

## Submission on Productivity Commission report: transitioning to a low emissions economy

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### Introduction

This submission responds to the Productivity Commission's draft report 'transitioning to a low emission economy'.

The submission has been prepared by David Mead of Hill Young Cooper Ltd. I have an urban planning and resource management background.

The main issue I have with the report is that much greater attention needs to be paid to how cities will have to transition to a low carbon society. I make no comment on agricultural emissions and the associated issues.

Put simply, transitioning to a low emission *city* must be the objective.

This is because of the following:

1. most people live in cities;
2. cities are path dependent; they are slow to adapt to changing social and economic forces;
3. NZ cities have grown in the post war 'carbon-intensive' period, where land use and infrastructure patterns and services reflect low energy costs;
4. changes to carbon prices to reduce or eliminate greenhouse gases will increase costs faced by households and businesses; they have to face increased costs if they are to change behaviour and adopt different technologies sufficient to reduce climate change;
5. moreover the price signals needed to achieve low emissions appear to be ever increasing as action is delayed, while potential substitutes have a degree of uncertainty as to their efficacy. Reliance on forestry to soak up significant greenhouse gas emissions may not prove to be so effective. Hoped for technological innovations like widespread use of electric vehicles and neighbourhood scale batteries for electricity storage are not certain outcomes, meaning there is no easy transition to transport and energy services that are cheaper than carbon-based options;
6. higher transport, energy (and food, infrastructure and 'waste' disposal) costs will affect household budgets. In turn, those costs will be reflected in peoples' and

businesses' locational choices, making some areas in cities more attractive and other areas less attractive, both central and peripheral areas;

7. there is a significant prospect of large populations being disadvantaged due to the 'lock in' of existing urban forms, leaving households in some areas to face much higher costs for transport and energy, but also potentially higher costs to cover infrastructure and utility services, but without the ability to take compensating actions;
8. **significant actions are needed now to help urban forms to adjust, both incrementally and radically, to changing social and economic patterns arising from high carbon prices.**

### **The Commission's findings**

It is helpful that the Commission have considered the role of the built environment in the transition to a low carbon economy. However its consideration seems to have been from only one perspective - the potential for changes to urban form to drive carbon reduction. The following findings are made with respect to the built environment:

*F15.1 Increasing the price of emissions in the New Zealand Emissions Trading Scheme is the most effective way to incentivise a transition toward the construction of buildings with lower embodied emissions.*

*F15.2 Increasing the density of urban areas, combined with good public transport and accessibility, can reduce vehicular travel and emissions. But intensification of this nature has proven difficult to accomplish and runs counter to the living preferences of many New Zealanders. Urban planning policies are likely to take many years to achieve significant increases in density. By then, reductions in vehicle emissions may have already been achieved through advances in low-emissions transport.*

These findings follow an economic 'text book' approach and hold true if a number of assumptions are made. As one economic study puts it (note 1):

*If emissions are actually taxed at the appropriate rate then there is no need for further spatial policy to improve private decisions about location. Second, if emissions are taxed below the optimal level, then it is appropriate to subsidize the areas that have less energy usage and tax the areas with more energy usage. Third, even with an optimal emissions tax, suboptimal public policies, such as zoning or transport subsidies, may still lead to suboptimal locations.*

Sounds easy, and the Commission's report appears to make the same assumptions. But ...

1. There are many imperfections in peoples' and businesses' locational decision making which suggest that a carbon charge will not automatically result in households and businesses finding their least cost locations. There are many inbuilt inefficiencies in cities; above all they are slow to respond to changed circumstances.
2. The dismissal of urban planning as a tool to drive carbon reduction in areas of a city with high emission patterns is dependent upon the right tax policies being in place. This is a big assumption and until the right tax is in place, planning should not be put aside as a tool, especially where planning policy achieves multiple benefits, even if planning tools are slow acting.
3. The last point noted – the inability of households and businesses to adjust their spatial preferences due to planning barriers - is now 'old news'.

The draft report makes comments about urban density in Auckland, including how the city has been slow to intensify and how a metropolitan urban limit has constrained the supply of land and therefore increased land prices.

Planning rules in Auckland have changed substantially since the 2010. Suburban density controls have been removed. While an urban boundary remains in place, significant greenfields land areas within the boundary are available, subject to the provision of infrastructure to enable a variety of housing types to be constructed. There is however, still work to be done on zoning and development capacity.

Now, infrastructure funding and roll out – including pipes, open spaces and transport - are the key constraints to providing increased density and modified urban form (in the Auckland region). Co-ordinated infrastructure and land use planning (in existing and future urban areas) would have the effect of freeing up land constrained by infrastructure, ensure better integration with transport options, especially public transport, and in turn encourage developers to build houses in appropriate areas. As long as infrastructure upgrades and extensions are provided across the existing urban area, as well as in new urban areas within the urban boundary, then a mix of housing typologies will be provided. The key is that such infrastructure upgrades and extensions are anticipatory, rather than reactive.

In other words, questions of how urban planning and infrastructure funding and spending will need to adapt to high carbon prices are much more than the normal calls to 'remove barriers' 'speed up processes' and remove 'subsidies'.

In this context, the Commission recommendations for the built environment are too limited. The report makes the following recommendations

*R15.1 Future reviews of the New Zealand Building Code should examine whether the Code is sufficiently flexible to enable practitioners to adopt building materials and techniques with low embodied emissions.*

*R15.2 Forthcoming reviews of New Zealand's Building Code should assess whether there is scope to materially reduce peak demand for electricity through the introduction of more stringent energy efficiency standards.*

*R15.3 Government should continue to promote the uptake of energy efficiency in buildings, with a particular focus on reducing emissions associated with peak electricity demand.*

While possible changes to the Building Code are identified, there are no similar changes recommended to the Resource Management Act, Local Government Act or Land Transport Act, for example. Perhaps the Commission is relying upon its other reports on urban planning and land for housing to address the issues faced by urban areas as they respond to higher carbon prices (and faster climate change). But that is not stated. Or it may be assumed that the Commission only sees minor or small changes to urban areas. Certainly the report suggests wide take up of electric vehicles, limited changes to electricity prices and other (unspecified) innovations as being possible. All suggest business as usual for cities under a low emission framework. But is this more hope than reality?

There is a disconnect between the statements at the start of the report about the scale of the challenge faced by society, and the actions noted for households (which all tend to suggest, for households in cities at least, business as usual).

In short, urban areas will need to adjust, and the higher the carbon price, the faster and more radical the likely change. Anticipating and co-ordinating this change to urban areas will require substantial effort. The direction of this change is not clear - there is the possibility of increased urban consolidation, but an ex urban form of growth is also possible as distributed

forms of infrastructure take hold. Both outcomes are possible, and resolution as to where most planning effort should be placed, is needed.

To my mind, additional or alternative findings and recommendations are needed covering the following:

#### *Findings*

*Until a full carbon 'tax', 'charge' or similar is in place, then urban planning does have a role in reducing pressures for spatial development patterns that are dependent upon high carbon inputs and facilitating and enabling development in areas that reduce or have below average carbon footprints.*

*Urban settlements face significant challenges in adapting to a low carbon economy, having been mostly built during a sustained period of high carbon availability / low energy costs. Path dependency and lock in of inherited urban forms represent a major block to required transitions and will need positive actions to overcome.*

#### *Recommendations*

*The government needs to develop tools and techniques that will allow for well-designed adjustments to urban form and infrastructure. This must involve co-ordination between land use and infrastructure planning, including soft or social infrastructure in areas of change*

*There is a need for strong signals to be delivered to the development market now as to future urban forms compatible with a low carbon economy, given the likely staged implementation of higher carbon prices and the uncertainty over possible soft adaptation measures, plus the long lead times between planning and urban development.*

*Funding mechanisms must be available so that the winners from the transition to a low carbon economy can help compensate the 'losers'. Significant areas of cities could be left behind, with many households and businesses 'trapped' in suburbs that are costly to live in and ever more costly to 'run'.*

### **The target: some emissions, low emissions or no emissions?**

The Government has committed itself to a zero carbon future, kind of. It plans to introduce a new Zero Carbon Bill in 2018 which seeks to set a new emissions reduction target by 2050. There seems to be a bit of a difference between zero carbon and 'low' emissions. I am not quite sure what low means, but never mind. I guess the direction of travel is clear. The method of travel – a carbon charge via the ETS or a carbon tax- also seems clear.

But how far and how fast the rate of travel has to be down the no/low emissions path does matter for cities, and that rate of travel is dependent upon what level of carbon charge is imposed.

There is no clear statement as to likely carbon prices and hence price adjustments that urban businesses and households will face. Yet understanding the extent of change likely to occur clearly rests with the price needed to reduce greenhouse gas emissions.

While there is always a degree of uncertainty, the Productivity Commission's report seems to hedge its bets. For example:

*"Modelling and other available evidence suggests that New Zealand's emissions price will need to rise to levels of the order of \$75 a tonne of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) and possibly*

*over \$200 a tonne over the next few decades to achieve the domestic emissions reductions needed to meet New Zealand's international commitments.*

*New Zealand could also reach net-zero GHG emissions by 2050 with emissions prices rising to between \$157 a tonne of CO<sub>2</sub>e and \$250 a tonne of CO<sub>2</sub>e by 2050 (with the higher figure assuming that technological change is slow)"*

What does seem to be the case is that every years delay in imposing an appropriate carbon charge results in higher and higher estimates of the required carbon charge, as the time to transition to a low carbon society shrinks.

A realistic (not too hot, not too cold) price signal needs to be set now.

### **Uncertainties over pathways**

The report states that the pathways to a low emission society rely on three key drivers: the expansion of forestry; the electrification of New Zealand's transport sector; and changes to the structure and methods of agricultural production. While not stated. It appears that these pathways have been selected because they provide for the least disruption to current living and business practices for most city dwellers, rather than be the 'best' pathways to follow to transition to a low carbon future.

Each of these 'pathways' have risks and uncertainties associated with them.

Expanding forestry is central to achieving large reductions in emissions up to 2050. Yet, the heavy reliance on forestry will create challenges in the short and longer term. In the short term, major land use change is needed, while in the long term – with continued emissions reductions required after 2050 to maintain net-zero - an alternative to forestry will be required.

Electric vehicles are seen as offering some of the most promising mitigation opportunities for New Zealand, but their uptake faces barriers, which are identified as high prices relative to fossil-fuel vehicles, anxiety about their limited travel range, and poor public understanding of their benefits. Significant upgrade of the local electricity network is also needed to cope with widespread charging. New EVs can be \$15,000 more expensive than similar petrol equivalents, which also means that second hand EVs are more expensive than their petrol equivalents. However prices will come down, over time.

To address these barriers, the report suggests that the government can offset some of these barriers by introducing a "feebate" scheme, through which importers would either pay a fee or receive a rebate, depending on the emissions intensity or fuel efficiency of the imported vehicle; providing funding support for electric vehicle infrastructure projects, to fill gaps in the charging network that are commercially unviable for the private sector; and raising awareness and uptake of low-emissions vehicles through leadership in procurement.

These are not minor or cheap actions and it is questionable as to whether public money should be used to subsidise a private good, rather than support a public good, like improved rapid transit services. In addition, some other method of funding transport projects from EV users will be required, as fuel excise tax reduces in relevance.

The implications of these pathways not being realised as fully as hoped, are not explored.

The other pathway, 100% renewable electricity generation, is not available. Shifting electricity generation to a low carbon pathway does not seem to figure in the Commission's report. With 80% of electricity said to be from renewables, the last 20% hard to close due to winter peak demands and the potential for dry years affecting hydro generation. But only 50

to 60% of electricity generation is actually carbon free, according to Vector. Yet to avoid generating more greenhouse gases from the likes of gas powered plants to cover peak periods or dry years, electricity prices will need to rise to help reduce demands. Calls for variable pricing to help moderate peak demands will impact upon households.

Presumably the only outcome if the different pathways are only partially able to be followed is every higher carbon prices as the government seeks to limit greenhouse gas use.

### Effects on households

The effect on households of ever higher carbon prices are not well understood or explored. It appears that the Commission have assumed that the changes to transport, energy and food costs will be minor, with the above pathways in place.

The report does provide the following:

*Previous modelling and empirical studies have estimated the possible impact of emissions prices on fuel and electricity prices. Infometrics (2017) estimated that a NZ\$100 a tonne emissions price would raise retail petrol prices by 28 cents per litre. Stevenson et al. (2018) investigated the impact of rising emissions prices on the electricity market, and found that annual average wholesale electricity prices rose from around NZ\$80 a megawatt hour (MWh) at a NZ\$20 a tonne emission prices to just over \$100/MWh at a NZ\$80 a tonne emissions price.*

Quite what that means for households is not clear, especially if carbon prices closer to the \$200 per tonne mark are needed.

The Ministry for the Environment, as part of its 2016 review of the ETS, estimated that if the carbon price rose to \$20 a tonne, petrol costs for the average New Zealand household would rise by around \$58 a year and power bills would rise by around \$64 a year. If the carbon price rose to \$50 a tonne, petrol and electricity prices combined would rise by \$6 a week, or around \$300 per year. The following figures were provided (note 1):

**Table 3: Estimated annual NZ ETS costs passed through to households**

Annual NZ ETS cost for an average NZ household:	Effective carbon price \$5	Effective carbon price \$10	Effective carbon price \$20	Effective carbon price \$50
Petrol <sup>22</sup>	\$14	\$29	\$58	\$145
Electricity <sup>23</sup>	\$16	\$32	\$64	\$161
Natural gas <sup>24</sup> (if used)	\$7	\$14	\$28	\$70

This doesn't sound too bad.

But what if carbon was \$150 per tonne? The above figures suggest a figure closer to \$1,000 per year. If the \$150 per tonne charge did raise petrol costs by about \$450 per year, then to maintain a 'petrol budget' the same as before the extra charge, average distance travelled per year, per car would need to drop by about 15%, or 2,000kms, all else being equal. This is an average of 9km per working day. In theory, households would seek to move 4 to 5kms closer to work to avoid the extra charge, but may have to accept living in a smaller house, or on a smaller section than their current arrangement, to avoid paying more than the value of the house that they currently occupy.

Even if public transport services step up to 'fill the gap' left by higher private transport costs, the above calculations still hold true, as public transport trips generally take longer to complete than equivalent private car trips.

These averages will 'hide' the extent of change needed for some households.

While on-the-one-hand it is understandable, to help facilitate the necessary transition, for the Commission (and the government) to say that the shift to a low carbon economy will not result in big changes to costs faced by households, it is on-the-other-hand potentially damaging to any transition to understate the potential effects and consequences. Some realistic analysis is required.

### **Taking action now on urban form.**

It is commonly held that urban form changes only slowly. Indeed this is the reason that the Commission finds that urban planning should not force reduction in carbon use. Rather urban areas should be left to adjust to changes to carbon prices.

This approach, however, does not recognise that potentially slow and incremental changes to urban form could be a significant drag on adaptive changes, significantly increasing transitional costs to households and businesses. This is because of the in-built 'momentum' of cities. Addressing this issue is fundamental to adjusting to high carbon prices as most people live in towns and cities. It also has to be more than just a call to speed up urban planning processes to better cope with 'consumer-driven' changes.

To take the example of transport, the report does acknowledge that 'future land transport policy should put emissions-reduction goals more centrally in government planning, adopt a more mode-neutral approach to assessing and funding new projects, and make greater use of demand-management techniques such as congestion pricing'.

First up, these actions suggest a degree of push back to the use of EVs and an associated contrary move to the hoped for public support for the take up of EVs. There is still congestion to address, for example. Even then, is a mode neutral approach sufficient? If electric vehicles are not the complete answer, what needs to be done? Here early action to promote a range of alternatives will pay dividends. As one report on urban form and carbon prices identifies (note 3):

*This paper investigates the impact of path dependencies on the ability to reduce urban commuting CO<sub>2</sub> emissions with a carbon or gasoline tax. Due to imperfect decision-making and long planning and construction timescales of new infrastructure, investments in public transport are not always optimal, especially after changes in relative prices (e.g., due to carbon pricing). As a consequence, the provision of public transport does not adapt automatically and instantly to new socio-economic conditions.*

*Our results show that public transport choices have a strong influence on the price elasticity of energy consumption and carbon emissions from urban individual transport.*

*If the carbon tax is implemented to change behaviors and reduce GHG emissions, it makes economic sense to complement it with policies that increase the price elasticity of carbon emissions, such as technology and innovation support or the type of infrastructure investments discussed in this paper.*

In other words, anticipatory actions for urban infrastructure changes need to be taken early, rather than be reactive actions. Even Vector has noted that without sufficient planning and co-ordination, all consumers will face the risk of increased electricity costs and increased outages, if there is a sudden upsurge in use of EVs and associated charging at home.

Should EVs not be the complete answer, then public transport, walking and cycling will need to be more widely used. This will require different infrastructure that will take time to put in place. Public transport coverage is still 'skeletal' in many parts of Auckland, and will remain so due to the dispersed patterns of land uses; increased frequency and coverage of services

will need public support. Meanwhile, other parts of the city are reaching the limit as to the number of buses that can be accommodated, and dedicated infrastructure with greater capacity (like rail, LRT, BRT) is needed.

The same strategy of anticipatory actions needs to be applied to housing and associated land use patterns. Substantial work is needed to make urban areas 'ready' for changes in locational and density patterns. Evidence suggests that if transport and energy costs rise, it is usual for cities to consolidate, as outlined above. Households will seek to shift closer to workplaces and amenities to reduce transport costs, provided house costs are not exorbitant. It is possible that as demands on urban land rise, many businesses may shift the other way, looking for cheaper land and less busy main transport networks to locate near. Add in factors like a shift to mid-level timber office buildings in central areas (and away from carbon intensive taller concrete and steel towers) and retreat from areas affected by climate change (flood plains and areas subject to coastal hazards), then considerable adjustments to urban areas are likely.

It is possible that some forms of distributed energy systems will be developed that support more dispersed land use patterns, but the operating costs of such systems spread across a low population base are unknown. In the face of rising costs, consolidation is more likely than dispersal.

In turn, these adjustments need preparatory work to ensure that transitions are smooth, not overly costly for households that have to shift, don't involve sudden shifts that raise the ire of existing residents and where infrastructure can be upgraded to cope with an influx of people. This extends to necessary social infrastructure like open space, schools and community facilities.

In particular, existing communities will raise questions about growth and change in their area as urban areas adjust to different cost pressures. This is inevitable and unavoidable. Communities cannot be 'cut out' of changes to zoning and development envelopes, but they can be mollified to an extent if they see that concrete actions are taken, in advance, to address issues like extra demands on infrastructure (social and physical infrastructure) and the provision of more green space.

In short planning ahead of demand is needed. This planning has to anticipate and shape future urban land use responses to changing carbon prices, it can't wait to the price pressures are felt and then react, as by that time, it will be too late to act.

### **Notes**

Note 1: The Greenness of Cities: Carbon Dioxide Emissions and Urban Development  
By Edward L. Glaeser Harvard University and NBER and Matthew E. Kahn UCLA and NBER. WP-2008-07

Note 2: <http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/nz-ets-review-discussion-document-november-2015.pdf>

Note 3: Carbon Price Efficiency Lock-in and Path Dependence in Urban Forms and Transport Infrastructure. The World Bank Urban Disaster and Risk Management Department Urban