Bio
Dr. Scott Bucking, PEng, is an Associate Professor at Carleton University in the Department of Civil and Environmental Engineering and the Azrieli School of Architecture and Urbanism. His research lab develops pathways to zero-carbon at scales from tiny homes to communities and experimentally validates these ideas using design-build approaches. In 2017, he led the construction of a tiny home called the Northern Nomad with 15 undergraduate and graduate students. The Northern Nomad is presently being used to experimentally validate the performance of GHG mitigation and resiliency strategies.

Talk:
Resilient by Design- Multi-Objective Optimization in the Net-Zero Era

As net-zero aspirations evolve from single buildings to broader communities and energy grids, prevailing planning strategies heavily prioritize electrification, often overlooking the potential integration of thermal resources like waste heat into the energy balance. Relying on a singular centralized electrical grid creates challenges in adapting to extreme weather events and potential increases in power outages. Neglecting grid dynamics in net-zero design may impede climate change mitigation efforts requiring a complete reduction of GHG emissions. Despite the rising ambitions, most net zero projects remain voluntary and involve key stakeholders, like local distribution companies, in supportive rather than leading roles. This presentation introduces a novel approach to design and integrate net-zero assets by fully leveraging renewable thermal and electrical resources, introducing Net Zero Modular Accelerators (NZMAs). The application of optimization approaches and AI, considering multiple objectives (energy, emissions, cost, and resilience), promises innovative solutions that transcend site boundaries, aligning with the original net-zero targets. Additionally, the presentation delves into the trajectory and insights gained from a researcher's involvement in over 50 net-zero buildings, including a net zero tiny home developed and tested at Carleton University.