

Submission to the New Zealand Productivity Commission on the 'Better Urban Planning Draft Report'¹

3 October 2016

Urban intensification and policies to reduce GHG emissions: an analysis of the Productivity Commission's argument

R. Chapman, N. Dodge²

We regret that time constraints permit us to address only one, but in our view, a key matter in the Commission's draft report.³

To summarise, the argument of the *Commission* (pp.213-217)⁴ around urban form and emissions goes as follows:

1. Evidence shows that increasing residential density can reduce vehicle use in some situations. But it also shows that local factors other than density are at least as important in influencing travel behaviour. (F 8.9)
2. Evidence on the proposition that higher-density cities in New Zealand are more environmentally sustainable is ambiguous at best. (F8.10)
3. Before attempting to use urban planning as a means of reducing GHG emissions in New Zealand, a more robust empirical research base should be developed reflecting New Zealand circumstances. Specifically, research should aim to improve the government's understanding of local factors that shape urban GHG emissions in New Zealand, and the extent to which urban planning can influence these factors. (R8.2)

The literature in this area is large and not straightforward. But it does point to some flaws in the Commission's argument. We take the Commission's three-proposition argument point by point.

¹ <http://www.productivity.govt.nz/>

² At Victoria University of Wellington and the NZ Centre for Sustainable Cities: <http://www.victoria.ac.nz/sgees/about/staff/ralph-chapman> . Nadine Dodge is a PhD candidate.

³ There are many contestable and sometimes tendentious statements in the Draft Report, such as the bullet in Box 2 (taken with the chapeau): 'Outcomes from the current urban planning system: ...Net and total greenhouse gas emissions have increased by 54% and 26% respectively since 1990.' This implies that the planning system (significantly) contributed to this outcome. We consider this to be a poorly supported conclusion.

⁴ http://www.productivity.govt.nz/sites/default/files/better-urban-planning-draft-report_1.pdf

Point 1

- This is not an evenly balanced literature (Ewing and Cervero, 2010): the majority of the literature points towards higher density as tending to reduce private vehicle energy use, especially looking across and within a wide range of cities. And a number of reputable international authorities have concluded, as we do, that **urban form**, including compactness, **is** a significant factor to be taken into account in policy aiming to reduce vehicle emissions (e.g. IEA, 2013; Kennedy and Corfee-Morlot, 2013; WHO, 2011). For example, The Global Commission on the Economy and Climate (2014) states:

‘How urban planners shape urban form and long-lived infrastructure in these coming few years will largely determine whether the world gets locked into a traditional model... or moves onto a better path, with more compact, connected and liveable cities, greater productivity and reduced climate risk.’ (p.41)
- Most authoritative studies suggest that urban density is one of a number of important factors that contribute to reduced GHG emissions. It is **not** the only factor, of course, as other urban form factors, prices and incomes, etc. are also significant.
- But we do not agree with the Commission’s wording (and its implication) that ‘local factors **other than density are at least as important** in influencing travel behaviour’ (emphasis added). Our reading of the empirical evidence is that other urban form factors **related to and facilitated by density** such as city design, land use mix and connectivity (which tend to be lower in the suburbs), together have an important influence on travel behaviour. For example, transit use is estimated to have a high elasticity with respect to street/intersection density and distance to transit (Ewing and Cervero, 2010, p.274), and these variables are clearly associated with population density. As these authors put it, ‘density is an intermediate variable that is often expressed by the other Ds (i.e., dense settings commonly have mixed uses, short blocks, and central locations, all of which shorten trips and encourage walking).’
- Density thus tends to be an **enabling factor** in reducing car use, VKT, and GHG emissions. It facilitates greater use of public transport, helping influence VKT. It also enables greater access to certain amenities such as shopping, and public facilities such as libraries. These variables show up as having significant elasticities, such as the elasticity of ‘distance to amenities’, in estimated models of VKT.
- In the literature on urban form and vehicle use/emissions there are of course some dissenters, some quoted at length in the Commission’s report. But some apparent ‘dissenters’ cited by the Commission are not, in fact, dissenters. For example, Doherty et al. (2009) are quoted by the Commission as noting the complexity of defining density, but this is incidental to the question at issue. They do **not** show that higher density is associated with higher carbon emissions; rather, if anything, they conclude that density, alongside other factors, **is** associated with lower transport

emissions. To quote, they conclude both that ‘transport energy is closely tied to density and the broader urban form’ (p.19) and implicitly concede that denser cities save transportation energy, in noting that ‘[t]he push for greater urban density to reduce transport energy could compromise other aspects of sustainability’. If anything, they are not concerned with the (beneficial) energy-related impact of density but are concerned with other aspects of urban sustainability, referring to social networks, for example, on p.20.

- Another source quoted by the Commission makes some easily rebutted assertions. Neuman (2005) – whom the Commission quotes three times – states that ‘the compact city is neither a necessary [n]or sufficient condition for a city to be sustainable and that the attempt to make cities more sustainable **only by using urban form strategies** is counterproductive.’ (emphasis added). Taking the first part of the assertion, we are not aware of any sprawling city that is widely considered ‘sustainable’ in credible analyses. Considering the second part, we know of no city that has aimed to make itself more sustainable **only** by using urban form strategies. The idea is a straw man, perhaps a product of Neuman’s project to discern a ‘new type of planning...not obsessed with urban form.’ (Neuman, p.23).⁵ Neuman also contradicts himself in noting that ‘Compact forms do impart advantages. These include lower land consumption, cheaper infrastructure and utility costs, and resource protection.’ (p.21), a point on which we agree with him, and on which the empirical evidence is strong.
- In short, rather than concluding as the Commission does that ‘Evidence shows that increasing residential density can reduce vehicle use **in some** situations’ (emphasis added), it would be more reasonable to conclude that ‘Evidence shows a significant association between residential density and reduced vehicle use in many but not all situations.’
- The assertion that ‘local factors other than density are at least as important in influencing travel behaviour’ is disingenuous. It amounts to an argument, disguised as reasonable, for dismissing any role for urban form in constraining carbon emissions. The counterargument is that even if other factors than density (e.g. carbon prices) are important in influencing travel, public policy should not ignore the potential for reducing emissions. All reasonably cost-effective policies should be deployed when the urgency and importance of reducing carbon emissions is so high (Chapman, 2015; Ostrom, 2010; Stern, 2015). And given the risks of failing to achieve the government’s emission reduction targets for 2030 and 2050, and the requirement that New Zealand’s Paris commitment (NDC) be strengthened over

⁵ Neuman’s patchy literature review relies on outdated studies such as Breheny et al. (1998) and curious readings of evidence, e.g. that intensity and proximity make cities (or parts of them) ‘toxic flashpoints’ (p.16) – a particularly American perspective. He also argues that ‘dense urban centers have diseconomies of scale (pollution and illness)’, but provides no evidence, when other literature suggests the opposite, because of car dependence in sprawling cities, and higher levels of walking and cycling in more compact communities.

time, there is a strong case for welcoming and implementing additional emission reduction instruments such as those available in adjustments to urban form.

- We conclude that the **weight of international evidence, contrary to the Commission's conclusion, is that higher residential density is generally associated with reduced car use** (e.g. vehicle kilometres travelled) in cities, and that urban planning policies should be framed accordingly.

Point 2

- The Commission's point 2 is that Evidence on the proposition that higher-density cities in New Zealand are more environmentally sustainable is ambiguous at best.
- We see this as probably mistaken, but in any case, irrelevant to the main matter in question (i.e. urban form and carbon emissions in New Zealand).
- Urban sustainability is complex and encompasses a number of dimensions. However, several pieces of New Zealand evidence suggest that more compact development is likely to have lower infrastructure costs or be more sustainable in other dimensions (Adams and Chapman, 2016 submitted; Dodge, 2016; Preval et al., 2016).⁶ The first of these suggests that major infrastructure costs tend to be lower per capita for denser territorial authorities. Preval et al. suggests that, although impacts of projected SHA development in Auckland are likely to have little overall impact on carbon emissions (some being greenfield, while others are infill), greenfield development is likely to have greater detrimental ecological impacts on water bodies than does intensification (brownfield and infill). PhD research by Dodge (2016) on Wellington City also suggests that more compact development is likely to result in reduced carbon emissions, relative to a scenario in which urban development occurs in more dispersed locations.
- With regard to the relationship between urban form and transport emissions, evidence from both the New Zealand Census and Household travel survey demonstrates that residents of higher density, centrally located areas have significantly lower emissions from transport than residents of lower density, less central areas. Census data shows that residents of higher density areas have lower automobile ownership rates (Figure 1), have shorter commutes, at least in Wellington (Figure 2), and are less likely to commute via automobile (Figure 3). NZ Household travel survey data shows that residents of denser areas have lower overall VKT, and thus lower carbon emissions.

⁶ For a published preview of some of these data see Early, L., Howden-Chapman, P., Russell, M., (2015) Drivers of Urban Change. Steele Roberts Aotearoa, Wellington., p.187

Figure 1

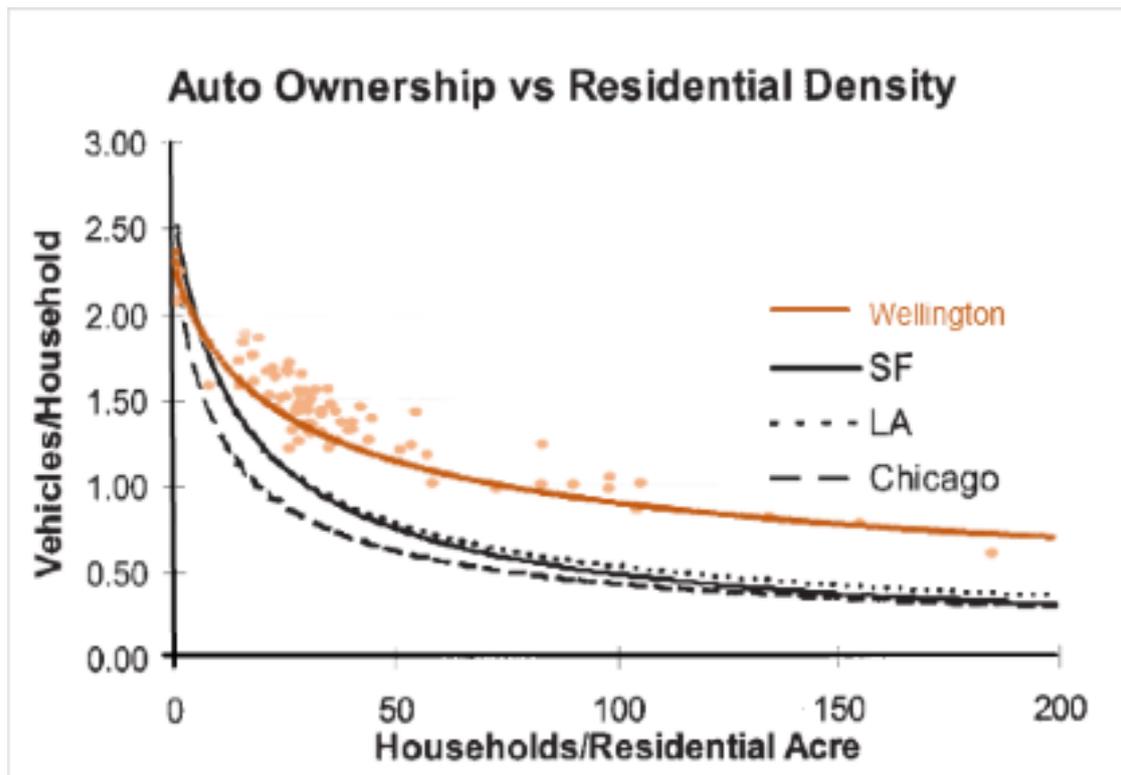


Figure 2

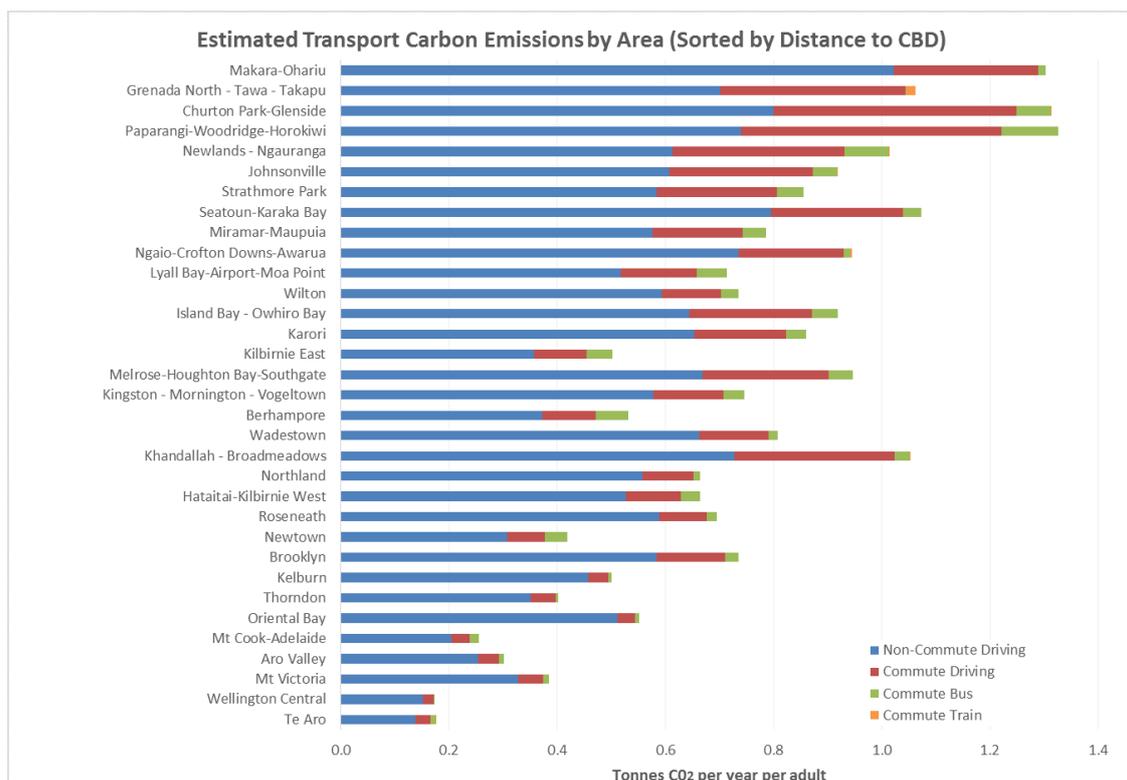
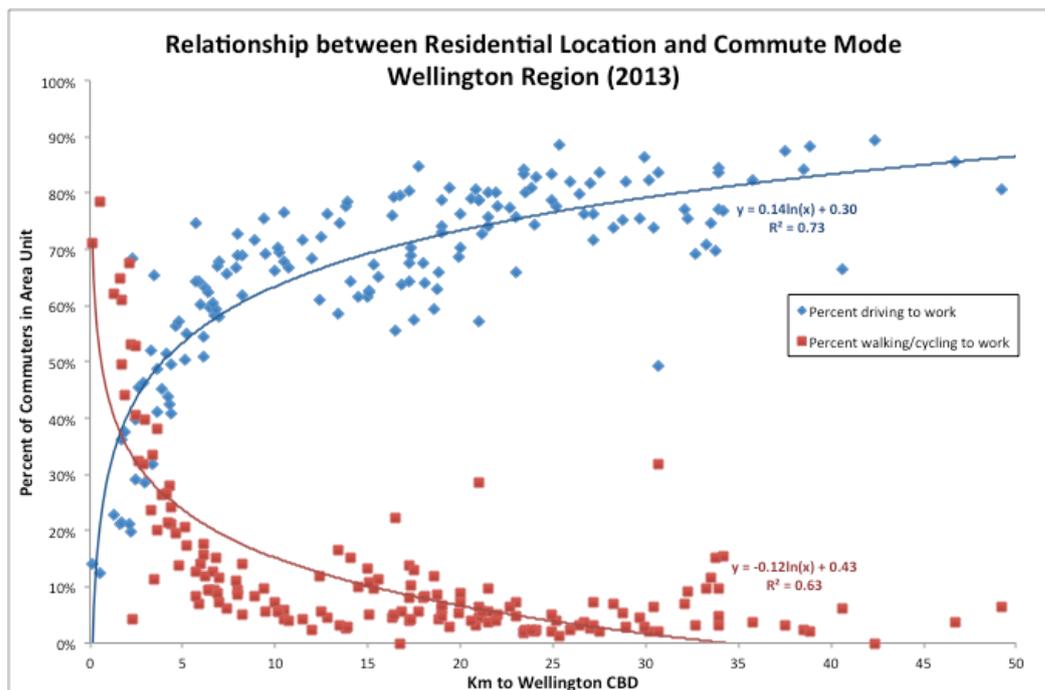


Figure 3



Source of Figs 1-3: Dodge (2016)

- More fundamentally, we see it as problematic to argue, on the basis of limited evidence around urban density and (overall) urban sustainability, that there is therefore an insufficient case for policies on urban form to pursue reductions in carbon emissions. It is logically quite possible that *more* can be known about the narrower question of how urban form affects carbon emissions than is known about the wider question of how density influences overall urban sustainability. In our view, there is considerable evidence to suggest that in New Zealand urban form has a reasonably discernible effect on carbon emissions, but the wider relationship between urban form and sustainability is more complex, depends more on other factors such as transport policy,⁷ and is overall less clear. What we conclude overall is that Point 2 is only obliquely relevant to the principal matter at issue, that of the relationship between urban form and carbon emissions – and hence the question of whether public policy should attempt to reduce urban carbon emissions through influencing urban form.

⁷ Chapman, R. (2008) Transitioning to low-carbon urban form and transport in New Zealand. *Political Science* 60, 89-98.

Point 3

- We agree that more research is needed to improve the (government's) understanding of local factors that shape urban GHG emissions in New Zealand. But more research is in our view not necessary in order to reach a preliminary, reasonable policy conclusion based on the balance of available evidence – both international and domestic – pointing to urban form as a useful planning domain through which urban emission reductions can be achieved over time. The link between urban form and transport usage (and hence emissions, until the internal combustion engine is very widely replaced) is a topic that is perhaps the most widely researched in the urban planning field, with over 200 studies examining the relationship between the built environment and travel, and the extant New Zealand research suggests that New Zealand patterns largely follow those in other developed countries.
- On the basis of the literature we are familiar with, we see a **strong case for adopting public policies** including cost-effective planning policies, which can **alter urban form over time in order to mitigate carbon emissions**, and we conclude that these are an important part of the armoury of policies for the urgent mitigation of climate change.
- Our conclusions concur with those reached by major organisations such as the IEA.⁸
- We consider it is highly problematic for the Productivity Commission to claim that there is insufficient evidence, relevant to urban form and transport carbon emissions, on which to base policy action – in particular the use of urban planning to reduce GHG emissions. Such a policy conclusion would in our view be an international outlier conclusion, and one based on a superficial reading of the literature rather than based on a thorough reading of the literature on relevant empirical evidence, together with a balanced policy analysis.

References

- Adams, M., Chapman, R. (2016 submitted) Do denser urban areas save on infrastructure? Evidence from New Zealand territorial authorities. *Policy Quarterly*.
- Chapman, R. (2008) Transitioning to low-carbon urban form and transport in New Zealand. *Political Science* 60, 89-98.
- Chapman, R. (2015) *Time of Useful Consciousness: Acting Urgently on Climate Change*. Bridget Williams Books, Wellington.

⁸ The IEA states: 'There are various ways to improve urban transport energy efficiency. For example, cities with high private vehicle travel activity can promote shifts to non-motorised transport (*e.g.* bicycles and walking) and public transport modes. They can also require higher vehicle fuel-economy standards **and establish stronger land-use regulations**.' IEA, (2013) *A Tale of Renewed Cities*. International Energy Agency, Paris. Emphasis added.

- Dodge, N.S., (2016) A quarter acre pavlova paradise lost? The role of preferences and planning in achieving urban sustainability in Wellington, New Zealand (Unpublished doctoral thesis), Environmental Studies Programme. Victoria University of Wellington, Wellington.
- Doherty, M., Nakanishi, H., Bai, X., & Meyers, J., (2009) Relationships between form, morphology, density and energy in urban environments. CSIRO Sustainable Ecosystems, Canberra, Australia, n.s.
- Early, L., Howden-Chapman, P., Russell, M., (2015) Drivers of Urban Change. Steele Roberts Aotearoa, Wellington.
- Ewing, R., Cervero, R. (2010) Travel and the Built Environment--A Meta-Analysis. *Journal of the American Planning Association* 76, 265-294.
- IEA, (2013) A Tale of Renewed Cities. International Energy Agency, Paris.
- Kennedy, C., Corfee-Morlot, J. (2013) Past performance and future needs for low carbon climate resilient infrastructure--An investment perspective. *Energy Policy* 59, 773-783.
- Neuman, M. (2005) The compact city fallacy. *Journal of Planning Education and Research* 25, 11-26.
- Ostrom, E. (2010) A Multi-Scale Approach to Coping with Climate Change and Other Collective Action Problems. *Solutions* 1, 27-36.
- Preval, N., Randal, E., Chapman, R., Moores, J., Howden-Chapman, P. (2016) Streamlining urban housing development: Are there environmental sustainability impacts? *Cities* 55, 101-112.
- Stern, N., (2015) Chapter 6: Broad approaches to moral and political philosophy: converging perspectives Why are we waiting. The logic, urgency and promise of tackling climate change. MIT Press. , Cambridge, MA.
- The Global Commission on the Economy and Climate, (2014) Better Growth, Better Climate: The New Climate Economy Report. World Resources Institute, Washington, D.C.
- WHO, (2011) Health in the Green Economy: Health co-benefits of climate change mitigation - Transport sector. World Health Organization, Geneva.