

Keagan Hudson Rankin

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EDUCATION

University of Toronto MSc & PhD, Engineering Supervisors - Shoshanna Saxe, I. Daniel Posen	2021 - Present Toronto, Canada
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University of New Brunswick BSc, Civil Engineering	2017 - 2021 Fredericton, Canada
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EXPERIENCE

University of Cambridge Visiting researcher, Centre for Sustainable Development	Sep 2024 - Mar 2025 Cambridge, UK
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City of Toronto Intern, Planning and Sustainability Divisions	Sep 2022 - Aug 2024 Toronto, Canada
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University of Toronto Teaching assistant, Faculty of Applied Science and Engineering	Sep 2021 - Jan 2024 Toronto, Canada
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University of Victoria Undergraduate researcher, Faculty of Engineering	May 2019-Aug 2019 Victoria, Canada
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University of New Brunswick Research assistant	May 2019-Aug 2021 Fredericton, Canada
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RESEARCH INTERESTS

- Industrial ecology, material efficiency and life-cycle assessment of infrastructure systems.
- Applications of data science, statistical/machine learning, stochastic simulation, optimization, and quantitative decision-making to the de-carbonization of materials/energy.

PUBLICATIONS

Journal Papers

- 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

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 ~ 100 speakers)	Sep 2023
CSCE Speaking Award (2nd of >150 speakers)	July 2022

INVITED TALKS AND 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

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