



Interactions of policies acting at the local, sub-national, and national scales for Canada's energy transition

Rose Murphy and Thomas Budd
Simon Fraser University

National Forum of the EMI
Montreal, QC
December 18, 2019



Modelling capabilities

Energy-economy models

- Designed to account for policies at the **national and sub-national levels**
- Tend to lack a spatial dimension, making it difficult to simulate policies at the **local level**

Spatial models

- Tend to ignore **unobserved** costs
- Generally unable to simulate **interactions** of local policies with sub-national and national policies



CIMS-Urban

Integrate the CIMS energy-economy model (EMRG, SFU) with a model of urban land-use and infrastructure model (GIS)



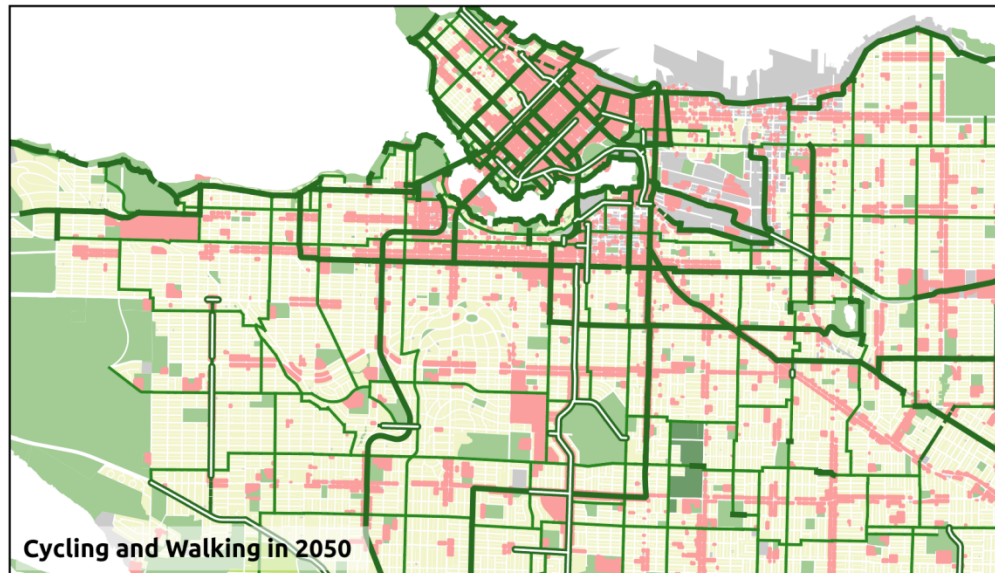
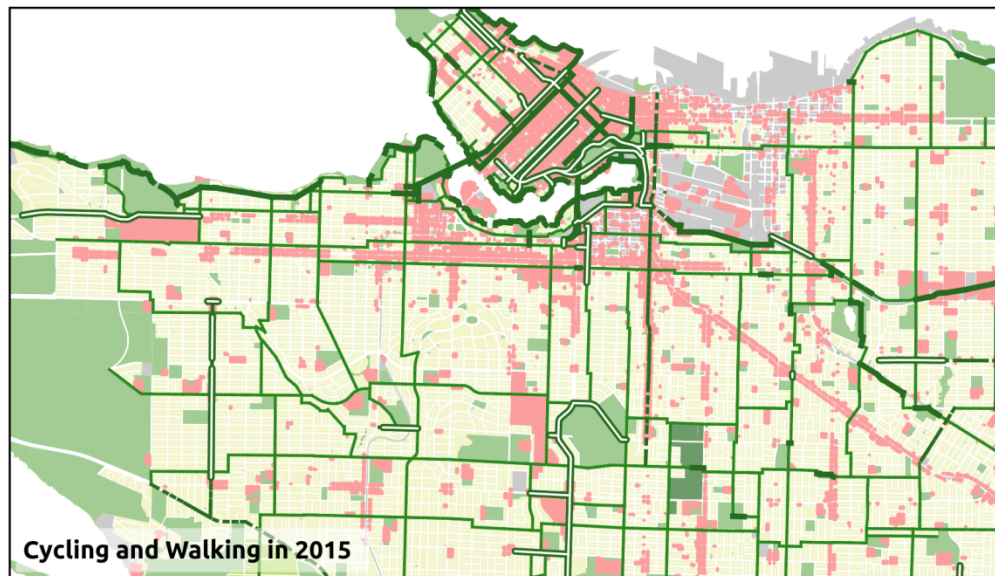
CIMS energy-economy model

- Estimates economy-wide energy consumption, GHG emissions, and costs under policy scenarios
- Energy consumption is based on economic activity and the nature of the **technologies** that produce, consume, and transport energy
- Forecasts of what technologies will be used are based on **costs** – both observed and unobserved
- Captures some **feedback effects** within the economy or can be linked with **other models**



Urban land-use and infrastructure model

- Forecasts unobserved costs of transportation modes for different areas of a city based on **land use** and the quality of the **transportation networks**



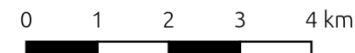
Land Use

- Parks and Open Space
- Industrial
- Residential
- Key Walk Destination

Bike Routes

- Local Street
- Painted Lanes
- Separated Lanes
- Shared Lanes

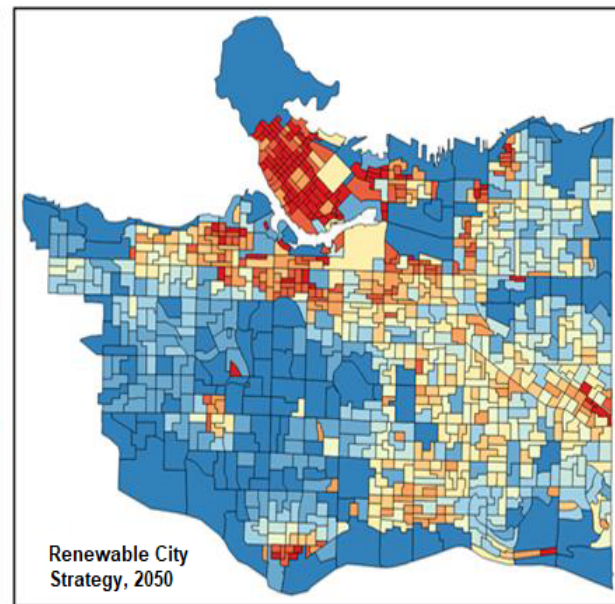
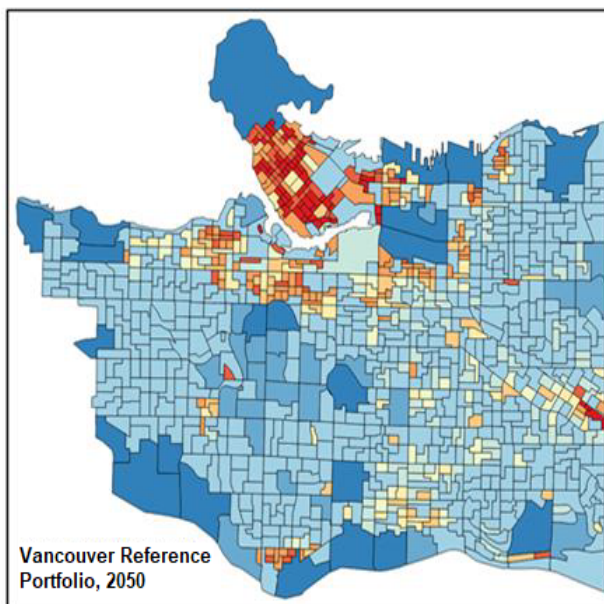
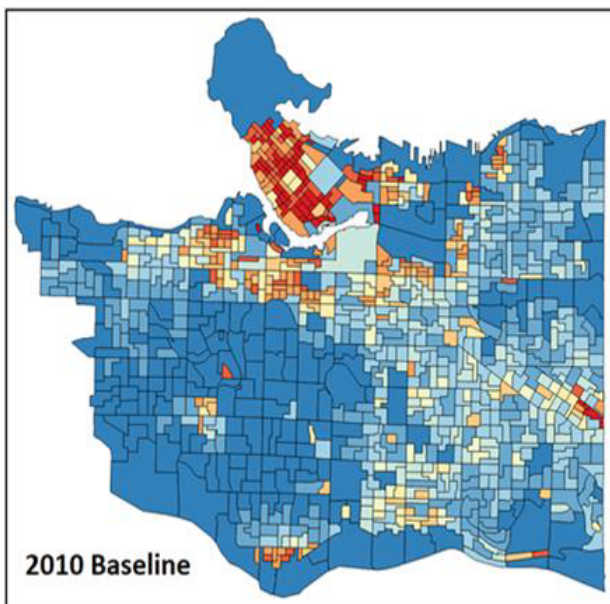
Projection: UTM Zone 10N
Data: City of Vancouver
Metro Vancouver
Statistics Canada





Urban land-use and infrastructure model

- Forecasts unobserved costs of transportation modes for different areas based on land use and the quality of the transportation network
- Mode shares affected by observed costs, unobserved costs, and how the **population is distributed** across the city
- Overall demand for personal transportation also affected by land-use and population distribution

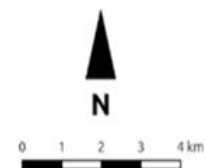


Projection: UTM Zone 10N

Population Growth Data: BC Stats (2017)

Dissemination Area Data: Statistics Canada (2016)

Mapping Software: QGIS Version 2.18



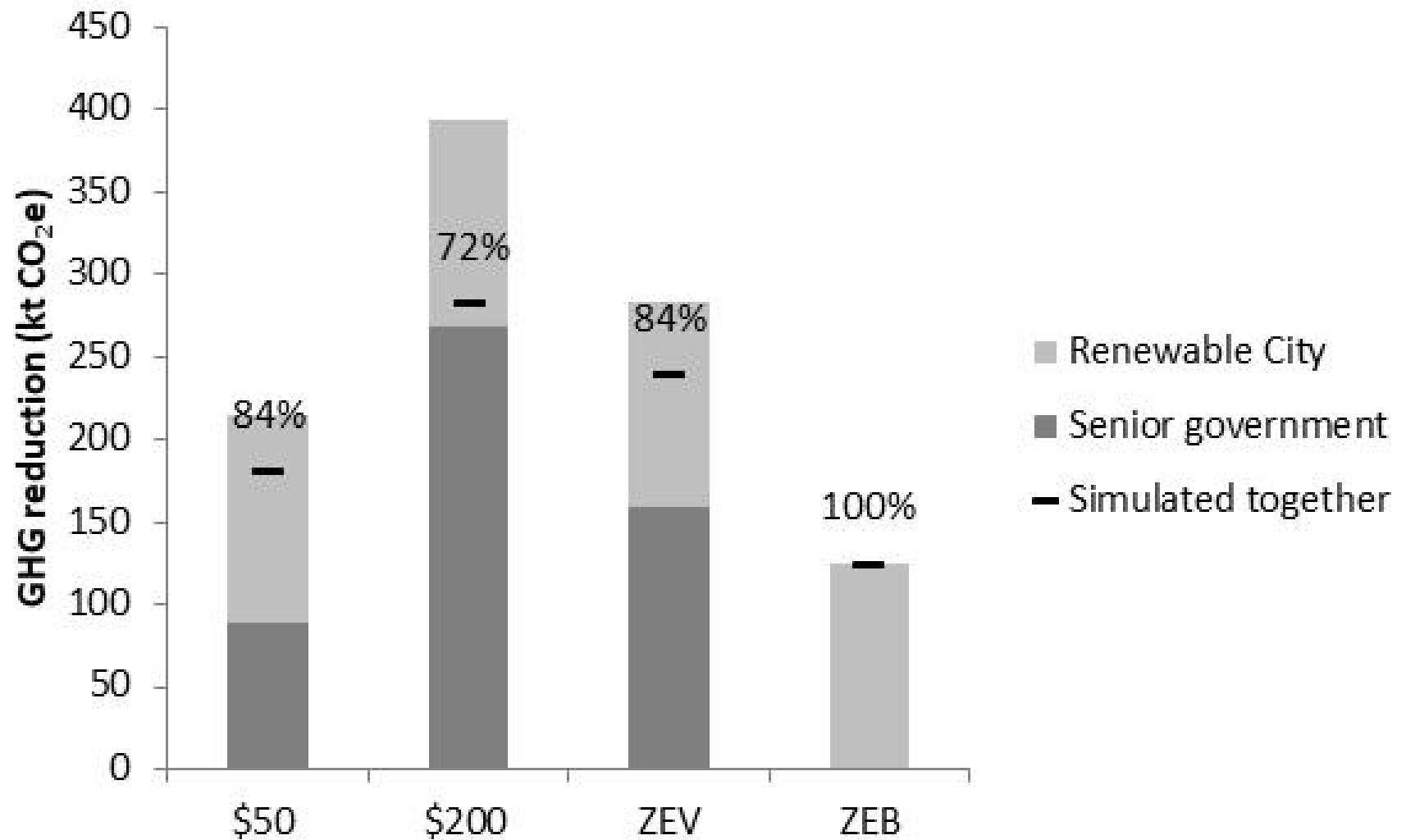


EMI project

Used CIMS-Urban to test how policies implemented by different levels of government can interact to affect urban energy use and GHG emissions in the City of Vancouver



GHG reductions from personal transportation in 2050





Conclusions

- Modelling suggests that municipal policy influencing urban form does not cause the same actions as the senior government policies
- Municipal policy has the potential to be more effective at promoting a reduction in the overall demand for personal transportation and a shift away from personal vehicles
- However, a shift to zero-emissions vehicles under senior government policy can reduce the impact of these actions on GHG emissions



Thank you

