

Real-World Exhaust Emissions of Canadian Light Duty Vehicles

Aislinn Dressler, Daming Wang, Dr. Laura Minet, Department of Civil Engineering

Background

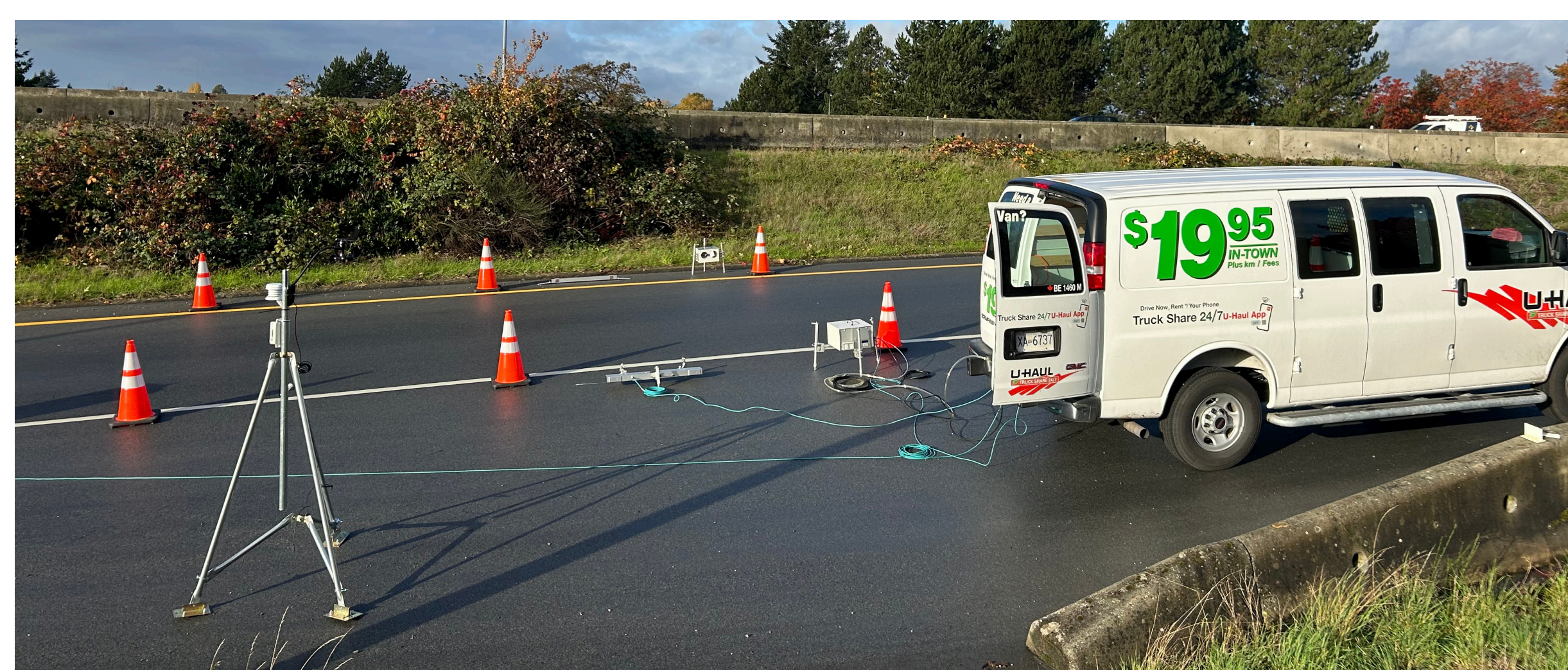
The transportation sector contributes significantly to the emission of air pollutants [1]. Technological improvements have led to changes in the amount and chemical composition of on-road vehicle emissions. These on-road vehicle emissions negatively impact local air quality, which in turn impacts the health of community members. Traffic-related air pollution results in around **1,200 premature deaths** in Canada every year and an additional **\$9.5 billion** in annual monetary health burden [2].

Objective

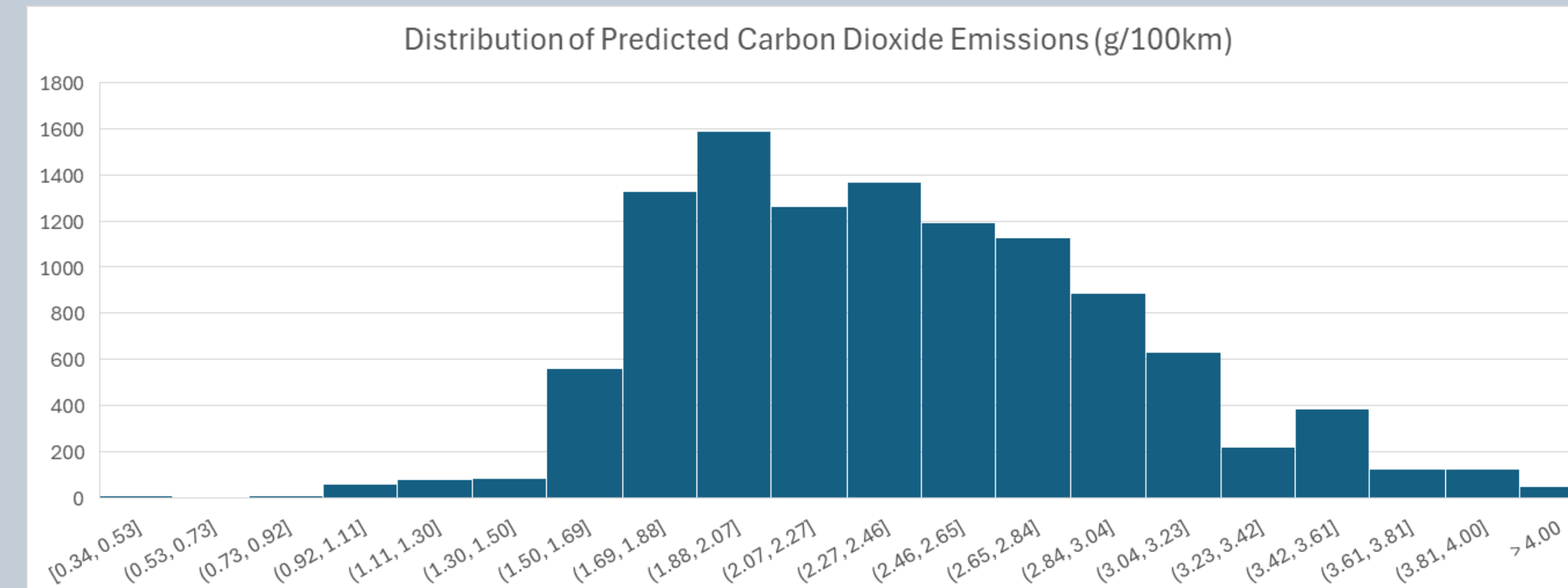
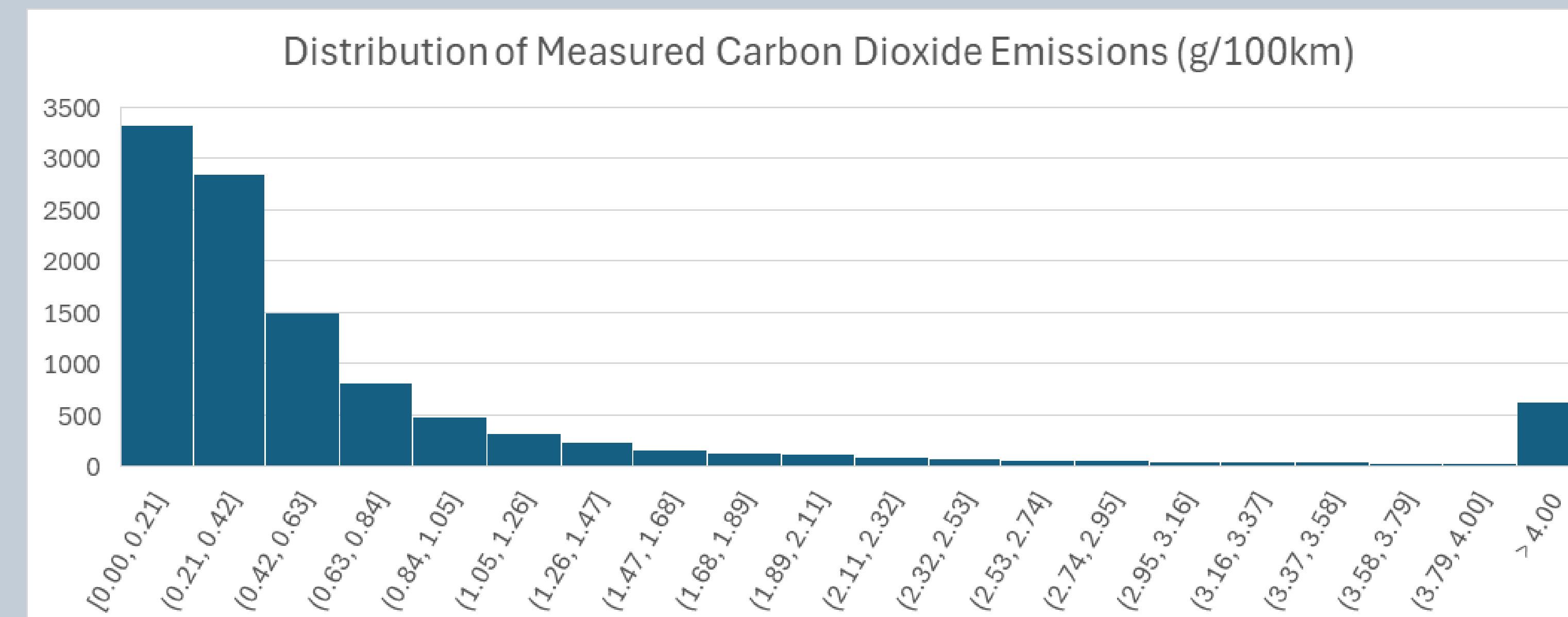
Evaluate the real-world exhaust emissions of light duty vehicles in the Capital Regional District (CRD).

Methodology

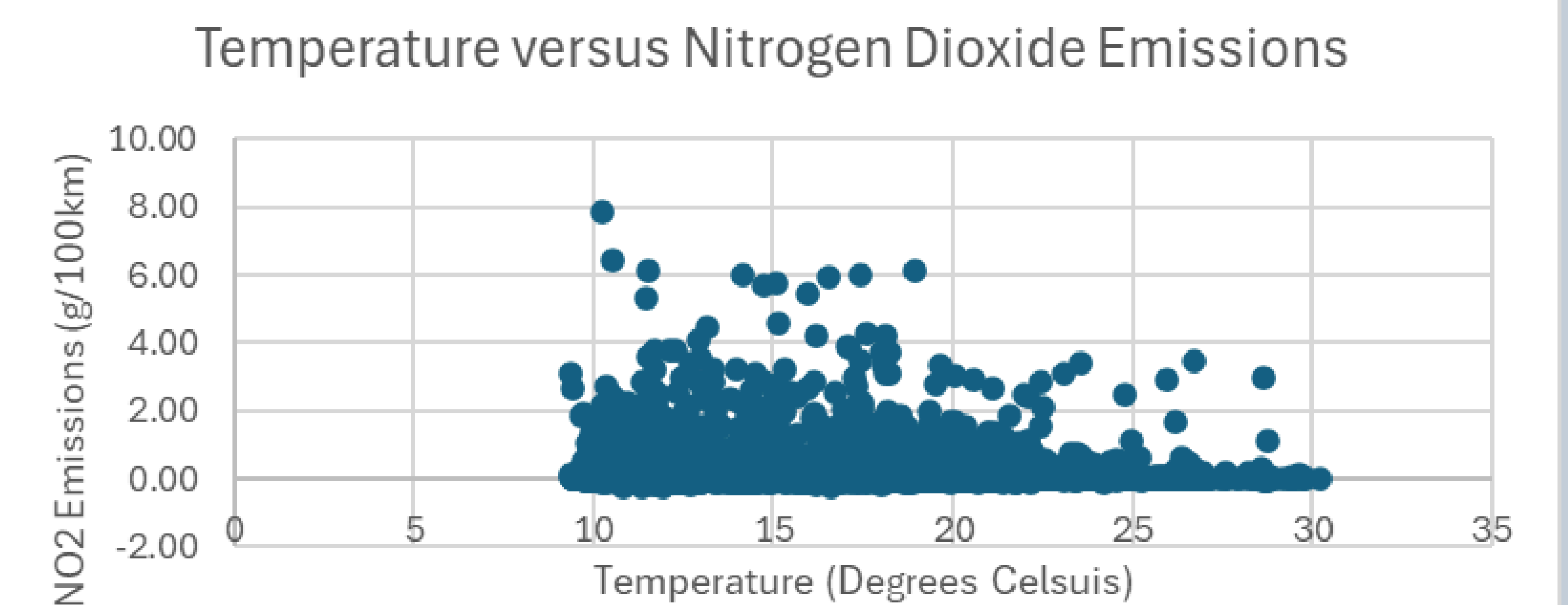
1. Collect vehicle emission data, vehicle images, and weather factors using remote sensing technology at 7 locations across the CRD.
2. Label all photos collected to match emission data to images.
3. Use photos of vehicles in language learning model to estimate weight, type, and fuel economy of each vehicle [3].
4. Analyze data for patterns (13,118 valid records).



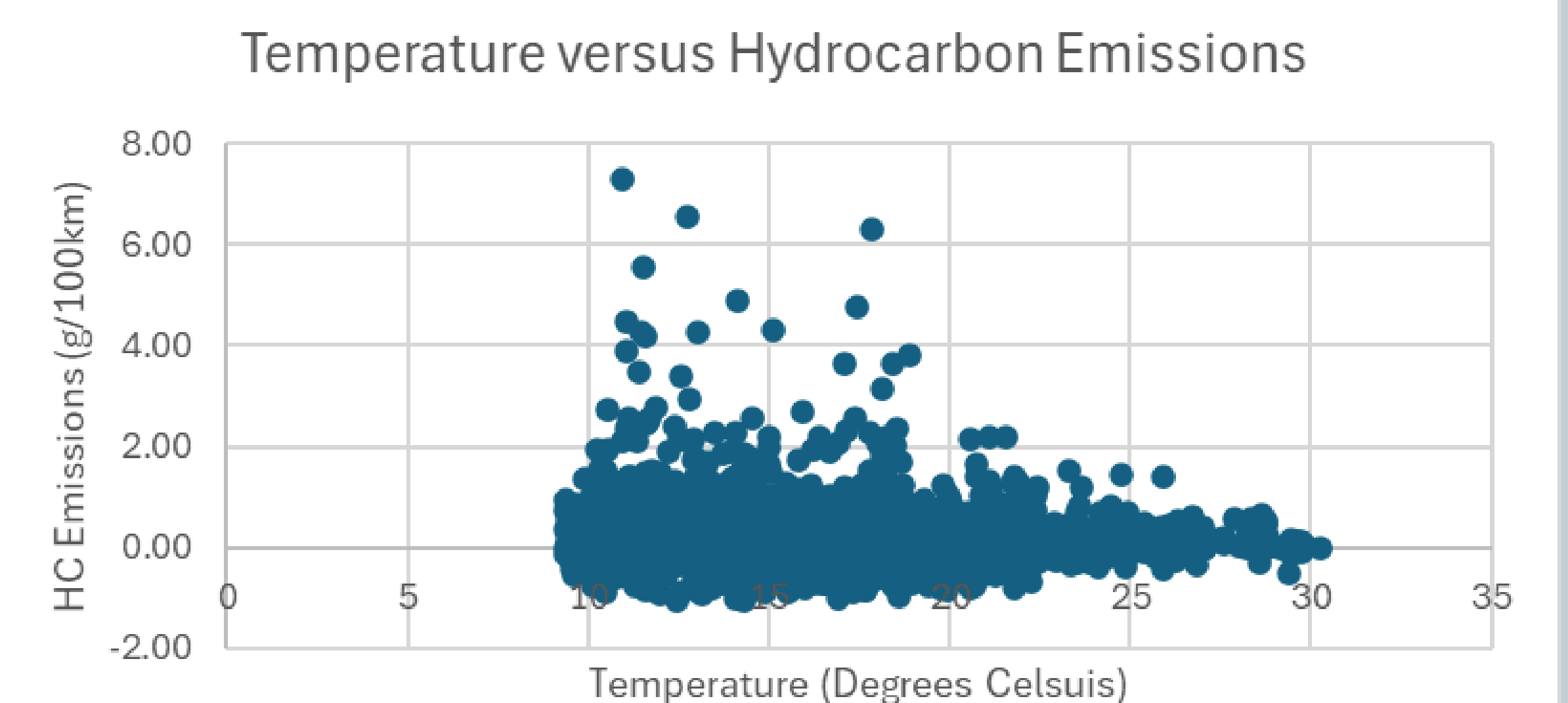
Results



Significantly lower carbon dioxide emission factors measured compared to NRCAN factors used [3]. Higher outliers in data (max measured 69.09 g/100km compared to max predicted 4.43 g/100km)



Higher nitrogen dioxide and hydrocarbon (HC) emissions with lower temperatures [3] [4]. Shows temperature has impact on emissions regardless of if vehicle is starting up or has been running for longer.



References

- [1] Environment and Climate Change Canada: Air pollution emissions (2024)
- [2] Health Canada: Health impacts of TRAP in Canada (2022)
- [3] NRCAN: Fuel consumption ratings (2026)
- [3] Clairotte et al. (2013). doi: 10.1016/j.apenergy.2012.08.010
- [4] Grange et al. (2019) doi: 10.1021/acs.est.9b01024

Acknowledgements

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