PhD Positions Available in Food Waste and Climate Change

Position(s):	PhD (3 positions available)
Location(s):	University of Guelph; McGill University; Dalhousie University
Start:	January 2024 or until all positions are filled
Stipend:	Graduate stipends are provided
Awards:	Merit based and institution specific
Granting Agency:	NSERC

Project Summary

Canada's food system may contribute up to 40 percent of anthropogenic greenhouse gas (GHG) emissions. The food system intersects all sectors, from primary production to consumers, and therefore has the potential to contribute anthropogenic greenhouse gas (GHG) emissions over the continuum. For instance, food loss and waste (FLW) in North America totals over 168 million tonnes annually creating significant direct and indirect social, economic, and environmental disruptions. The quantification of food system GHGs from FLW lack accurate granular data on the comparative sources within the Canadian food system. Comprehensive strategies to address the root causes of these GHGs do not exist. Data across the food system is fragmented within sections of the scientific literature, consultation reports by provincial governments or industry stakeholders, and with non-governmental organizations at the grassroots level. As a result, there is a significant lack of cohesive data on the IC&I continuum of the food system and groups within these sectors face a range of differing access to resources, varying policy frameworks provincially, and increasing economic pressures. This project aims to aggregate fragmented reporting and data into an open access database, quantify food system GHG emissions, from cradle to grave, and use learned experiences to develop effective mitigation strategies at a community level. This will be achieved through direct measurements, community-based pilot projects, and modeling analysis in partnership with diverse stakeholders. The project is a collaboration of experts who will address the scientific and human dimensions of the food system to develop publicly available tools to assess GHG emissions, disseminate tested GHG mitigation strategies to stakeholders, and train highly qualified personnel who will engage with the implementation frameworks developed from their research. The project will generate meaningful actions and policies that will result in significant and sustainable reductions in anthropogenic GHGs across Canada's food supply chain.

Position Details

Three PhD positions are available at multiple institutions (University of Guelph, McGill, and Dalhousie) that will intersect to achieve targets within a larger project focusing on Food Waste and Carbon transformations in Canada's Food System. Broadly speaking, these positions will use data gathered from the literature and through direct measurement to quantify greenhouse gas (GHG) emissions (National/Regional), model GHG emission scenarios, and evaluate different potential benchmarks for different sectors in Canada's food value chain, with an emphasis on Food Loss and Waste (FLW), from primary production through to the IC&I sector and consumers. All three laboratories and universities are strong advocates for increasing and improving equity, diversity and inclusion in the Sciences and Engineering disciplines. All universities offer

accommodations, training, and resources to provide a wide range of supports for all applicants to participate and engage at the highest level of academic pursuits.

Position 1: Sustainability Evaluation of Controlled Environment Agriculture (greenhouse & vertical farms/plant factories) – Advisor: Dr. Thomas Graham, University of Guelph

The successful candidate will conduct a thorough greenhouse gas (GHG) audit and evaluation of the Canadian Controlled Environment Agriculture (CEA) sector (greenhouses & plant factories/vertical farms). A combination of literature, database mining, and hands-on/on-farm quantitative assessments will be used to characterize the current GHG status of the sector. Validation of information will be directly obtained from several key areas that have a disproportionately high impact on overall sustainability and/or GHG production and that are often inaccurately characterized. These key areas are: 1) water use/use efficiency, 2) energy consumption/use, and 3) material inputs and cycling (e.g., fertilizer, clamshells/packaging; waste biomass), and 4) waste biomass generation. Further, models or scenarios under which these systems could operate to achieve the sustainability potential that they represent will be developed. Such scenarios may include a shift to renewables, consideration of food miles, accounting of intrinsic carbon savings and resource cycling/closed loop production.

Position 2: Evaluation of Institutional, Commercial, and Industrial (IC&I) food waste and associated GHG potential - Advisor: Dr. Gordon Price, Dalhousie University

The candidate will evaluate the literature associated with Canada's Industrial, Commercial, and Institutional Sector (IC&I) in relation to food loss and waste, greenhouse gas emission potentials, and development of empirically derived strategies for mitigation of GHGs. The research will be conducted in collaboration with industry and non-governmental organization partners who are actively engaged in this area of study. Key areas of study will include: 1) Evaluating differences across Canadian municipalities in handling food waste from the IC&I sector, 2) Acquisition and quantifying potential GHG emissions based on empirical datasets from different municipal partners and analysis of the literature, and 3) Developing systems-based models of carbon and nutrient movements, transformations, and requirements through Canada's IC&I Sectors. These may involve the use of existing process modeling frameworks, carbon footprinting, life cycle analyses, and/or a range of other tools that can help provide insights to FLW and GHG emissions within this sector. The research will integrate with a broader team of students, researchers, and collaborators from industry, government, and NGOs toward understanding Canada's GHG emissions from this important economic sector.

Position 3: Evaluation of IC&I Food Loss Patterns within the Montreal & Southwestern Quebec catchment area - Advisor: Dr. Grant Clark, McGill University

The successful candidate will conduct a study of the quantities, patterns and environmental impacts of food loss and waste (FLW) in Canada's Industrial, Commercial, and Institutional Sectors (IC&I), with a focus on Montreal and Southwestern Quebec. The study will be closely collaborative with those mentioned above (Positions 1 and 2) and other ongoing research projects. There will be strong interaction with other research

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groups, local, provincial, and national government agencies, and non-government actors. Tasks will involve a thorough review of literature about the topic; acquisition and collation of existing data; empirical measurements where key data gaps are identified; modeling and analysis of food systems to better understand FLW and related environmental impacts; estimate changes in FLW and environmental impacts under scenarios related to changes in climate, production methods, dietary preferences, waste management strategies.

Apply to:

Position 1:	Position 2:	Position 3:
Dr. Thomas Graham	Dr. Gordon Price	Dr. Grant Clark
University of Guelph	Dalhousie University	McGill University
tgraham@uoguelph.ca	gprice@dal.ca	grant.clark@mcgill.ca