Keagan Hudson Rankin

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EDUCATION

University of Toronto — **2021 - Present**
MASc & PhD, Engineering — Toronto, Canada
Supervisors - Shoshanna Saxe, I. Daniel Posen

University of New Brunswick — **2017 - 2021**
BASc, Civil Engineering — Fredericton, Canada

EXPERIENCE

University of Cambridge — **Sep 2024 - Mar 2025**
Visiting researcher, Centre for Sustainable Development — Cambridge, UK

City of Toronto — **Sep 2022 - Aug 2024**
Consultant, Planning and Sustainability Divisions — Toronto, Canada

University of Toronto — **Sep 2021 - Jan 2026**
Teaching assistant, Faculty of Applied Science and Engineering — Toronto, Canada

University of Victoria — **May 2019-Aug 2019**
Undergraduate researcher, Faculty of Engineering — Victoria, Canada

University of New Brunswick — **May 2019-Aug 2021**
Research assistant — Fredericton, Canada

RESEARCH INTERESTS

- Material efficiency and life-cycle assessment of housing and infrastructure systems.
- Applying data science, stochastic simulation, and optimization to decarbonize materials/energy.
- Epistemic practices surrounding uncertainty in machine learning and computational science.

PUBLICATIONS

Journal Papers

- Rankin KH et al. 2026. The climate limits of construction in over 1,000 cities. *Nature Cities*
- Rankin KH, Saxe. 2024. A future growth model for building more housing and infrastructure with less embodied greenhouse gas emissions. *Environmental Science and Technology*
- Yoffe, Rankin KH, Bachmann, Saxe, Posen. 2024. A top-down assessment of GHG emissions in the Canadian construction sector. *Environmental Research: Infrastructure and Sustainability.*
- 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

- Rankin KH, Arceo, Yoffe, Isin, Saxe. 2023. Forecasting embodied housing emissions and material efficiency scenarios to 2030 in Ontario, Canada. *ISIE2023.*
- 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.*

- Froese, Bristow, Rankin K 2021. Towards a sustainability-centred design curriculum in civil engineering. *Engineering Education for Sustainable Development (EESD).*

Posters

- Rankin KH, Saxe, Posen. 2024. Carbon budgeting: research challenges and city-level decarbonization. *Gordon Research Conference in Industrial Ecology.*
- 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.*
- 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.*
- Rankin, KH, Isin, Arceo, Saxe. 2023. Evaluating the material intensity of missing-middle *Gordon Research Conference in Industrial Ecology*

Reports

- 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.
- Rankin K.H., Posen, Saxe. (2019). Setting a Carbon Budget for Toronto's Construction Sector – MITACS Report

RECOGNITIONS

National

NSERC Vanier Scholar	**Apr 2025**
CMHC Gold Roof Award for Housing Research	**Jan 2025**
TAC Esch Foundation Scholarship	**Sep 2020**
NSERC Undergrad Research Award 3x	**Jun 2018, 2019, 2020**

Grad

Francis Bradfield Fellowship in Environmental Engineering	**Nov 2024**
David Scrymgeour Community Bursary	**Aug 2023**
OGS/QEII Scholarship in Science and Technology 2x	**Sep 2022, 2023, 2024**
Graduate Studies Conference Grant 2x	**Apr 2022, Apr 2024**
CW Bowman Scholarship in Energy Research	**Apr 2022**
NSERC Alexander Graham Bell Award CGSM	**Sep 2021**
CIVMIN top-5 incoming students award	**Sep 2021**

Undergrad

D. Malcolm Jeffrey Memorial Prize - highest department GPA over 4 years	**Apr 2021**
Annual capstone design report 1st prize	**Apr 2021**
$ 25,000 of total merit/research award funding over course of degree	**Sep 2017 - Apr 2021**

Speaking

GRC Poster Award (2nd of >100 presenters)	**June 2024**
UTERC Presentation Award (2nd of $\sim$ 100 speakers)	**Sep 2023**
CSCE Speaking Award (2nd of >150 speakers)	**July 2022**

INVITED TALKS AND SELECT MEDIA

Talks

Scenario modelling of urban metabolism – recent progress and research trends. ISIE-SEM Perpetual Conference **2024**

Building more housing with less embodied greenhouse gas. School of Cities Embodied Emissions Symposium. Toronto, Ontario. **2024**. recording link

Carbon capture's make or break role in climate-change mitigation. Massey College Junior Fellow Lecture Series. Toronto, Ontario. **2024**

Providing more housing with less embodied greenhouse gas. UofT Engineering Research Council Annual Conference. Toronto, Ontario. **2023**.

Media
Urban Construction Boom Threatens Climate Goals. Forbes. **2026** link

We must completely change the way we build homes to stay below 2°C. New Scientist. **2024**. link

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**. link

Can we build more affordable housing while meeting Canada's climate commitments?. The Varsity. **2024** link

SERVICE AND AFFILIATIONS

Peer Review
IOP Science – Environmental Research: Infrastructure and Sustainability
Building & Environment

Co-Organizer **2025**
ISIE2025 special session on AI4IE

Campus Cooperative Residence Inc (CCRI) **2023 - 2025**
Board of Directors

Massey College **2022 - Present**
Junior Fellow

Association for Professional Engineers and Geoscientists NB **2021 - Present**
Engineer in Training

UofT CIVMIN Graduate Society **2021 - 2022**
Academic Director

Shad Valley **2021**
Student Mentor

SKILLS AND OTHER

Programming/Markup Languages (in general order of experience)
Python, TeX, R, Matlab, SQL, Git, HTML + CSS, Visual Basic

Software (in no particular order)
Excel, REVIT, ArcGIS, OnScreenTakeoff, AutoCAD, EPANET, OpenLCA, Brightway2, Exiobase

Languages
English (native), French

Rowing
Team New Brunswick - Eastern Canadian champions, finalist at 2017 Canada Games
Vic City Rowing Club - High performance team
UNB Rowing - 3x Atlantic Canadian University champion
Cambridge University, Clare Boat Club - Lent M1 bumps blades