What If Millennials Transformed Energy Demand?

Effects of High Density Community Lifestyles on GHG Emissions

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INTRODUCTION

Per capita GHG emissions in Canada have shown no sign of decrease in the past few decades, largely due to energy demand characteristics of older generations [1]. However, what if energy demand characteristics were changed by a new generation?

Major decision drivers of Gen Y/Millennials (born 1985–2004) are personal financial status and a preference for environmentally friendly lifestyles [2] [3] [4]. We've chosen to focus on the potential GHG emission reductions due to a change in demand within personal residence and transportation sectors.

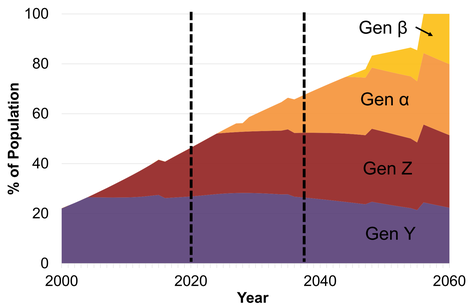


Fig. 1. Alberta's population per generation per year.

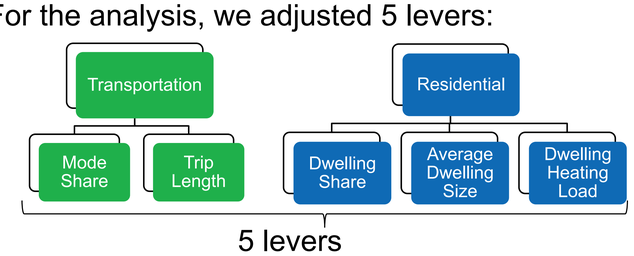
Gen Y will be the dominant generation, responsible for major policy and lifestyle decisions between 2020 and 2037.

METHODS

Based on looking at environmentalism as the major Millennial decision driver, we chose to assess the impact of a lifestyle within communities that combine **high density mixed land use** with better **public transit connectivity**.

Using the CanESS modeling software [5], the impacts of such lifestyles on GHG emissions in Alberta were modelled, assuming that future generations would also prescribe to Millennials' lifestyle choices.

For the analysis, we adjusted 5 levers:



RESULTS

Personal Transportation Levers

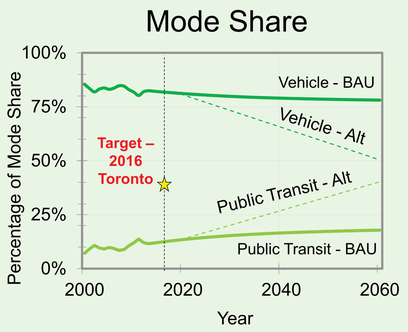


Fig. 2. Mode share.
The alternative mode share was based on Toronto's 2013 mode share, as Toronto's 2013 population will be similar to Alberta's 2060 population.

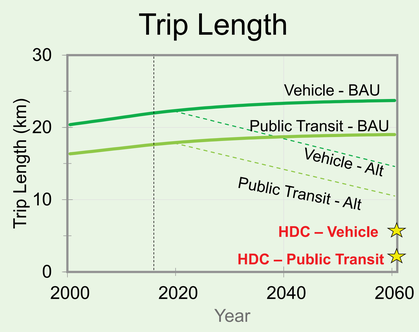


Fig. 3. Trip lengths.
The Alternative scenario for trip length was based on trip lengths within a high density community (HDC).

Residential Levers

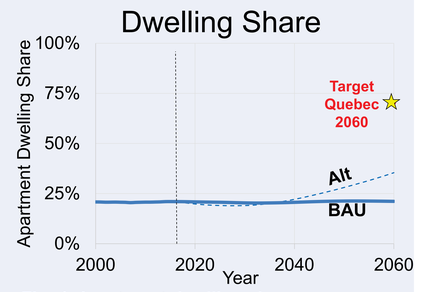


Fig. 4. Apartment dwelling share.
Increasing the apartment share aggressively only allows Alberta to reach 35% apartment share by 2060 while Quebec will achieve 70%.

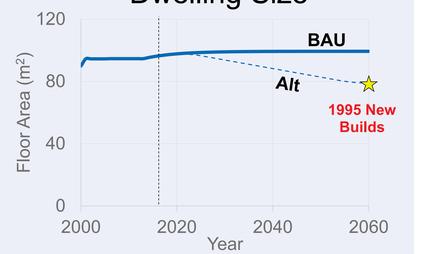


Fig. 5. Average apartment dwelling size constructed per year.
For our alternate scenario, we modelled a return to 1995 values for the dwelling size of new builds.

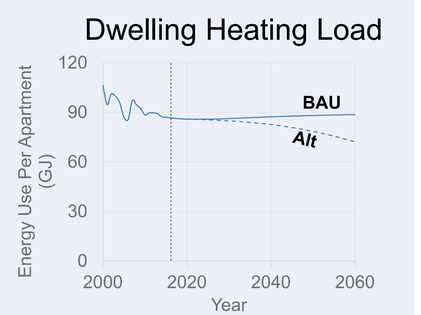


Fig. 6. Energy use per apartment per year.
A 35% efficiency reduction of new apartments corresponds to a drop of 16.6 GJ per apartment by 2060.

Impact on Emissions

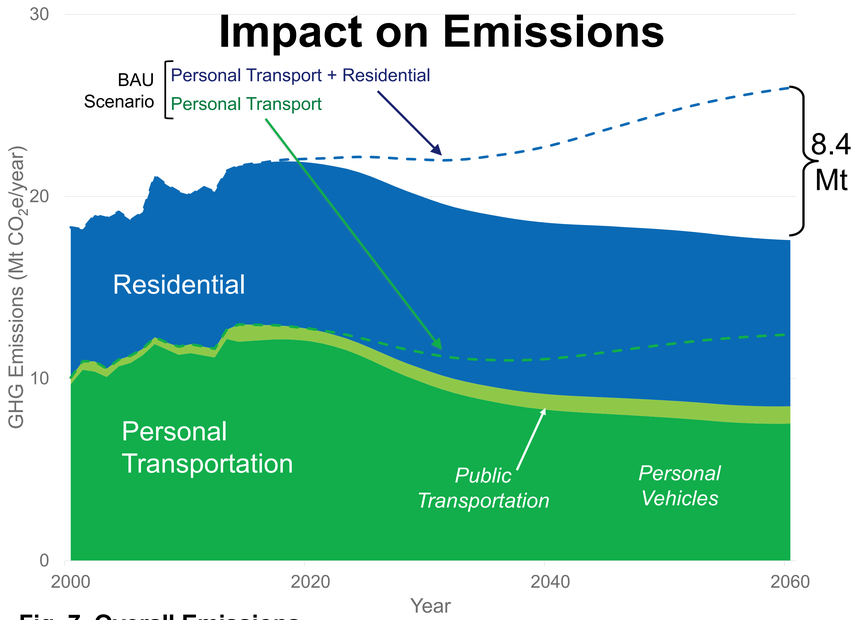


Fig. 7. Overall Emissions
By implementing changes to the five levers in both the residential and the personal transportation scenarios, we were able to achieve an 8.4 Mt reduction of CO2 by the year 2060. Approximately a 4 Mt reduction was achieved in each the transportation sector and 4.4 Mt reduction from the residential sector.

DISCUSSION

Our investigation found that there is a potential 8.4 Mt CO_2e reduction associated with a move towards higher density living.

Within the personal transportation sector, the most significant effect was from reducing the average trip length. Reducing house size was key in decreasing overall home heating demand and thus CO_2e emissions.

These positive energy demand trends can be encouraged through economic incentives and providing the infrastructure required for this style of living.

CONCLUSIONS

The Millennial generation has shown signs that it could cause a significant change in our energy demand. Their preference for living in high density communities could lead to a change in urban form [2].

Encouraging and enabling this behaviour represents an opportunity for a significant reduction in CO_2e emissions. This can be done by:

- Subsidizing high-density living
- Improving public transit
- Developing infrastructure for family living in these communities
- Communicating this information to Millennials, especially online

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