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Presentation

Climate change mitigation and cities: a time of useful consciousness

Biography

Ralph is an economist who has worked in government, consulting, and the academy. Having helped negotiate the Kyoto Protocol in another life, his interests have turned to practical ways of doing something about climate change, that is, mitigation policies in transport, energy, housing and cities. He teaches at Victoria University of Wellington, where he heads the Environmental Studies programme. He is also a co-director of the NZ Centre for Sustainable Cities, an urban research network. In August 2015, his book about climate change policy, *Time of Useful Consciousness*, was published by Bridget Williams Books.



Climate change mitigation and cities: a time of useful consciousness

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4 Nov 2016

Foundations for Tomorrow



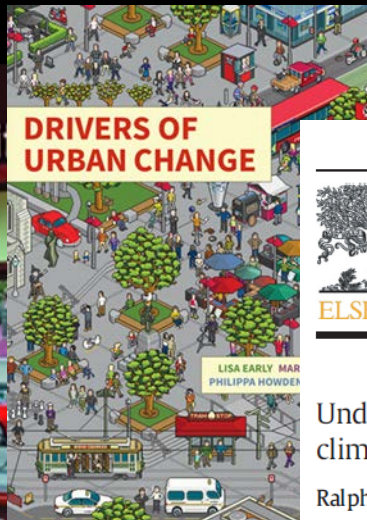
Environment Institute
of Australia and
New Zealand Inc.

Victoria University of Wellington



NZ Centre for Sustainable Cities

- Network of 40+ researchers – including several from Victoria University
- Funded by competitive grants, e.g. **Resilient Urban Futures** (MBIE)
- Papers and books available via our websites - for example:





Outline:

climate change mitigation and cities

1. **Drivers:** the big issues confronting us
2. **Cities as systems:** a framework
3. **Improving quality of life:** co-benefits of better urban form
4. **Critical steps for cities...** along a sustainable path
5. Conclusion



1 Drivers: the big issues

Globally and locally:

- Climate change – Paris agreement: time of useful consciousness
- Inequality and affordability -- housing and transport
- Transitioning; building resilience

...which takes us to:

- How do we shape our cities to reduce emissions while improving quality of life?

Sizing up a few aspects

- 1 How much of our CO₂ emissions are from cities?
About 70% -- [IPCC, 2014, Working group 3](#)
- 2 Transport is responsible for what percentage of New Zealand's carbon dioxide emissions?
Over 40% - [NZTA](#)
- 3 How long do we have to get global emissions to ~ zero?
About 35 years, for a 2/3 chance of staying within 2 C
- 4 What's a likely coastal consequence of exceeding 2 C?
Sea level rise of around 10 metres – [James Renwick](#)

Inspiration

'Cities are the optimum scale for integrated policy development and action on climate change mitigation'
– Hoornweg et al 2011

'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.'

- The Global Commission on the Economy and Climate, 2014



2 Cities as systems: a framework

- Interconnected systems
- Nesting, complex interaction, self-realising, emergent properties, unintended consequences; whole more than sum of parts
- Co-benefits / adverse side-effects critical in evaluating policies
- Systems thinking particularly relevant to cities –
urban form – transport – energy – quality of life

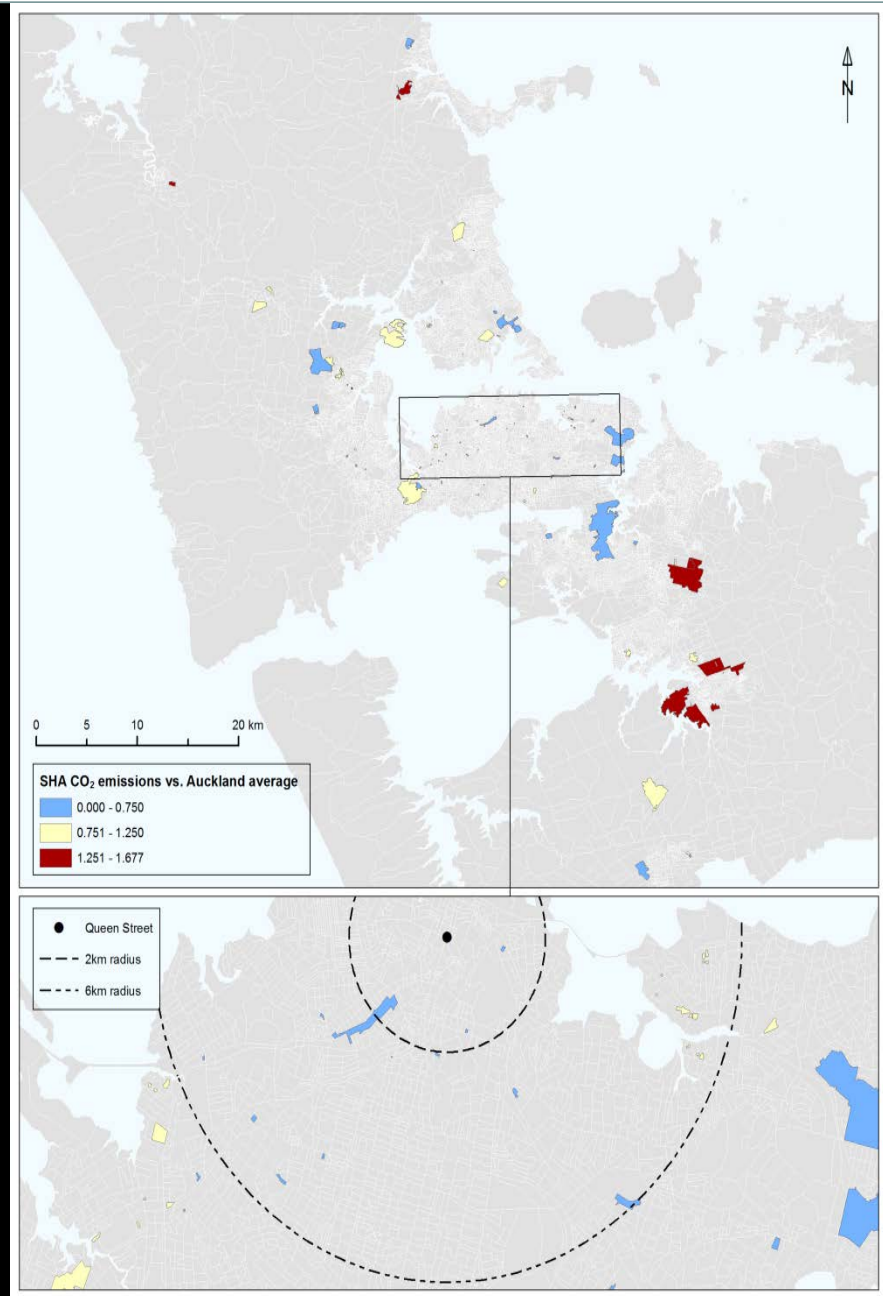
Chapman, R., Howden-Chapman, P., & Capon, A. (2016). Understanding the systemic nature of cities to improve health and climate change mitigation. Environment International

Illustrating cities as systems: a study of SHAs in Auckland

- SHAs a flagship government 'housing' policy for current shortage
 - created 'Housing Accords' (central -- local govt)
 - less onerous consent procedures
 - aim of 40,000 additional dwellings over 10+ years
- **Research Q: Do new SHA developments make Auckland less environmentally sustainable?**

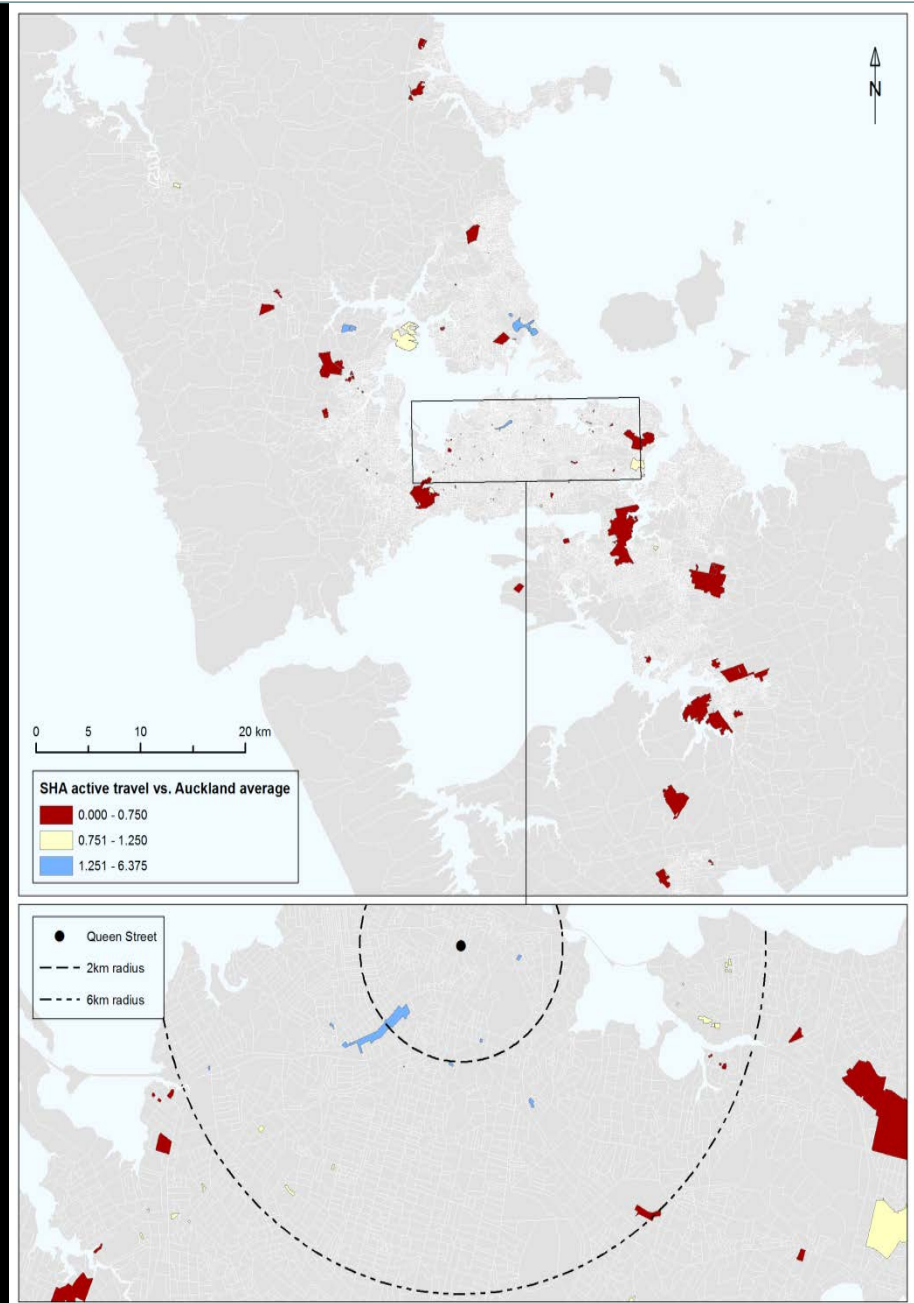
Commute emissions: results

- Modelled travel
- Found a negligible reduction (22 kg in average CO₂ per commuter per year vs Auckland average CO₂ of several tonnes per yr)
- Compared SHAs by location – South Auckland SHAs stand out as problematic



Active commuting: results

- Compared active travel proportions for SHAs with Auckland average
- Found the SHA weighted average of 4.3% active commuters **lower** than the Auckland-wide proportion of active commuters 6.6%
- Health consequences



SHA impacts

(assuming all SHA housing actually built...)

- Close to zero benefit for carbon emissions and overall city density (poor, given target)
- Some **reduction** in **active mode use** expected
- Greenfield development → bigger negative impact on stormwater pollution than infill / brownfield
- Overall, SHAs add a bit more housing, BUT probably make a **weak or net negative contribution** to making Auckland more sustainable

Consequences of SHA impacts in terms of urban system framework

- **Unintended consequences** in terms of stormwater pollution, active travel
- No real contribution to key issue of climate change
- Cannot neglect connections (environmental, health consequences) when 'solving' housing problem
- **Need to think holistically** for system sustainability



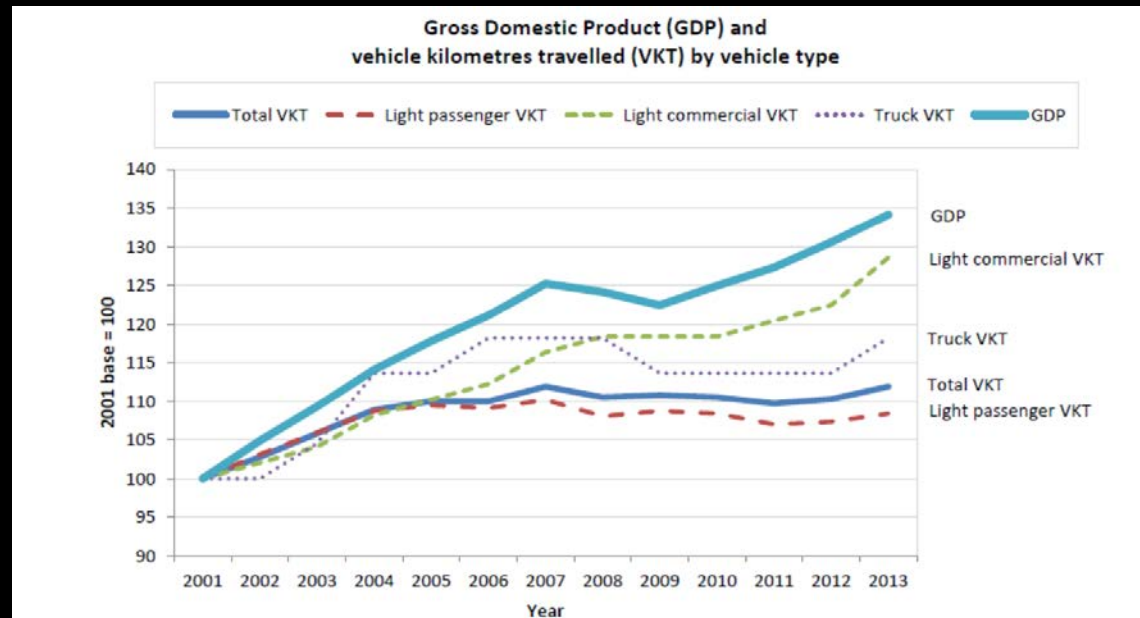
3 Improving quality of life: co-benefits of good urban planning

What sort of housing, travel and neighbourhoods do Kiwis like?

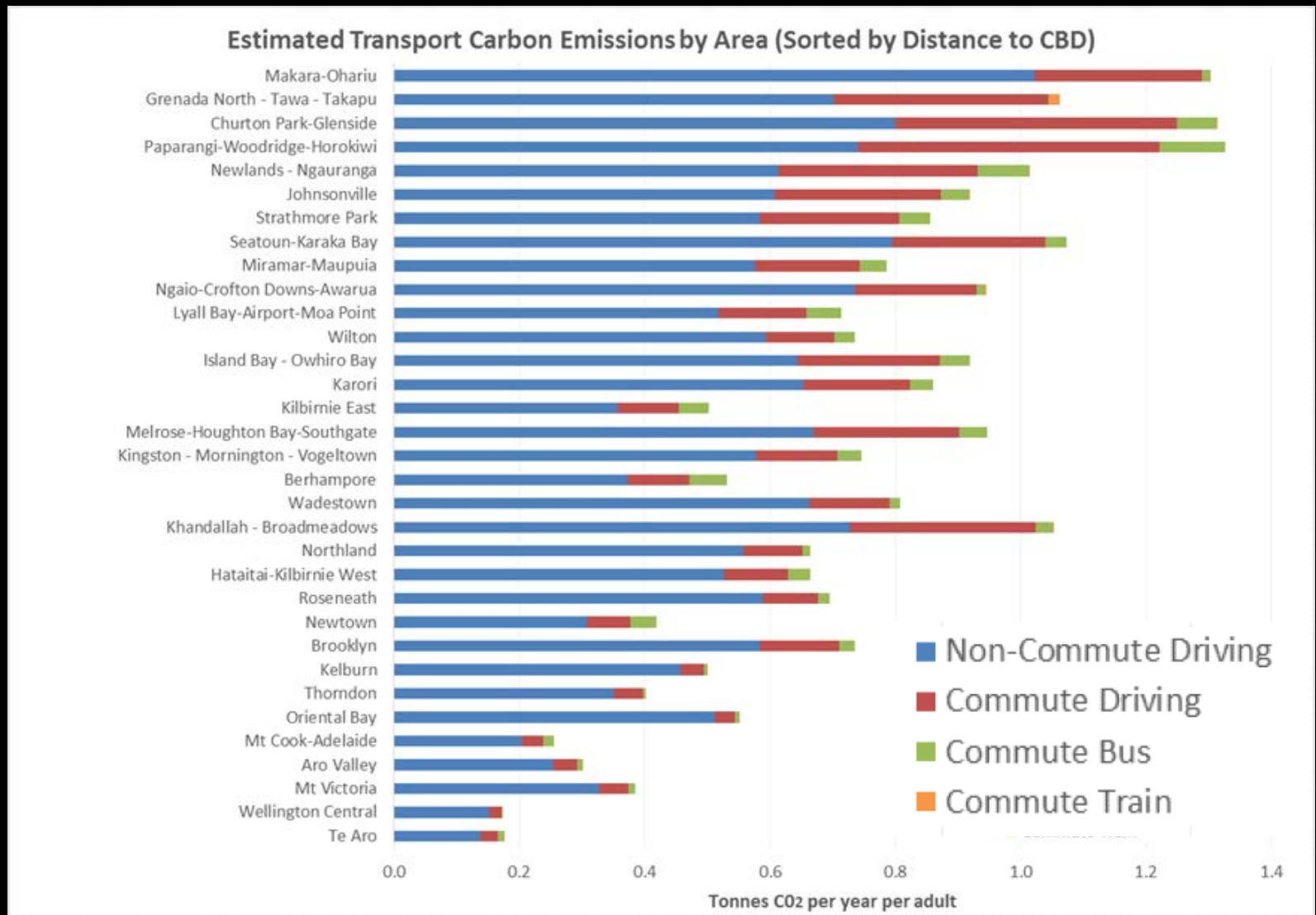
- Most currently prefer stand-alone housing
- **But** many would opt for **compact, accessible neighbourhoods** - especially younger or older people
- Want access to **green space** – not necessarily much
- Often prefer **walk, cycle or use public transport** than car

How are our preferences changing?

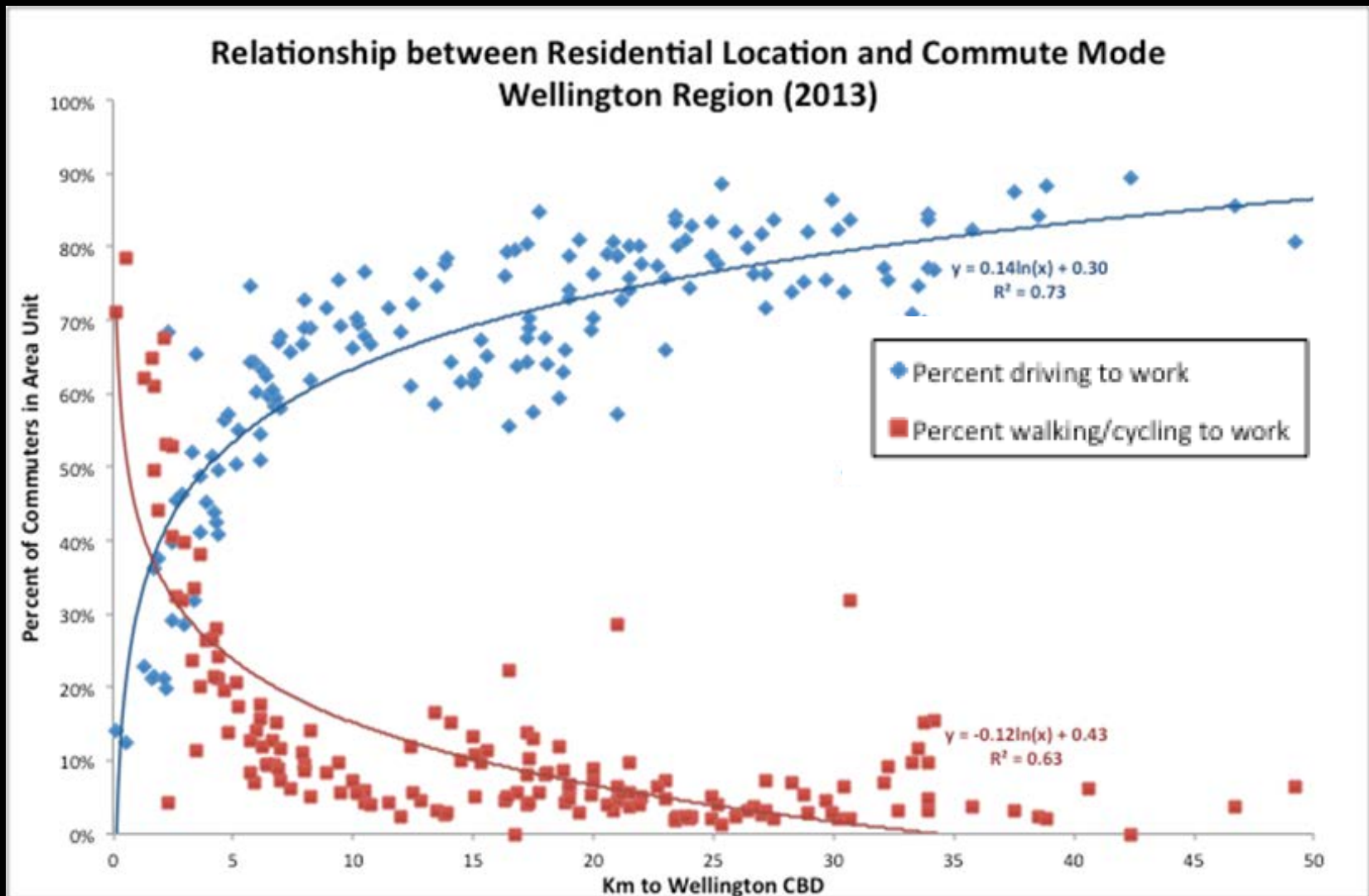
- Aspiring to **accessible, mixed use neighbourhoods, vibrant communities** -- e.g. with shops, amenities, public spaces
- Market (developers) moving towards **compact, medium density housing** in well-connected places
- Increasingly using **active transport** (walking, cycling) or public transport, rather than a car



Why more central housing helps: carbon emissions & distance to CBD (Wgtn)



If live more centrally, drive to work less



Wellington study of travel, neighbourhoods and housing

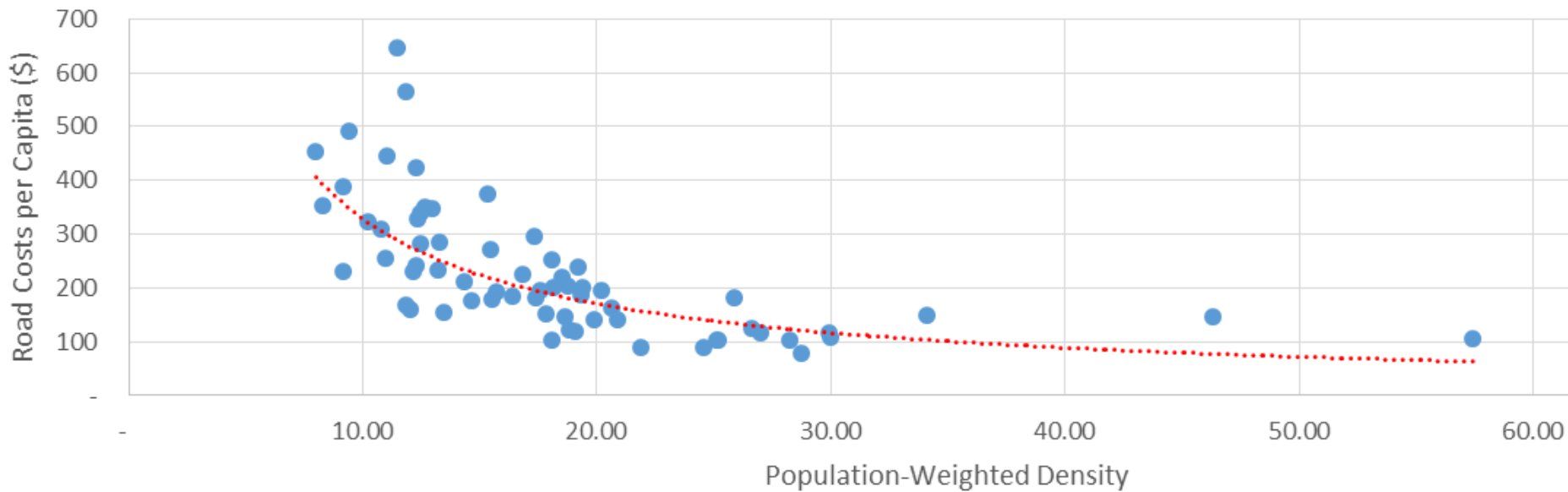
- Survey as basis of a model of choices
- Modelled out 30 years
- Compared BAU with
 - Wellington City Council planning scenario
 - a scenario based on stated preferences
- **Found travel emissions about 20% lower** than BAU with latter scenarios

4 Critical steps... along a sustainable path

- a. Design our cities to be more compact and better connected – save on infrastructure, energy costs, and carbon emissions; improve health
- b. Invest heavily in walking, cycling & public transport – for health, cost savings & sustainability
 - Electrify bus fleets asap; and support electric cars
- c. Raise the price on carbon – but get the timing of a high price right

Infrastructure for compact cities: roading costs tend to fall as settlement density rises (NZ territorial authorities)

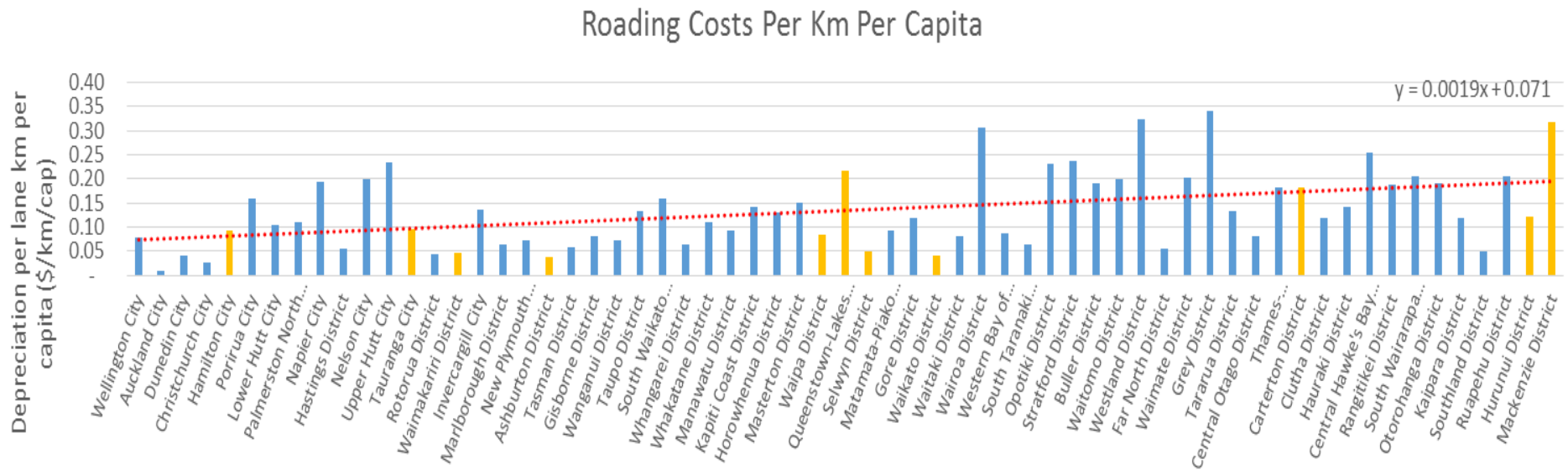
Road Costs Per Capita against Population-Weighted Density



Other things being equal, we can save on infrastructure by intensifying settlements

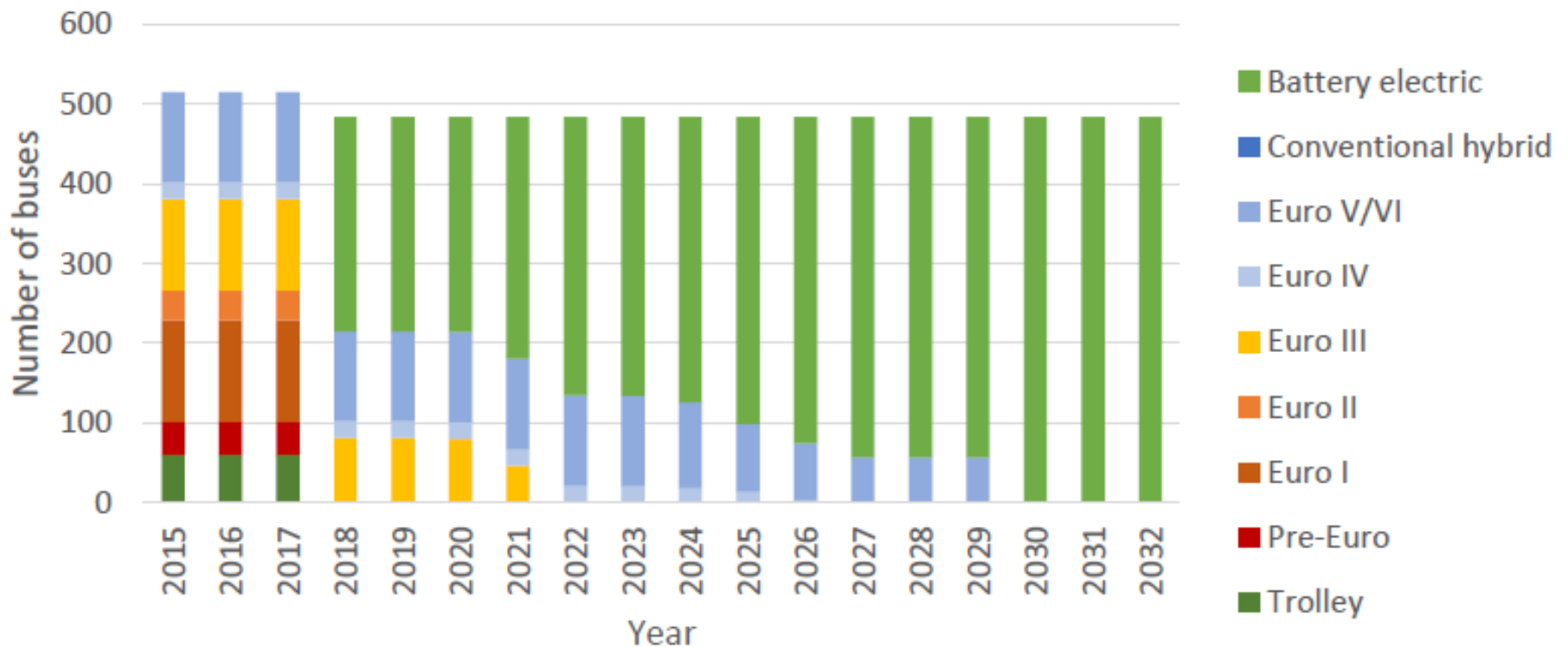
Adams & Chapman
2016 forthcoming

Ordering settlements by density: denser cities such as Wgtn have lower infrastructure costs



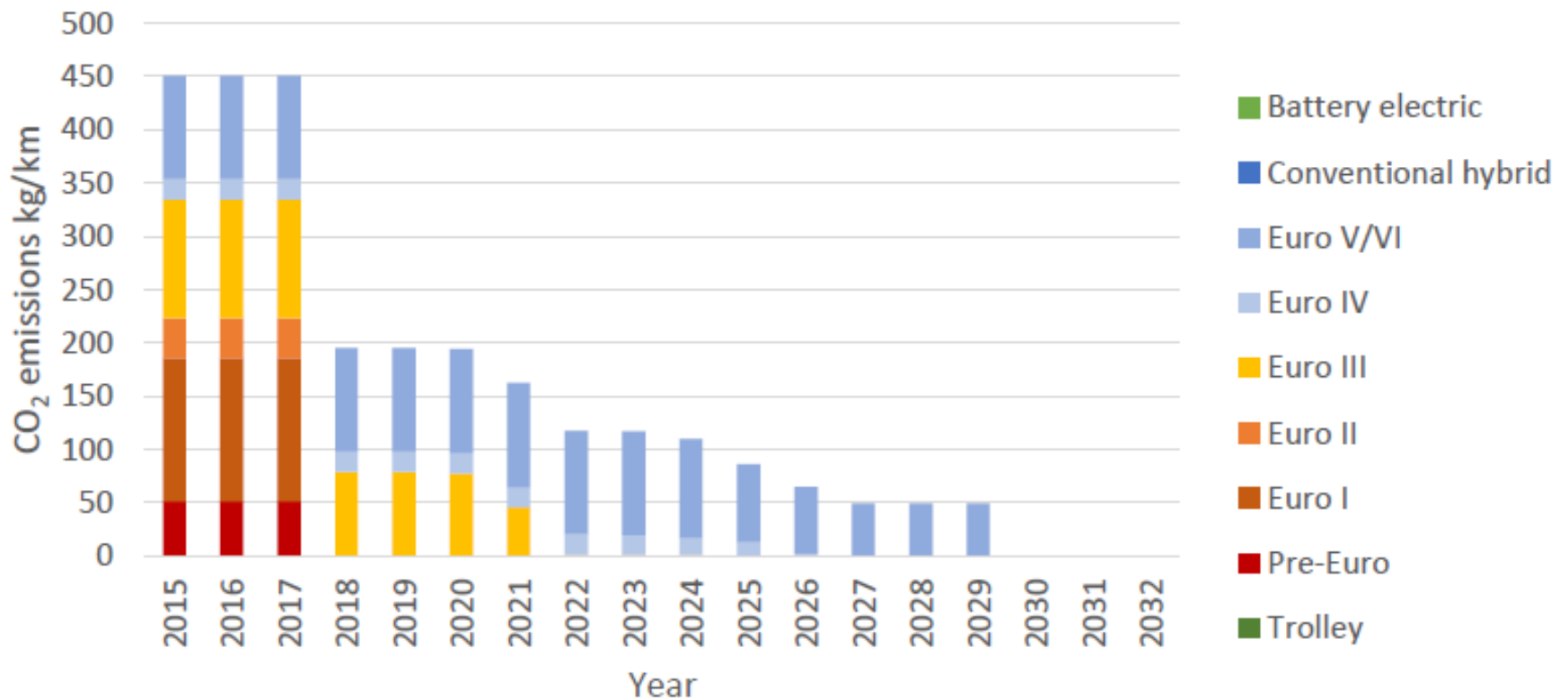
Moving to battery buses: costly but big advantages (CO₂, PM, NO_x)

Scenario 5 Wgtn Region bus fleet configuration



Carbon emissions from bus fleet with early introduction of battery buses

Scenario 5 Wgtn Region bus fleet CO₂ emissions kg/km



Conclusions (1)

- **Climate change**, as well as **quality of life** (including the ability to afford housing) require innovative thinking
- People's preferences are also changing: **think ahead to resilient futures**
- Policies need to consider urban system behaviour -- policy **interaction** and **unintended** effects
- Huge potential for more sustainable living with policy changes to support **compact urban form**, **more affordable housing** and **sustainable transport**

Conclusions (2)

- Compactness isn't everything in urban form / design
- Density helps with other factors -- city design, land use mix, connectivity, accessibility, etc.
- These all influence travel behaviour & quality of life
- Policies can alter urban form over time
- Benefits for health, community, quality of life, and – most of all - climate change



Time of Useful Consciousness

Acting Urgently on
Climate Change

RALPH CHAPMAN

WHAT ACTIONS IN THIS TIME PERIOD ARE
TRULY VITAL, AND WILL WE TAKE THEM?

BWB Texts

<http://bwb.co.nz/books/time-of-useful-consciousness>

Thank you

