

Decarbonizing the UofT community: How can we enable more sustainable and equitable personal choices across the three campuses?

Climate Positive Energy and Climate Positive Campus Joint call
for Proposals – March 24 - 25, 2022



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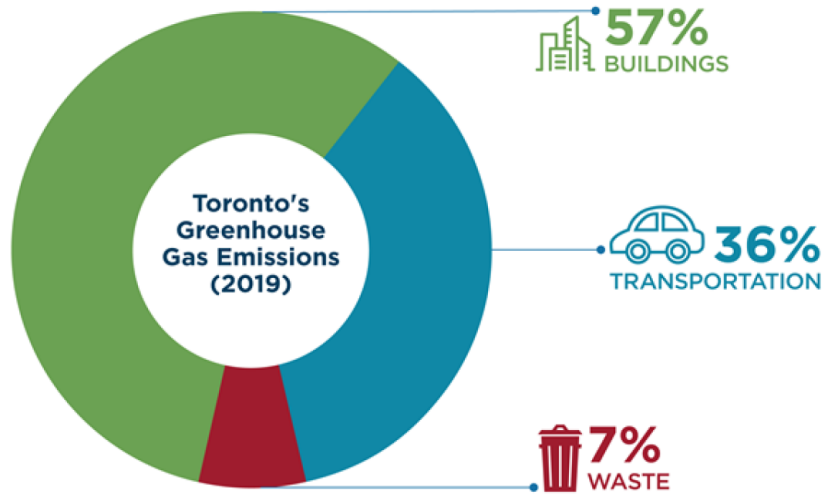
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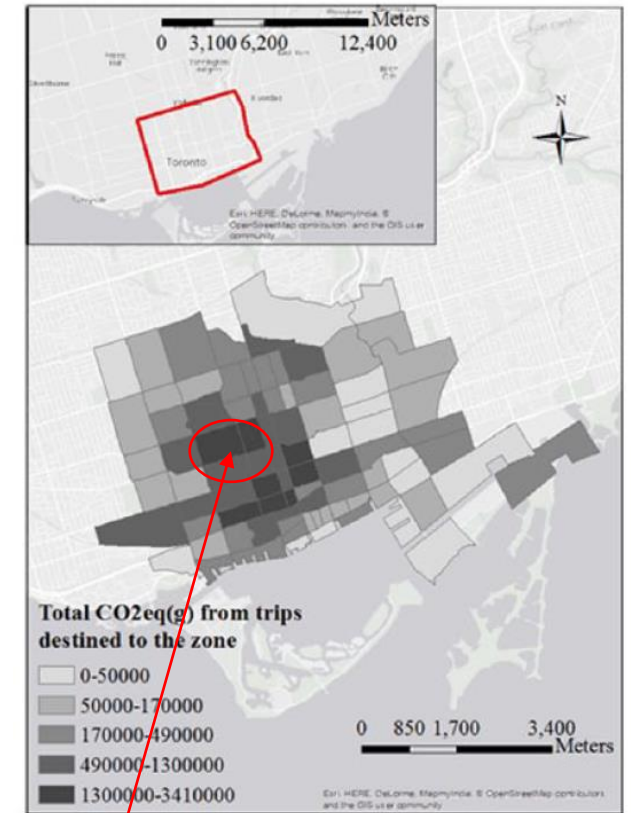
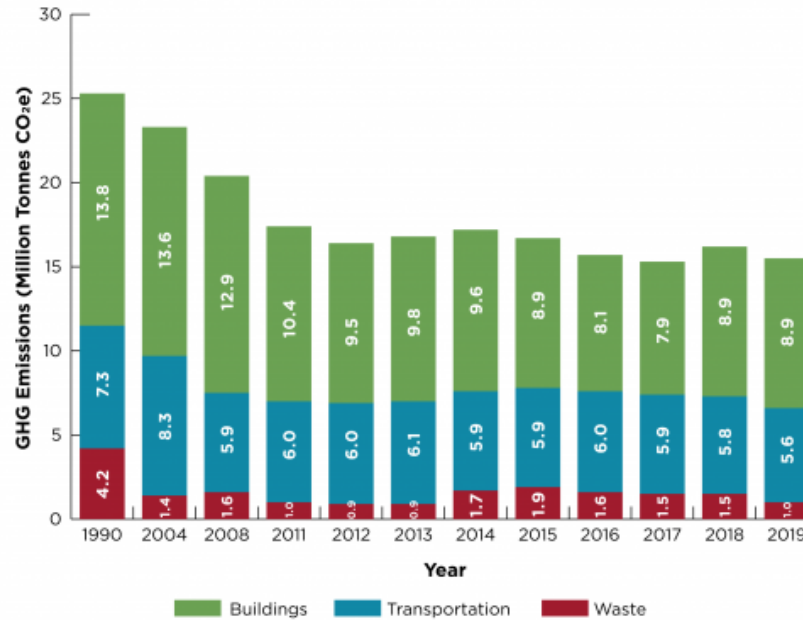
Co-PIs: D. Posen, M. Hatzopoulou, E. Miller,
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Departments: CivMin, Geography, UTM, UTSC, SoC

The pace of community GHG reduction in the City of Toronto is slow and there is little accounting of scope 3 emissions



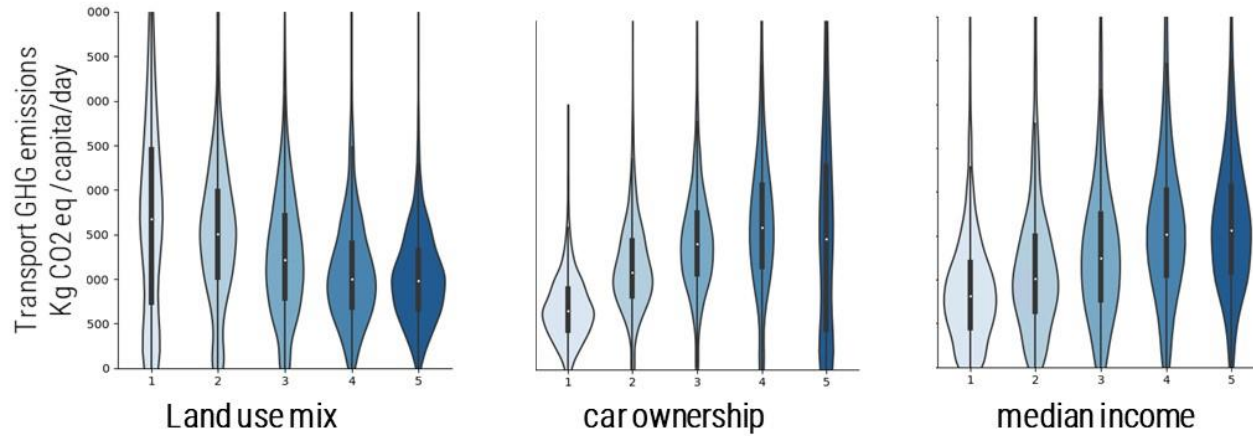
TransformTO Net Zero strategy: A climate action pathway to 2030 and beyond, City of Toronto, November 2021



Tu et al., 2018 TRR

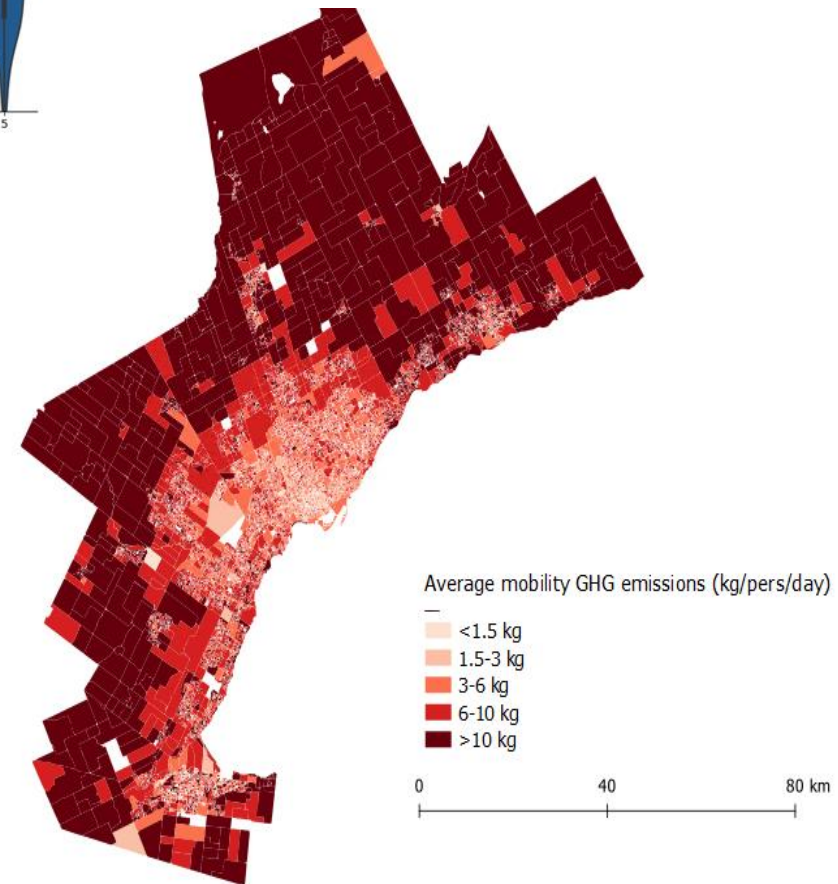
We know little about UofT's share of GHG emissions in the City but we know that the St George campus and the hospitals are responsible for high emissions due to the number of trips they attract and the emission intensity of those trips

What do we already know?

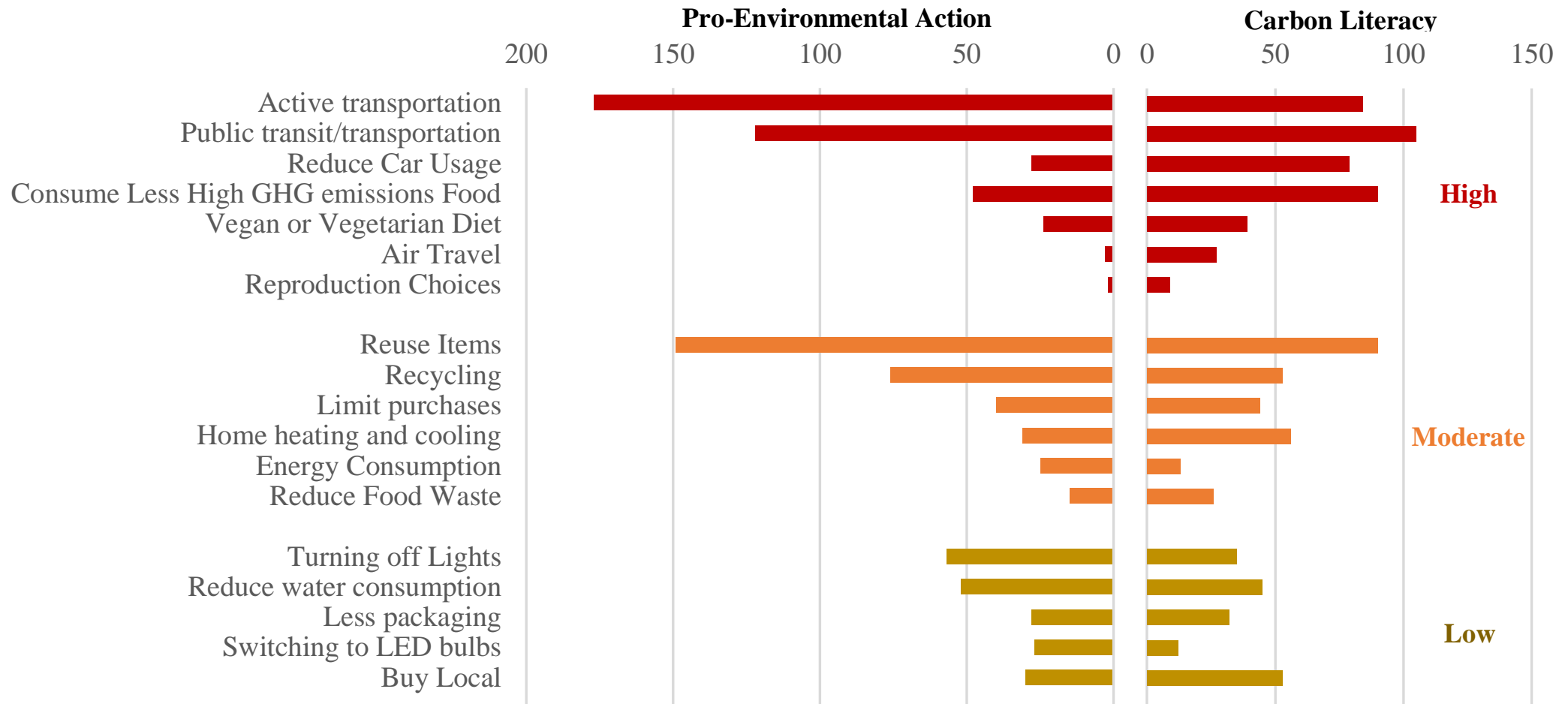


Transport GHG emissions are a manifestation of multiple factors:

- where a person lives and works
- mode of transportation & choices available
- vehicle technology
- attitudes and perceptions

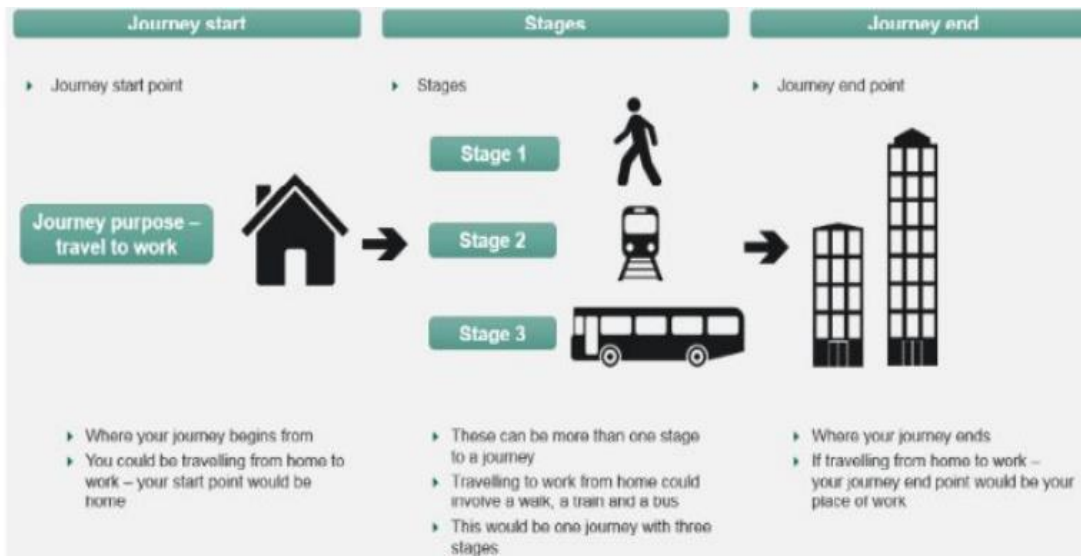


What do we already know?

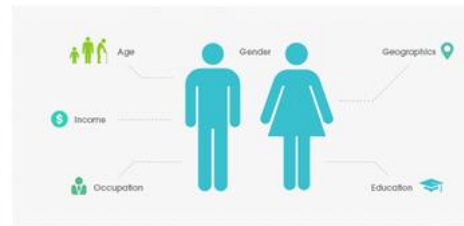


Reducing the GHG emissions of the UofT community requires an understanding of the entire set of factors influencing personal choices

This begins with a carbon footprint and 7-day commuting survey of faculty, staff, students at the three campuses



King et al., 2019



Socio-economic characteristics

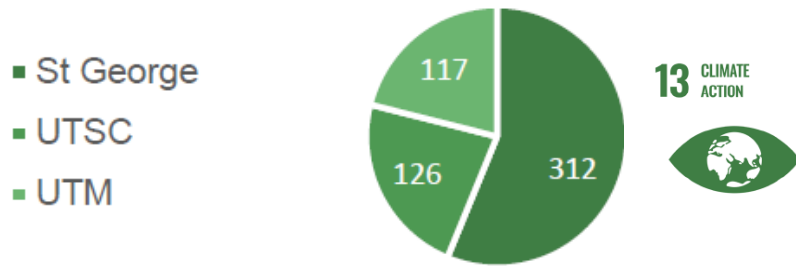


- Carbon literacy and its association with pro-environmental action
- Transportation infrastructure/services and travel demand
- Carbon footprint analyses by employee/faculty/student groups, campus, home location, etc.

Another key element of reducing GHG emissions is to understand how education and social externality information affects choices

Part I: analyzing sustainability content in U of T curriculum

Courses related to SDG13 at U of T's three campuses







<https://data.utoronto.ca/sustainable-development-goals-sdg-report/>

Part II: A stated preference (SP) survey helps quantify how people behave in a new situation by showing them 'experiments'



Level-of-service attributes

Information attributes

	CAR	P&R
Parking Cost	4 €	3 €
Travel Time	12 min	18 min
Parking Time	12 min	2 min
Headway	-	5 min
If you use P&R instead of car as driver:	  <p>It reduces traffic stress by 30%.</p> <p>A study conducted among 10,000 car drivers in Europe has shown that 20 minutes driving in traffic is enough to increase psycho-physical stress. One in three Italians ranks traffic as the major source of stress.</p>	
	  <p>It reduces CO₂ emissions by 45%.</p> <p>If all commuters travelling into the centre of Cagliari (150.000 trips per day) would switch to P&R for just one daily trip, this would reduce CO₂ emissions by 36,920 tonnes, an amount offset in one year by 4,013 hectares of forest, roughly 140 times the area covered by the Monte Urpinu Park (a well known park in Cagliari)!</p>	

To implement the outcomes of this research, we propose a set of information tools and real-world interventions



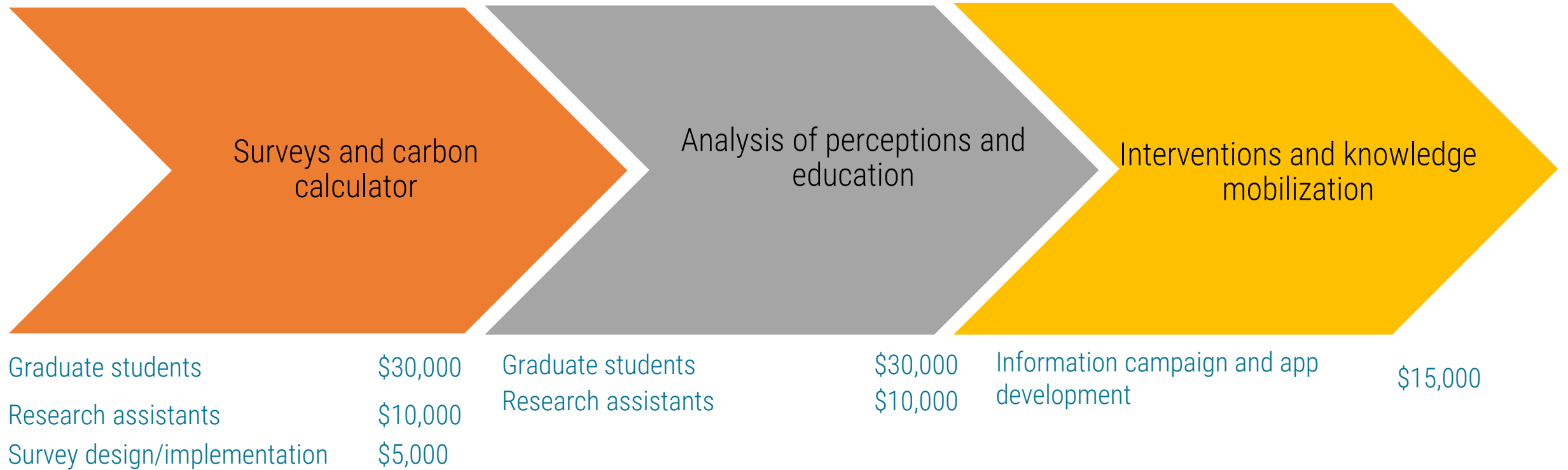
Personal GHG calculator

Knowledge mobilization

Ride share apps for new cyclists, transit support



Budget



A team representing four UofT initiatives and three campuses

Behavior & choices



Eric Miller
Khandker Nurul Habib

Experts in:

- Agent-based micro simulation models
- Demand forecasting and behavioral choice modelling



Equity & justice Community engagement






Karen Chapple
Steven Farber

Experts in:

- Inequality and sustainability planning
- Social and economic outcomes of transportation

Life-cycle GHG emissions



Marianne Hatzopoulou
Daniel Posen
Heather Maclean
Matt Adams

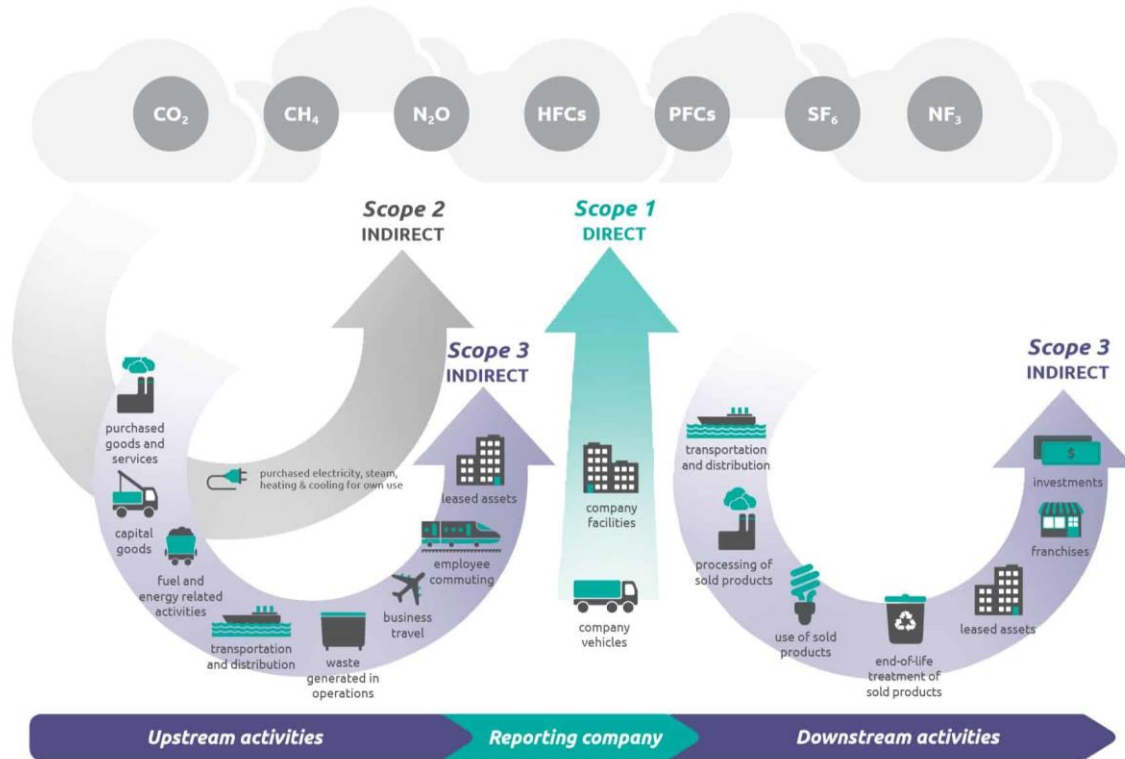
Experts in:

- Large-scale transportation emission inventories
- Life cycle assessment, carbon accounting, and teaching sustainability
- Environmental analysis and spatial analysis

EDI Strategy

- Generate GHG emissions across **various groups** and identify the transportation needs of individuals, including the **most vulnerable groups**
- **Community engagement** through the proposed surveys, which will be **advertised widely**
- Information sessions and webinars not only to promote the survey tools but as an opportunity to **engage with the community** around GHG emissions

2050 Target – beyond Scope 3



- Campus commuting behaviour represents a substantial foray into quantifying Scope 3 emissions
- Extension to personal carbon footprints captures a wealth of other emission reduction opportunities
 - Eliminate personal vehicle travel: ~1 t CO₂e/pers/yr
 - Eliminate meat consumption: ~1 t CO₂e/pers/yr
 - Eliminate 1 long-haul flight: ~1 t CO₂e/pers/yr
 - Increased adoption of suite of 'moderate impact' actions (e.g., recycling, cold water laundry) : ~1 t CO₂e/pers/yr
- Capturing even half of these opportunities could eliminate ~200kt CO₂e across the campus community – greater than all campus direct emissions

Thank you.

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