Centre for Climate Science and Engineering

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Introduction / Overview

The Centre for Climate Science and Engineering (CSE) is a multi-disciplinary research and education centre established in 2019 as a multi-faculty initiative at the University of Toronto. The centre is supported by the Dean's Strategic Fund from the Faculty of Applied Science and Engineering. At the CSE, we focus on the intersection of climate science, engineering, and policy. We aim to mitigate and prepare for the impacts of climate change through research on energy, air quality, GHG emissions, building structures, and transportation.

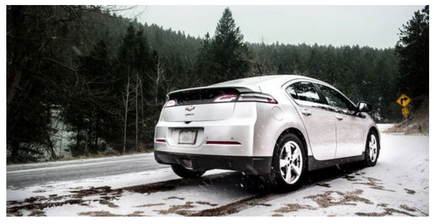
Major Outcomes/Results/Impact

1. Generate and communicate actionable knowledge for engineering decisions and policy development under climate change.
2. Create multi-level educational programs to train professionals on the fundamentals of climate science, promote opportunities to connect climate data and models to engineering design and analysis.
3. Stimulate strategic partnerships with private and public sector stakeholders.

Research Projects

Evaluating the Environmental Impacts of Alternative Fuel Vehicles with Changing Climate

This research seeks to establish a relationship between different climate variables and vehicle energy consumption and emissions, with a focus on alternative fuel vehicles (PI: Posen, Kushner)



From Covid-19 Effects on Travel Behaviour to Strategic Planning for Deep Reductions in Metropolitan Greenhouse Gas Emissions

This project aims to quantify the impacts on GHG emissions of various initiatives that promote a shift in individual behaviour (PI: Hatzopoulou)

Climate Change Impacts and Potential of Window Wall Retrofits for Improved Energy and Comfort Performance

This project seeks to develop in-situ retrofits to improve the energy consumption and occupant comfort of window wall construction, in both current and future climates (PI: Touchie)

Assessing Climate Change Impacts on Ontario's Electricity Reserve Margin

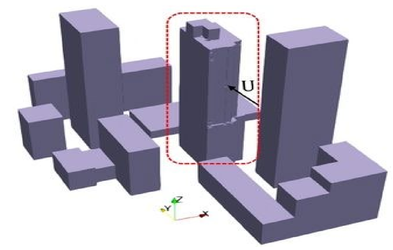
This project investigates the potential effects of several major climate change impact pathways on Ontario's future demand and capacity based on the "business-as-usual" climate change scenario for the period of 2020 to 2040 (PI: Posen, MacLean)

Impact of Toronto Air Quality During Extreme Weather on Public Health Under a Changing Climate

This project is evaluating the public health index by simulating NO_x, O_3 and $PM_{2.5}$ concentrations in Greater Toronto and Hamilton Area using a Polair3D model during extreme weather events under current and future climates (PI: Posen, Kushner, Hatzopoulou)

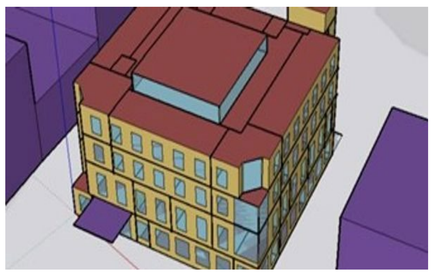
The Impact of Climate Change on Wind Loading in the Built Environment

In this project, the relationships between climate models and computational fluid dynamics (CFD) models are studied, with a focus on how surface wind information is propagated from climate models to CFD models through the atmospheric boundary layer interface (PI: Mercan, Kushner)



Assessing the Impacts of Climate Change on Energy Use and Retrofit Potential of Institutional Buildings at the University of Toronto St. George Campus

This project investigates the impacts of climate change on the campus building energy use and thermal comfort as well as the use of retrofit measures for improving buildings' climate resilience (PI: Touchie)



Educational Programs

Graduate Courses

Two graduate courses have been developed with an emphasis respectively on 1) engineering approaches to GHG mitigation and 2) climate science & adaptation for engineering systems

E-Learning modules

Eight e-learning modules have been developed in collaboration with the University of Western Ontario to address the need of training at the climate science- engineering interface. This program was funded by eCampus Ontario.

High-school educational program

This program was coordinated with the DEEP Summer Academy; it focuses on Building Resilience

Outreach Activities

Workshops and Lecture series

Monthly lecture series are open to the public to attend. They are featured by industry professional and other academic institutions to communicate actionable knowledge for engineering decisions and policy development under climate change.

Opportunities

The CSE efforts can stimulate strategic alliances across the private, public, and academic sectors to collaborate in initiatives that support professionals to face climate change challenges.

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