

Keagan Hudson Rankin

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Education

- 2021 – present **University of Toronto**
PhD & MASc (2023), Engineering
Supervisors: Shoshanna Saxe, I. Daniel Posen
- 2017 – 2021 **University of New Brunswick**
BASc, Civil Engineering

Experience

- 2024 – 2025 **University of Cambridge**, Centre for Sustainable Development
Visiting Researcher
Student lead on \$25,000 NSERC International Catalyst grant; published *Nature Cities* paper on the climate limits of 1,000+ global cities.
- 2022 – 2024 **City of Toronto**, Planning and Sustainability Divisions
Research Consultant
Awarded Canada’s top housing research award [🏆](#) ; quantified the infrastructure emissions of >7 million people; informed 2023 “Housing Options” zoning law changes.
- 2019 – 2021 **University of New Brunswick**, Faculty of Engineering
Research Assistant
Created a sensor setup and signal processing app for drive-by inspection of bridges.
- 2019 **University of Victoria**, Faculty of Engineering
Research Assistant
Co-developed a sustainability-focused curriculum for first- and second-year students.
- 2018 **Canadian Rivers Institute**
Research Assistant
Built a regression to monitor water pollution for nearby hydroelectric plant.

Research

- Interests Industrial ecology; sustainable infrastructure systems; epistemic practices in using and interpreting computational models.

Journal papers

- [1] [Rankin KH](#) et al. 2026. A call to ensure the reproducibility of machine learning in industrial ecology. (*Preprint - in review*)
- [2] [Rankin KH](#) et al. 2026. The climate limits of construction in over 1,000 cities. *Nature Cities*
- [3] [Rankin KH](#), Saxe. 2024. A future growth model for building more housing and infrastructure with less embodied greenhouse gas emissions. *Environmental Science and Technology*
- [4] Yoffe, [Rankin KH](#), Bachmann, Saxe, Posen. 2024. A top-down assessment of GHG emissions in the Canadian construction sector. *Environmental Research: Infrastructure and Sustainability*
- [5] [Rankin KH](#), Arceo, Isin, Saxe. 2024. Embodied GHG of missing middle: residential building

forms and strategies for more efficient housing. *Journal of Industrial Ecology*

Conference papers
& presentations

- [6] Rankin KH, Saxe, Posen 2026. A simulation-optimization model for decarbonization in residential energy transitions. *INFORMS Annual Meeting 2026 – energy systems program*. Presentation accepted but unable to attend conference.
- [7] Rankin KH, Saxe, Posen 2026. Modelling the impact of demand-side decarbonization in residential energy transitions. *ISIE-SEM conference & ISSST2026*.
- [8] Rankin KH, Serrenho, Bachmann, Posen, Saxe 2025. Carbon emissions and budgets for more than 1000 cities. *ISIE2025*.
- [9] Rankin KH, Arceo, Yoffe, Isin, Saxe. 2023. Forecasting embodied housing emissions and material efficiency scenarios to 2030 in Ontario, Canada. *ISIE2023*.
- [10] Rankin KH, Zhuo, Lei, Rizaee, Searle, Ene, Amuno, 2022. Pull-based simulation modeling for modular supply chain analysis: A case study in Northern Canada. *Proceedings of the Canadian Society of Civil Engineering Annual Conference*.
- [11] Froese, Bristow, Rankin K 2021. Towards a sustainability-centred design curriculum in civil engineering. *Engineering Education for Sustainable Development (EESD)*.

Posters

- [12] Rankin KH, et al. 2026. ML Reproducibility in Industrial Ecology: Surveyed Studies Have Issues — and Citations Don't Care. *Gordon Research Conference in Industrial Ecology*
- [13] Rankin KH, Saxe, Posen. 2024. Carbon budgeting: research challenges and city-level decarbonization. *Gordon Research Conference in Industrial Ecology*.
- [14] Rankin KH, Arceo, Yoffe, Isin, Saxe. 2023. The potential for missing middle to provide more housing with less embodied emissions: quantifying and optimizing material efficiency in low-rise, multi-unit housing. *ISIE Biannual Conference*.
- [15] Yoffe, Rankin KH, Bachmann, Posen, Saxe. 2023. A Top-Down approach for downscaling sectoral emission budgets. A case study of Canada's construction sector. *ISIE Biannual Conference*.
- [16] Rankin KH, Isin, Arceo, Saxe. 2023. Evaluating the material intensity of missing middle. *Gordon Research Conference in Industrial Ecology*

Reports & white
papers

- [17] Ruiz, Zuluaga, Rankin KH, Saxe. (2026) Embodied Greenhouse Gas Emissions in Transit-Oriented Development Scenarios. *School of Cities & Canadian Urban Institute*. 
- [18] Rankin KH, Posen, Saxe. (2025). Setting a Carbon Budget for Toronto's Construction Sector. *City of Toronto*.
- [19] Hudgins, Haralampides, Dolan, Rankin K, Yamazaki (2019). Results and analysis of the 2018 suspended solids field program in the Mactaquac headpond, Saint John River, NB. *Canadian Rivers Institute*.

Awards & honours

National

- 2025 NSERC Vanier Scholarship
- 2025 CMHC National Gold Roof Award for Housing Research
- 2020 TAC Esch Foundation Scholarship
- 2018, 2019, 2020 NSERC Undergrad Research Award (3×)

Graduate

- 2026 University of Toronto Doctoral Excellence Award
- 2024 Francis Bradfield Fellowship in Environmental Engineering
- 2023 David Scrymgeour Community Bursary
- 2022, 2023, 2024 OGS/QEII Scholarship in Science and Technology (3×)
- 2022, 2024 Graduate Studies Conference Grant (2×)
- 2022 CW Bowman Scholarship in Energy Research
- 2021 NSERC Alexander Graham Bell Award (CGS-M)
- 2021 CIVMIN top-5 incoming student award

Undergraduate

- 2021 D. Malcolm Jeffrey Memorial Prize for highest department GPA over 4 years
- 2021 Capstone design project, 1st prize in department

Speaking

- 2026 ISSST Student Speaker Award [7] (5 awarded out of >100 presentations)
- 2024 GRC Poster Award [13] (2nd out of >100 presenters)
- 2022 CSCE Speaking Award [10] (2nd out of >150 speakers)

Invited talks & media

Invited talks

- 2025 The mis-education of machine learning models – a reproducibility crisis in applied science
Massey College Junior Fellow Lecture Series, Toronto, Ontario
- 2024 Scenario modelling of urban metabolism – recent progress and research trends [↗](#)
ISIE-SEM Perpetual Conference, online (recording)
- 2024 Building more housing with less embodied greenhouse gas [↗](#)
School of Cities Embodied Emissions Symposium, Toronto, Ontario (recording)
- 2024 Carbon capture's make or break role in climate-change mitigation
Massey College Junior Fellow Lecture Series, Toronto, Ontario

News & press

- 2026 Urban construction boom threatens climate goals [↗](#), *Forbes*
- 2026 We must completely change the way we build homes to stay below 2 °C [↗](#), *New Scientist*
- 2024 How to build more with less: new model shows how Canada can reconcile its housing and climate targets by adopting established sustainable construction practices [↗](#), *University of Toronto Engineering News*
- 2024 Can we build more affordable housing while meeting Canada's climate commitments? [↗](#), *The Varsity*

Teaching

Experience

2021 – 2026

Teaching Assistant

University of Toronto, Faculty of Applied Science and Engineering

CIV1399

Applied Methods for Industrial Ecology (Masters/PhD)

Developed quizzes marked project-style assignments; prepared and taught a tutorial on material-flow analysis.

CME368

Engineering Economics and Decision Making (Undergraduate)

Delivered lecture on discount rates and project comparisons to ~100 students; ran office hours and tutorials; worked with the instructor on an experimental AI marking.

CIV1321

Large Scale Infrastructure & Sustainability (Masters/PhD)

Ran two lectures for ~30 master's and PhD students; marked presentations and semester-long research assignments.

CIV100

Mechanics (Undergraduate)

Planned and delivered lecture-style tutorials for 150+ students; ran weekly 2-hour office hours; invigilated and marked 800 final exams.

Mentorship

2026

James Reichenbach (visiting student)

Mentored on a project refactoring a building-material database into SQL pipeline.

2025

Qianyi Zhang (undergraduate)

Co-advised on capstone thesis: setting optimal emissions limits across sectors.

Service and activities

Peer Review

Journal of Industrial Ecology; Building & Environment; Environmental Research Infrastructure and Sustainability (IOP)

2022 – present

International Society for Industrial Ecology

Member

Co-organized IE Day 2026 session “How are generative AI tools being used in IE research?”; co-organized IE Day 2025 session “AI for IE: emerging trends, best practices, and applications of artificial intelligence for industrial ecology”; co-organized ISIE2025 special session on artificial intelligence for industrial ecology (100+ attendees).

2022 – 2026

Massey College

Junior Fellow

Elected to competitive fellowship for University of Toronto graduate students; co-organized 60th-anniversary sustainability conference featuring international speakers; co-editor of the 2023 edition of *Audeamus* (college literary journal).

2024 – 2025

Clare College Cambridge

MCR Associate Member

2023 – 2025

Campus Cooperative Residence Inc. (CCRI)

Board of Directors

Elected to the board for a 2-year term; helped operate a co-op of over 200 members; assisted planning a >\$2M budget for hiring, payroll, capital investments and repairs; helped resolve membership disputes and modernize bylaws.

2021 – 2022 **Shad Valley**
Student Mentor
Helped secondary students complete an sustainable engineering design project.

Other

Citizenship Canadian

Languages English (native), French (proficient)

P.Eng Status Engineer in Training (EIT), Association of Professional Engineers and Geoscientists of New Brunswick

Rowing Clare Boat Club: 1st men's boat, 2025 Lents blades, 3rd on river; 2017 Canada Games lwt men's 4-, 3x Atlantic Canadian university champion.

Last updated: October 9, 2026