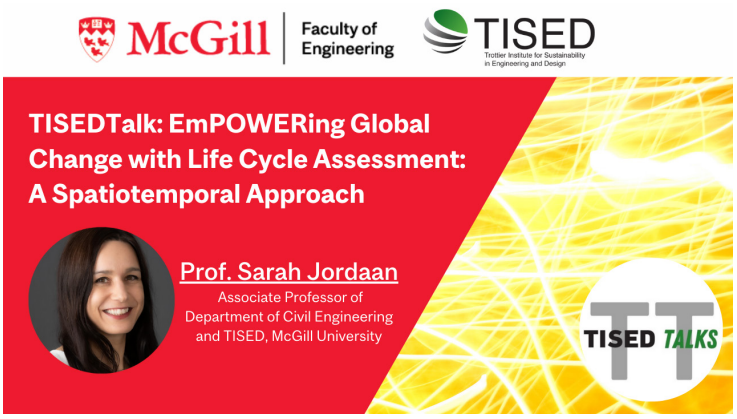
TISEDTalks - Invited Speakers Series

TISEDTalks feature both Canadian and international researchers on relevant topics of sustainability in urban planning, architecture, and engineering; attendance is open to all members of our community, professors, students and public, alike.

TISED hosted six hybrid TISEDTalks during the 2022-2023 academic calendar, with strong participation and engagement from our community.

Prof. Jaehong Kim, Henry P. Becton Sr. Professor of Engineering in School of Engineering and Applied Science at Yale University. "TISEDTalk: Toward Single Atom Catalysis for Environmental Application." Presented: April 2023.

Watch Now



Prof. Sarah Jordaan, Associate Professor, Civil Engineering and TISED at McGill University "TISEDTalk: Empowering Global Change with Life Cycle Assessment: A Spatiotemporal

Watch Now

Prof. Benjamin Goldstein, Assistant Professor, Bioresource Engineering, McGill University. "TISEDTalk: Tracking Corporate Actors Across Space and Time." Presented: February 2023.

Watch Now

Prof. Miranda Schreurs, Chair of Climate and Environmental Policy, Technical University of Munich. "TISEDTalk: Climate Change and the War in Ukraine: Can Crises Stimulate Transformative Change?", December 2022.

Watch Now

Prof. Stephanie Loeb, Assistant Professor Civil Engineering at McGill University. "TISEDTalk: Light Driven Environmental and Engineering Processes." November 2022.

Watch Now

Jacques Ferrier, Founder Architect and Urban Planner, Ferrier Marchetti Studio. "TISEDTalk: From infrastructure to sensual city." October 2022.

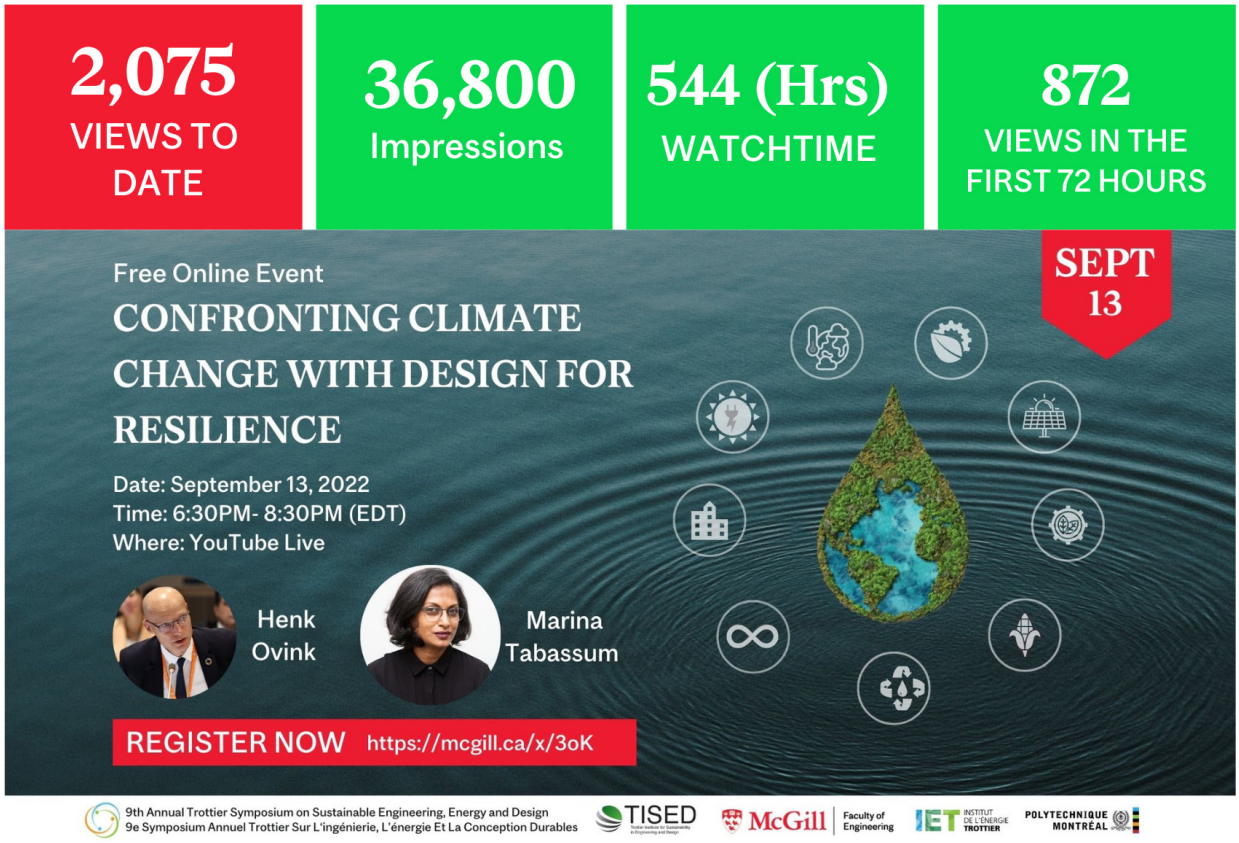
Watch Now

9th Annual Trottier Symposium on Sustainable Engineering, Energy and Design

The Annual Symposium focuses on the relevance of sustainable engineering and design to people's lives. Each year TISED and Institut de l'Énergie Trottier (IET) at Polytechnique Montréal take turns hosting this event.

On September 13th 2022, TISED in partnership with IET, hosted the 9th annual Trottier Symposium on Sustainable Engineering, Energy, and Design. The event was held virtually.

The 9th Symposium, titled "**Confronting Climate Change with Design for Resilience"** featured two prominent speakers Henk Ovink and Marina Tabassum. The presentations were followed by a Q&A period, moderated by Prof. Nik Luka with questions submitted live by the audience via Twitter and email.



STUDENT SUPPORT

Made possible by the generous donation from various benefactors as well as the Trottier Family Foundation and with support from the Faculty of Engineering, TISED provides student funding opportunities in the form of Faculty Scholar Awards, Graduate Fellowships (MEDA), Undergraduate Research Internships (SURE) and other education enhancement initiatives.

Faculty Scholar Awards

The Faculty Scholar Awards support research in sustainability in part by funding the Scholar's doctoral students.

Panda Faculty Scholar Award in Sustainability in Engineering and Design

Faculty Scholar: Prof. Jefferey Bergthorson, Mechanical Engineering
Graduate Student: Jocelyn Blanchet and Keena Trowell
Research Area: fundamentals of metal-water reactions for producing hydrogen on demand

To date, the research team has filed six patens to date on metal fuels. These patents are related to the concept of using metals as recyclable fuels, one which relates to the concept of the direct combustion of metal fuels for heat and power and the second related to the reaction of metals with water to produce hydrogen on demand as a fuel for fuel cells or engines. Strong industrial collaborations will facilitate the commercialization of these radical concepts for clean and low-carbon, and even zero-carbon, power.

Publications supported by Award (directly and indirectly):

1. C Bennett , J Blanchet, KA Trowell, and JM Bergthorson. Solar PV and e-fuels to decarbonize Canada's domestic and exported energy. Renewable Energy, Renewable Energy, 217 (2023), 119178.
2. KA Trowell, J Blanchet, S Goroshin, DL Frost, and JM Bergthorson. Hydrogen production via reaction of metals with supercritical water. Sustainable Energy & Fuels 6.14 (2022), 3394-3401.
3. KA Trowell, S Goroshin, DL Frost, and JM Bergthorson. Hydrogen production rates of aluminum reacting with varying densities of supercritical water. RSC Advances 12.20 (2022), 12335-12343.
4. JM Bergthorson and KA Trowell. 9 Metal Fuels. In: Renewable Fuels: Sources, Conversion, and Utilization. Ed. by J O'Connor, B Noble, and T Lieuwen. Cambridge University Press, 2022, 275-328.

John M. Bishop & Family Faculty Scholar Award in Sustainable Engineering & Design

Faculty Scholar: Prof. Francois Bouffard, Electrical Engineering
Graduate Student: Imen Jendoubi and Mohamed Awadalla
Research Area: autonomous management of uncertainties stemming from renewable generation and electricity demand with energy storage systems

During the past year, the M. Bishop & Family Faculty Scholarship directly supported the PhD research of Imen Jendoubi, whose work tackles various methodological approaches to perform the control of local renewable energy generation in conjunction with local flexible electricity demand and energy storage. Upon graduation in February 2023, Imen returned to her native Tunisia accepting a faculty position at MUST University in Tunis.

Upon Imen's departure, the funds associated with the John M. Bishop and Family Faculty Scholar award were redirected to support final year PhD student Mohamed Awadalla. As part of his research, Mohamed has been looking at increasing the accuracy of the representations of uncertainty of variable renewable energy generation in large-scale power system operations planning problems.

Publications supported by Award:

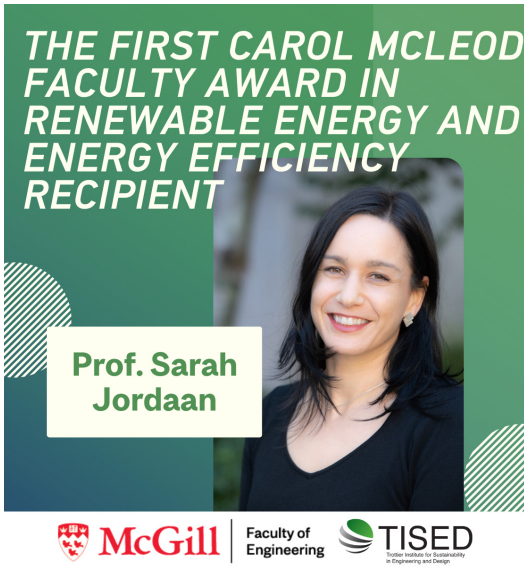
1. I. Jendoubi and F. Bouffard, "Data-Driven Sustainable Distributed Energy Resources' Control Based on Multi-Agent Deep Reinforcement Learning," Sustainable Energy, Grids and Networks, vol. 32, Dec. 2022.
2. I. Jendoubi and F. Bouffard, "Multi-Agent Hierarchical Reinforcement Learning for Energy Management," Applied Energy, vol. 332, Feb. 2023.
3. M. Awadalla and F. Bouffard, "Tight Data-Driven Linear Relaxations for Constraint Screening in Robust Unit Commitment," submitted to IEEE Transactions on Energy Markets, Policy and Regulation, Mar. 2023.
4. M. Awadalla and F. Bouffard, "Cost-Aware Bound Tightening for Constraint Screening in AC OPF," submitted to IEEE Power Engineering Letters, Apr. 2023.

Carol McLeod Faculty Award in Renewable Energy and Energy Efficiency

Mr. David P.J. McLeod, BEng 1955 made a generous donation in memory of his wife, Carol McLeod, to establish the Carol McLeod Faculty Award in Renewable Energy and Energy Efficiency to reward outstanding Faculty members in TISED.

The award will be given annually to support the outstanding teaching and or research innovation efforts of dedicated Faculty members who are affiliated with TISED and who contribute to the areas of renewable energy and energy efficiency.

On February 10, 2023 Prof. Sarah Jordaan was named the inaugural Carol McLeod Faculty Award recipient. Prof. Jordaan's remarkable project will delve into vehicle electrification and application of circular economy concepts to the management of Li-ion batteries in a Canadian context. Prof. Jordaan will also host a workshop on developing circular economy concepts for EV battery deployment.



Rubin and So Foundation Faculty Scholar Award

Established through a gift to the Faculty of Engineering and is intended to support the outstanding research innovation efforts of dedicated scholars affiliated with TISED who have demonstrated research achievement and potential in the area of climate change and sustainability. The call for applications was announced on April 13, 2023; the announcement of the inaugural Rubin & So Foundation Faculty Scholars is expected by September 2023.

TISED Graduate Fellowships (MEDA)

The McGill Engineering Doctoral Awards (**MEDA**) program aims to recruit the best and brightest new doctoral students from around the world. Selection for this award is based on the excellence of a student's academic and research record, including publications, presentations and his or her potential to make a major impact on the quality of research in the Faculty of Engineering at McGill University and in the field of engineering. MEDA are offered by the Faculty of Engineering and are cost-shared with the student's Department/School or supervisor.

No. TISED MEDA Fellowships Awarded in 2022-2023	Total Funds Awarded in 2022-2023:	Total Funds Awarded since 2015:
9	$40,100	$410,000+

Krauser Family TISED Fellowship : **Aysa Hedayati Azar**, Civil Engineering.
Research Area: Environmental

Redwood TISED Fellowship: **Jeenu John**, Civil Engineering. **Research Area**: Enviromental

Mike Zahn Fellowship: **Anwesha Banerjee,** Civil Engineering. **Research Area**: Environmental

ACDEG Fellowship in URBS: **Anindya Dey**, Civil Engineering. **Research Area:** Environmental

ACDEG Fellowship in URBS: **Khalil Hashem**, Civil Engineering. **Research Area:** Enviromental

U&M Sharma TISED Fellowship: **Ali Al Abed,** Mechanical Engineering.
Research Area: Combustion and Energy Systems.

U&M Sharma TISED Fellowship: **Marzie Karimi Dehkordi,** Mechanical Engineering. **Research Area:** Combustion and Energy Systems.

C.R. Martoni Fellowship: **Lin Wu,** Mechanical Engineering. **Research Area:** Surface Engineering

Gabor/Urban Strategies: **Kylie Pettifer**, Urban Planning. **Research Area:** N/I

Educational Engancement Activities

In addition to direct student financial support, TISED provides education enhancement activities for students including hosting information sessions and industry guest lecturers.

TISED hosted a Bruce Lourie's presentation"Thinking about your career Path? Make it

TISED & SEAM hosted a Lunch and Learn about Sead courses called "SEAD

TISED & SEAM hosted Alp Bora's presentation "Why we need mining to save the environment",

TISED & SEAM hosted a Wine and Cheese Social, March 2023.

Summer Undergraduate Research in Engineering (SURE) Awards

The SURE awards provide an opportunity for undergraduate students to get exposure to research in their discipline through paid summer research traineeships. Typically, students work closely with a graduate student. .

No. TISED SURE Awards granted in 2022	No. TISED SURE Awards granted since 2013:	Total Funds awarded in 2022:
19	155	$58,000+

Summer 2023 TISED SURE Award Recipients

Aki, Fujinawa, Mechanical Engineering. William Harker SURE Award in Sustainability in Engineering & Design.

Allen Liu. Chemical Engineering. Jerry and Norma Farnell SURE Award.

Amanda, Del Balso, Civil Engineering. Furino-Remillard SURE Award in Sustainable Engineering.

Bianca, Lamarche, Civil Engineering. Boersma SURE Award in Sustainable Engineering.

Claire, Wells, Materials Engineering. Claudia Macedo Memorial SURE Award in Sustainable Engineering.

DongRui, Wang, Civil Engineering. Stephen Nicholas Barrans SURE Award in Sustainable Engineering.

Felicity, Li, Architecture. Class of Architecture 1975 SURE Award.

Clements, Finnegan, Architecture. Hazelview SURE Award in Sustainability.

Jianbin, Cheng, Electrical Engineering. William Harker SURE Award in Sustainability in Engineering & Design.

Liam, Woolley, Civil Engineering. Harry Marksfield SURE Award.

Nora, Gu, Chemical Engineering. Jerry and Norma Farnell SURE Award.

Owen, Armstrong, Chemical Engineering. Furino-Remillard SURE Award in Sustainable Engineering.

Qi, Zheng, Chemical, Engineering. Mr. & Mrs. Lee Hee Chong and Mr. and Mrs. David Su Toye SURE Award in Sustainable Engineering.

Ralph, Al Hussami, Chemical Engineering. Harry Marksfield SURE Award.

Seung-Hyeok, Han, Mechanical Engineering. Prof. David Selby SURE Awd Sustainable Engineering.

Tana, Sun, Civil Engineering. Jerry and Norma Farnell SURE Award.

Xiangyun, Bu, Mechanical Engineering. Brian Hirst SURE Award in Sustainable Engineering.

Xinxin, Hao, Chemical Engineering. Allan & Linda Stephens SURE Award in Sustainable Engineering.

Xuan, Wu, Civil Engineering. John M. Bishop family SURE Awards for Sustainability in Engineering and Design.
Ralph, Al Hussami, Chemical Engineering. Harry Marksfield SURE Award.

Education and Training

TISED educates future engineers, urban planners, and architects by offering training opportunities, new courses, integrating sustainability into programs, and enhancing education 'outside the classroom'. TISED offers a growing catalogue of interdisciplinary sustainability-focused courses, which will form a core of our new Master of Engineering: Sustainability in Engineering and Desing program.

Master of Engineering: Sustainability in Engineering and Design

TISED's new Master of Engineering program was officially approved by Ministère de l'Enseignement supérieur in February 2023. TISED worked with McGill's Enrolment Services and in mid-April opened applications for a Fall 2023 admission cycle to domestic students. A small cohort is expected to start at the end of August.

Applications for the Fall 2024 admission will open on September 15. In preparation for the student recruitment, TISED plans to hire a Graduate Student Coordinator during the summer of 2023 and actively participate in the student recruitment efforts, in partnership with the McGill Engineering Student Centre, by attending graduate recruitment fairs, hosting prospective student information sessions as well as a TISED Open House. A cohort of 35-40 students is expected for Fall 2024.

New Faculty Search – Industrial Ecology and Life Cycle Assessment

In anticipation of the program launch, in October 2021 TISED initiated the academic recruitment process for a professor in the area of industrial ecology and life cycle assessment.

On August 22, 2022, Prof. Sarah M. Jordaan was jointly appointed Associate Professor at TISED and the Department of Civil Engineering. Prior to McGill, Prof. Jordaan was an Assistant Professor at Johns Hopkins University, where since 2016 she held a dual appointment at the School of Advanced International Studies and the Department of Environmental Health and Engineering. Professor Jordaan is a distinguished expert in LCA/Industrial Ecology, and on several critical areas of sustainability. Learn more about Prof. Jordaan's research.

As part of her appointment, Prof. Jordaan will teach two SEAD courses; Industrial Ecology (SEAD 540) and Life Cycle Analysis and Environmental Footprinting (SEAD 520). Prof. Jordaan will also serve as the first Graduate Program Director (GPD) of TISED's new Master of Engineering: Sustainability in Engineering and Design

TISED Course Offerings

While we prepare to welcome our first Master's program students on campus, TISED continues to offer its sustainability courses as part of the McGill Engineering curriculum.

SEAD 550 – Decision-Making for Sustainability in Engineering and Design and SEAD 515 – Climate Change Adaptation and Engineering Infrastructure continue to be popular. SEAD 540 – Industrial Ecology and Systems was not offered this year but will be taught during the 2023-24 academic year by Prof. Jordaan.

In Winter 2023, **SEAD 520** – Life Cycle-Based Environmental Footprinting course was taught by Prof. Sarah Jordaan and new software tools were integrated into the course to allow for hands-on learning of LCA concepts. Ecoinvent™, a Life Cycle Inventory (LCI) database that supports various types of sustainability assessments, was purchased and along with OpenLCA software, implemented into the course.

SEAD 530 – Economics for Sustainability in Engineering and Design, debuted in Winter 2023 with 29 students from 6 different departments enrolling the in course. The course introduces students to the basic concepts of the micro- and macroeconomics of sustainability as well as economic policy instruments related to sustainability in engineering and design disciplines. The course features real-life examples (e.g., Canada's Carbon Tax) and case studies (e.g., electric vehicles) as well as industry guest speakers; in February two representatives from WSP gave a guest lecture about incorporating externalities, the environmental and social costs that are typically ignored, into engineering business decisions.

The SEAD courses continue to attract steady interest from both graduate and senior level undergraduate students, with 140 students registered for the SEAD courses during the past academic year, compared to 108 students in the previous year. The students continue come from a diverse group of backgrounds, with representation from different departments across the Faculty.

Student Training - SEDTalks! Presentation Skills Training

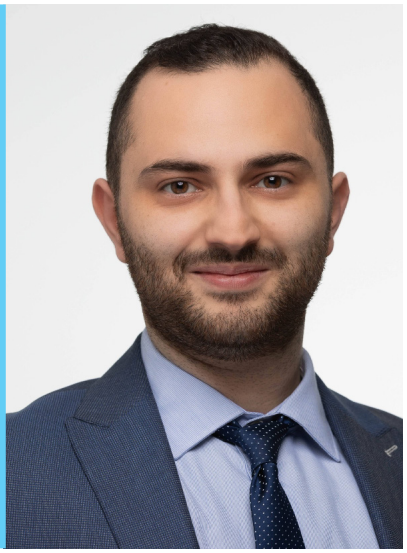
The SEDTalks! Presentations Skills Training is a platform for graduate students to share their sustainability research, develop professional skills in public-speaking and communication, expand their academic and industrial networks, and work with other researchers to make an impact on sustainability through engineering and design. Delivered in partnership with SkillSets and led by oral communication professionals, from Teaching and Learning Services (TLS), the training includes workshops, small group coaching sessions with feedback, and explores strategies to design research talks that are both accessible and impactful.

30+ Training workshop participants from all units in the Faculty of Engineering

9 Students presented 180-second research talks at the SEDx180s Event

SEDTalks! Event

2023 Program ChangeMakers



Hamidreza Ermagan

Mining and Materials Engineering, Ph.D. Candidate
SUPV: Prof. Agus Sasmito
Renewable Energy and Energy Efficiency

Rethinking energy storage: following in our ancestors' footsteps to create a sustainable energy future.

While renewables offer a clean source of power, the batteries necessary to make them available 24/7 come at a high environmental cost. Hamidreza's research looks to the past when thick walls of stones were used to trap the sun's heat during the day and release it slowly and evenly at night. With this passive technique as inspiration, his work focuses on meeting modern energy needs, which necessitates concentrated high-temperature storage. Maximizing the efficiency and safety of high-temperature systems requires understanding the heat transfer characteristics that current computational fluid dynamics models cannot accurately model. Hamidreza's research is to develop new correlations to improve the accuracy of these models, allowing this ancient technology to be an integral part of a green future.

Fathima Afsal

Civil Engineering and Applied Mechanics, Ph.D. Candidate
SUPV: Prof.Dominic Frigon
Sustainable Industrial Processes & Manufacturing

How can we engineer our way out of creating more super-bugs?

Sustainability is not just about the health of our planet, but also the health of all living animals on our planet. Currently the proliferation of antibiotic resistant super-bugs threatens that health. Antibiotic resistance is often thought of as a problem stemming from farms, municipal wastewaters and hospitals. Recent research has indicated that each of us may also be a prospective incubator by potentially hosting millions of antibiotic resistant genes in non-pathogenic microbes. These microbes have the ability to transfer that antibiotic resistance to a pathogen, making each person a possible source of the next antibiotic resistant super-bug. Fathima's research focuses on developing methods to study these complex pathways with hopes to uncover a mechanism that may short-circuit this process before it starts.

Arav Saherwala

Chemical Engineering, Master's student
SUPV: Prof. Nathalie Tufenkji
Climate Change Adaptation and Resilience

Shining a Light on the Unseen: Spectral Fingerprinting Nanoplastics to Investigate their Environmental Impact

Researchers have shown that large plastics accumulating in the environment break down into smaller microplastics or nanoplastics through exposure factors such as UV light, abrasion, or temperature variation. The plastic fragments are then taken up by smaller aquatic organisms and bioaccumulate up through the food chain, leading to potential impacts on human health. Due to their small size, detecting and identifying micro- and nano-plastics in aquatic environments is challenging. Avar's research focuses on studying the spectral information from nanoplastics using enhanced darkfield hyperspectral microscopy. This novel process will help develop detection methods for nanoplastics that will help us understand nanoplastics' fate, transport, and impact on the environment with hopes of informing future policy decisions regarding plastic pollution monitoring.

CONTACT US

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Appendix A: TISED Members

Madhav Govind Badami	Urban Planning
Sarah Jordaan	TISED/Civil Engineering
James Richard Forbes	Mechanical Engineering
Jeffrey Bergthorson	Mechanical Engineering
Kirk H. Bevan	Mining and Materials Engineering
Sharmistha Bhadra	Electrical and Computer Engineering
Vikram Bhatt	Architecture
Lisa Bornstein	Urban Planning
Francois Bouffard	Electrical and Computer Engineering
Benoit Boulet	Electrical and Computer Engineering
Andrew Boyd	Civil Engineering
Richard Chromik	Mining and Materials Engineering
Sylvain Coulombe	Chemical Engineering
Noemie-Manuelle Dorval Courchesne	Chemical Engineering
Salmaan Craig	Architecture
George Demopoulos	Mining and Materials Engineering
Allen Ehrlicher	Bioengineering
Ahmed Elgeneidy	Urban Planning
Dominic Frigon	Civil Engineering
Susan Gaskin	Civil Engineering
Subhasis Ghoshal	Civil Engineering
Pascal Hubert	Mechanical Engineering
Michael Jemtrud	Architecture
Geza Joos	Electrical and Computer Engineering
Mary Kang	Civil Engineering
Anne-Marie Kietzig	Chemical Engineering
Jan Kopyscinski	Chemical Engineering
Mustafa Kumral	Mining and Materials Engineering
Fabrice Labeau	Electrical and Computer Engineering
Tho Le-Ngoc	Electrical and Computer Engineering
Larry Lessard	Mechanical Engineering
Jinxia Liu	Civil Engineering
Nicholas Luka	Architecture
Aditya Mahajan	Electrical and Computer Engineering
Sara Mahshid	Bioengineering
Mohamed Meguid	Civil Engineering
Brett Meyer	Electrical and Computer Engineering
Luis Miranda-Moreno	Civil Engineering
Sivakumaran Nadarajah	Mechanical Engineering
Alessandro Navarra	Mining and Materials Engineering

Van-Thanh-Van Nguyen	Civil Engineering
Jim Nicell	Civil Engineering
Dan Nicolau	Bioenginering
Sasha Omanovic	Chemical Engineering
Sidney Omelon	Mining and Materials Engineering
David Plant	Electrical and Computer Engineering
Nathaniel Quitoriano	Mining and Materials Engineering
Agus Sasmito	Mining and Materials Engineering
Patrick Selvadurai (late)	Civil Engineering
Lijun Sun	Civil Engineering
Laxmi Sushama	Civil Engineering
Thomas Szkopek	Electrical and Computer Engineering
Mélanie Tétreault-Friend	Mechanical Engineering
Nathalie Tufenkji	Chemical Engineering
Ipek Tureli	Architecture
Theodora Vardouli	Architecture
David Wachsmuth	Urban Planning
Xiaozhe Wang	Electrical and Computer Engineering
Kristian Waters	Mining and Materials Engineering
Viviane Yargeau	Chemical Engineering
Yazhou (Tim) Xie	Civil Engineering
Codruta Ignea	Bioengineering
Cao Changhong	Mechanical Engineering
Fiona Zhao	Mechanical Engineering