Quick Analysis Technique to Estimate GHG Emissions Based on Neighbourhood Built Form
Méthode d’analyse pour estimer les émissions de GES en fonction de la forme urbaine
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Abstract
• There is growing awareness of climate change and its potential impacts. In response, many municipalities and provinces have set greenhouse gas (GHG) emission reduction targets. The transportation sector is one of the largest contributors to Canadian GHGs. As such, it will increasingly be called upon to help achieve GHG emission reductions. In the past few years, considerable research and policy has been focused on reducing GHG emissions through improvements in technology, fuels and vehicles. However, there has been less attention given to travel activity. There are even fewer studies looking at how to reduce automobile usage and distances travelled, and especially less work investigating the relationship between built form (suburban vs. urban, type of infrastructure, etc.) and its impact on automobile usage.

• This study focuses on transportation related GHG emissions by examining the association between built form and travel activity. The objective is to present a quick-analysis tool to assess the GHG impacts based on changes in vehicle kilometres travelled (VKT). Built form (density, mixed uses, etc.) and infrastructure (street connectivity, distance to high order transit, sidewalks, etc.) play an important role in the travel activity of a neighbourhood. To develop the model, we used different statistical techniques to find out the most efficient improvement methods in a suburban context.

• This relationship is shown through the development of multiple scenarios to compare and contrast the GHG emissions of neighbourhoods with different characteristics (built form, infrastructure, regional context, etc.). Existing research on travel behaviour and the built form (density, mixed uses, etc.) and its impact on automobile usage.

Link Between Built Form, Transportation Infrastructure, Travel and GHG Emissions
• Factors influencing transport GHG Emissions

General Methodology to Estimate Vehicle Kilometres Travelled (VKT) Impacts of Built Form and Transportation Measures
• Neighbourhoods can be identified based on local attributes (see regional factors in table below).

• Four step method:
  1) Establish baseline vehicle-kilometres travelled in the study area
  2) Identify opportunities and constraints for interventions in the neighbourhood
  3) Assess the effectiveness of different measures and scenarios on total VKT
  4) Identify and assess the effectiveness of measures

1) Establish baseline vehicle-kilometres travelled in the study area
Can drive itineraries for a suburban/urban neighbourhood

2) Identify opportunities and constraints for interventions in the neighbourhood and assessing current conditions (examples)
• Street Grid Connectivity

3) Assess the effectiveness of different measures and scenarios on total VKT

4) Identify measures and their impacts
• Type of transport measures are extremely dependent on the type of neighbourhood
• Focus on street grid connectivity and accessibility, rather than the coverage of active transportation infrastructure. Well-connected street grids are also beneficial for transit use (often designed to minimize through-traffic)

Combined Estimated Effect of Measures on VKT and GHG Emissions
• Various measures individually are very efficient at reducing VKT and GHG emissions, especially in an existing neighbourhood
• Reducing VKT and GHG emissions in an existing neighbourhood requires a number of measures (land use, active transport, street grid, transit services, etc.)

• The most effective measures depend on a neighbourhood’s unique context (location, constraints and opportunities)

• Implementing measures in an existing neighbourhood is very difficult (cost, time, demand, etc.). This is especially the case in neighbourhoods developed without considering how it will change over time

• Method can be applied to new developments

Regional planning is essential to reduce GHG emissions and VKT

Conclusions
• Few measures individually are very efficient at reducing VKT and GHG emissions, especially in an existing neighbourhood
• Reducing VKT and GHG emissions in an existing neighbourhood requires a number of measures (land use, active transport, street grid, transit services, etc.)
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• Method can be applied to new developments
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References
• Current literature on the topic of GHG and transport is extensive, but the focus is generally on reducing emissions from vehicles. This paper focuses on how built form influences travel activity, and how travel activity affects GHG emissions.

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