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2 October 2017

The Productivity Commission
By email to info@productivity.govt.nz

Dear Sir or Madam

Low-Emissions Economy Inquiry: Response to the Issues Paper

Thank you for the opportunity to make this submission to the Issues Paper. The Issues Paper is an excellent resource across a broad scope, and is very impressive.

I am interested in and will comment on the overall challenge of moving to a low-emissions economy, and the specific challenges related to transportation.

I start with the most important question, which is 'what does success look like?'. You have asked this at the end, with your question #40. I think there should be a shared vision for New Zealand, within the context of a change to a low-emissions economy.

Climate change presents an existential challenge, the nature of which is somewhat open to interpretation, but the reality of which is moving beyond debate. Large proportions of the New Zealand population now think that climate change is something that we must do something about (Horizon Polls, Colmar Brunton research). However, the support for the political parties that focused on the need for change, in the recent election, was not as strong as other research might have suggested it would be.

There are several different positions that could be taken, and a shared commitment to a chosen position, by a majority of New Zealanders, would go a long way to making a chosen position achievable. A referendum might be called for.

Certainly, a much deeper conversation is called for. I think that the vast majority of New Zealanders have not engaged with the topic to the extent that would be ideal as a prerequisite to taking action. This needs to be remedied.

To begin with, we should start by being honest. A clear statement of our current annual emissions, and our current annual forestry carbon absorption, and the extent of our obligations by date, should be given to everyone. This would exclude the artificial accounting artefact of cheap (questionable quality?) offsets that the government owns. It helps no one to pretend we are achieving something that we are not. I think it tends to make people cynical and therefore less likely to support real action.

I think it is also important to stop pretending that the challenge will be solved without tangible action by individual people. We all need to drive less and fly less, and it would be good if we change what we eat. But there is no conversation that is helping people to consider these needs and make personal commitments to change. People who understand the situation seem to believe that the conversation must be positive, and that it is appropriate to pretend that enough can be achieved by macro-level producers, such that individuals need not be worried or take action.

A lot could be achieved by macro-level producers, but thus far it seems they have been given very cheap credits so that they do not feel any imperative to change. Agriculture has also been excluded. It seems there is a belief that businesses and farmers must be protected from added costs – but this does them and us a disservice because they do not make the necessary adjustments that would keep them competitive. Most businesses are subject to a market price, that sometimes varies greatly (such as the price of milk powder at the auction), and the successful operators figure out how to succeed despite these variations. I think all producers should immediately be exposed to the full costs of carbon emissions.

With everyone conversant with the true state of affairs, and the imperatives that exist, we could have a national conversation in which we could choose our future. There is no question that the future requires lower emissions, and that New Zealand can succeed within that environment. New Zealanders should be involved in a conversation about what success will look like, and a national consensus should be developed.

I suggest two rounds of discussion, with two decision processes. The logic is that after the first decision process, like a 'Brexit vote', people might wake up the following day and question whether they really understood what the vote was about. But at least there will have been a vote, and everyone will see which way it appears to be going. Because of this, the second round will be much more serious, and more people will truly engage.

It is important that the discussion be more than a 'consultation' where pre-set options are presented. Because this is an existential issue, people should be involved in developing all the options. This should not be a popularity contest.

In the meantime, it is important to get on with helping 'engaged' people to reduce their emissions. People have changed their light bulbs, and are waiting for a clear indication of what to do next.

The Issues Paper suggests that (under the heading of 'Buildings') *low-emissions design and heating of buildings can likely help engage citizens in the wider project of building a low-emissions economy*. The question is, given the long lead time for changing buildings, is there a better source of knowledge spill-over that could be effective in a much shorter timeframe?

I think that there is such an opportunity within transportation.

But first, I'd like to observe that carrots are a better mechanism for change of this nature than sticks. The issues paper makes this point in Box 9 on page 47, where it says it is important to avoid framing the desired changes as a loss. In general, if people can be rewarded for taking a desired action, it would be preferable to penalising them for not taking the desired action. For example, subsidies for compact fluorescent lightbulbs encouraged uptake of these light bulbs.

"I will begin with the proposition that in no other major area are pricing practices so irrational, so out of date, and so conducive to waste as in urban transportation." So said William Vickrey in his 1963 essay Pricing in Urban and Suburban Transport. Vickrey goes on to propose pricing of every vehicle movement relative to the time of day and direction of travel, and the amount of congestion present. Vickrey's pricing ideal has been described by subsequent researchers as the 'first best method' for controlling traffic congestion.

However, what is the first best method in the eyes of economists and researchers has not proven to be very popular with the general population. Efforts around the world to introduce road pricing have been particularly unsuccessful. People dislike being forced to pay to use what used to be a free 'right of way'; and they object to paying to use a road that they perceive they already paid for through their taxes. The result is that with very few exceptions, road pricing does not exist and traffic congestion is rampant.

There are significant negative externalities experienced in each of New Zealand's major centres due to traffic congestion, and in one, Auckland, there is an initiative underway to evaluate the introduction of road pricing. The Auckland Smarter Transport Pricing Project (TPP) is a joint venture between Auckland Council, Auckland Transport, and several Government departments. Its stated purpose is to *undertake a thorough investigation sufficient to support a decision on whether or not to proceed with introducing pricing for demand management purposes in Auckland*. The terms of reference state that *the primary objective of pricing is to improve the performance of Auckland's transport network, in particular through improved congestion results*.

In a 2012 research project for the New Zealand Council for Infrastructure Development (more recently known as Infrastructure New Zealand), Horizon Polls found that in response to a \$1.00 motorway toll, 16% of Auckland commuters would switch to carpooling. 16% also said they would switch to public transport. (People could choose multiple options, so some of these (but not all) are the same people). In response to a \$2.00 toll the number who would switch rises to 24%. These proportions, if they materialised, would be sufficient to decongest Auckland's roads.

In a 2017 report for the Employers and Manufacturers Association, Infrastructure New Zealand, Auckland International Airport Ltd, Ports of Auckland Ltd, and the National Road Carriers Association, entitled Benefits from Auckland road decongestion, the New Zealand Institute of Economic Research (NZIER) found that Auckland could expect a rise of 1% - 1.4% in its GDP from decongesting its roads. The economic and social benefits would total between \$0.9 billion and \$1.3 billion per year. Of this total, \$2 million per year relates to reduced emissions.

I have proposed to members of the governance team and steering team for the TPP (see attached letter) that as well as the 'stick' of congestion charges that conventional wisdom would suggest for pricing, the project consider a 'carrot' approach that I refer to as 'reverse tolls'. Instead of penalising all the traffic for traveling at peak times, the solution would reward a smaller number who switch to carpooling and public transport (and other modes).

I estimate that \$100 million per year in rewards would be sufficient to decongest Auckland's roads. From this there would be co-benefits of about 200,000 tonnes of reduced CO₂-e emissions per year, GDP gains of about \$1 billion per year, reduced demand for expanded infrastructure in the order of \$2 billion per year, reduction in the potential for stranded infrastructure assets as automated vehicles arrive on the scene in 5 – 10 years' time, as well as other benefits.

Many of these benefits could be achieved with traditional 'congestion charges', except that it is unlikely the political will exists to implement such charges at the scale needed. What would also be lost is the opportunity to frame the change as a gain, and to *engage citizens in the wider project of building a low emissions economy*. Further, carpoolers using electric

vehicles could be paid a greater reward which would encourage greater uptake of electric vehicles.

The annual cost of reverse tolls will rise over time as population and economic activity grow, since the goal will be to maintain the roads in their newly decongested state. There are two important initiatives that could help to control this growing cost.

The first is 'daily parking cash out'. All organisations that provide parking for their staff would be engaged to adjust this benefit in one of two ways. They would either pay a cash benefit each day that an entitled staff member arrives other than by driving; or convert the full value of parking to monthly salary, and charge a daily parking rate when the staff member arrives by driving. Enlightened businesses will recognise that in the long run they can reduce the number of parking spaces provided for staff, and either put that land to better use or release it to the market, at a profit.

The second is 'civic engagement'. Traffic congestion as we know it is not the failure of planning that it is usually characterised as in the media. Traffic congestion is the failure of civil society to make intelligent use of the road asset. Having established reverse-tolls, the administration will have demonstrated that society values people traveling as passengers rather than as drivers. This will set the stage for a constructive dialogue that encourages civil society to support this strategy and maintain the gains. A target might be agreed such that everyone who currently drives makes a point of traveling as a passenger at least one day per week, or offering rides to other people who travel as passengers.

In conclusion, this submission is a long answer to the Issues Paper Question 10: *In addition to encouraging the use of electric vehicles, what are the main opportunities and barriers to reducing emissions in transport?*

In summary, I suggest the following: road pricing in the form of reverse-tolls at the level needed to achieve decongestion; daily parking cash-out; and civic engagement; for greater levels of carpooling and other alternative modes. An electric car in traffic imposes the same negative externalities on the rest of the traffic as a car with an internal combustion engine. It is only if we reduce the traffic that we make a big difference. The strategy has the added attraction of knowledge spill-over and significant co-benefits.

While this is a strategy that might be under consideration for Auckland, it could also be effective in reducing emissions, achieving co-benefits, and engaging citizens in the wider project of building a low emissions economy throughout the major centres of the country.

Thank you again for the opportunity to comment.

Yours faithfully



Paul Minett, CEO
Trip Convergence Ltd

Enclosure: Letter to TPP Governance Group, Steering Group, and Project Director.

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2 October 2017

To:

Project Director,
Steering Group, and
Governance Group of the
Auckland Smarter Transport Pricing Project
By email.

Dear All

Reverse Tolls

I am writing to request that a concept of 'reverse tolls' be included in the analysis that is undertaken in the Auckland Smarter Transport Pricing Project (TPP).

Put simply, the proposal is to pay people to travel as passengers when they would otherwise be drivers. In other industries such as electricity, this is characterised as 'demand side management'. In transportation, it is not an unusual concept to incentivise people to use alternative modes, but to my knowledge it has never been implemented 'at scale' to achieve decongestion. My suggestion is that it be considered alongside the more traditional forms of road pricing. I think it will prove to involve lower capital and operational costs, faster implementation, lower political capital, greater acceptability in the community, and more positive community outcomes, when compared with the traditional alternatives.

I have had a long-term interest in alternative modes of transportation, and as a researcher in the field have identified reverse-tolls as a potential game changer for urban transportation. The TPP is an excellent opportunity for evaluation of the concept, and potential piloting of solutions. I would like to help, and offer the following information for your consideration.

In Scope

The first question you might ask is whether this concept is 'in scope' for the TPP. In my opinion, the drafters of the Terms of Reference did a good job of setting a purpose and scope that could include any solution that would use pricing of any sort that could promise congestion reduction. They specified outcomes that are 'in scope', not methods. I acknowledge that most of the literature on 'road pricing' anticipates 'charging' not 'buying'. But all the economists I have so far discussed this concept with agree that a road pricing regime could incorporate a breadth of solutions from 'selling decongestion to those who do not change how they travel', to 'buying decongestion from those who do change how they travel'. New technologies make this possible.

Method/Technology

Because this concept has not yet been implemented 'at scale', an argument could be made against including it in the TPP on the basis that there is no technology for it, and it has not

been previously proven anywhere. In this regard, there are probably many approaches that could be used to make a technological solution, and I have personally carried out a technical proof of concept on one. This solution concept involves use of a smart phone app in which alt-mode users can 'tag on' and 'tag off' from carpools, vanpools, bus, bicycle, and walking trips, and with a high degree of reliability their trips can be reported for location and direction (using GPS), and time of day (using timestamps). Simple business rules can be applied to recognise the people using the alt-mode and paying them accordingly, including paying different rates for times and places of greater levels of congestion. To implement the solution at scale in a city such as Auckland, prices (rewards) would rise to the level needed to achieve the target level of decongestion on each road.

Capital Cost

There would be no capital cost for an Authority to implement this solution. All the required technology is already in the hands of the people who are traveling – their smart phones. The app, provided by a third party, would be downloaded by users for free from the appropriate sources (App Store, Google Play, etc.). This contrasts to alternative methods of road pricing that require bespoke technology that will have capital cost and ongoing maintenance implications.

Operating Costs

I envisage several types of operating costs that need to be considered for comparison purposes including marketing costs, costs incurred by users, transaction costs, enforcement/audit, and rewards.

Marketing

The app would be made available for download for free for users, and public discussion could be expected to generate some level of interest. Public relations activity would be used to multiply this effect. The more useful and friendly the app is for users; the more likely word-of-mouth would generate a large user base without significant marketing spend. Social media would be a valuable channel to increase uptake. The size of early adopter rewards would also influence how rapidly a large user base developed. The magnitude of required marketing spend is difficult to predict. I don't think the magnitude would be very different to that required for the introduction of a traditional 'charging regime' road pricing system.

Costs incurred by users

Users would be expected to use their data allowance on their smart phones. This would be minimised for the operation of the app. It is foreseen as an insignificant amount compared to most data allowances. However, this should be recognised as a cost that would probably not exist in a charging regime.

Transaction costs

Transaction cost is the cost of capturing the information and making payments. There will be a cost for capturing the data about each trip, and applying the business rules, and maintaining an account for each user. In a charging regime, this would involve a transaction with each road user each time they use the road, or the part of the road that is in the charging zone. In a reverse toll system, transactions would only be needed with people who have changed to an alt-mode, perhaps 20% by volume compared with a charging regime. Paying money to people is generally less costly than collecting it from them. A fee would be paid to the third-party app provider for the data collection and reward fulfilment functions.

Payment could be into the HOP accounts for people who have them, which might both reduce costs and encourage further public transport usage.

Enforcement/Audit

Unlike a charging regime, reverse tolls require no enforcement, such as catching people who do not have the required technology, or who evade payment. On the other hand, there will be an audit requirement to ensure that the records of passenger travel are reliable, and the payments are made according to the business rules. On balance, I expect that the cost of the audit for reverse tolls would be much lower than the cost of enforcement for a charging regime.

Rewards

A reverse tolls regime would involve a cost of rewards that would not exist in a charging regime. The most significant question about this concept is ‘how much’ this would cost. Until the concept is tested, it is not clear how much, but I estimate that it will be in the order of \$100 million per year to decongest Auckland’s roads. I arrive at this using a simple calculation of \$5 per day, for 100,000 passengers, for 200 days per year.

The price allowance of \$5 per day is based on the Horizon Poll research carried out for NZCID in 2012, in which, in response to a \$1 motorway toll, 16% of people said they would switch to carpooling; and in response to a \$2 toll, 24% would switch. \$5 per day feels reasonable for getting enough people to switch. The goal on behalf of the Authority would be to get the target number to switch for the lowest possible cost. I envisage two scales of reward: a larger amount for the effort of getting started; and a lesser amount for ongoing usage.

The volume of 100,000 is based on: the 25,000 people already traveling as passengers in non-public transport vehicles (see table); a target reduction of 50,000 people who are driving and would become passengers; and an allowance of a further 25,000 people who would be ‘latent demand’, ready to fill the spaces created, and whom the solution would need to address to maintain a target reduction of 50,000 vehicles. I estimate that a region-wide reduction of 50,000 vehicles would achieve decongestion.

Main means of travel to work	Number of Aucklanders
Drove a private car, truck or van	340,299
Drove a company car, truck or van	65,484
Passenger in a car, truck, van or company bus	24,510
Public bus	33,933
Train	9,462
Motor cycle or power cycle	5,496
Total traveling by motorized transport	479,184

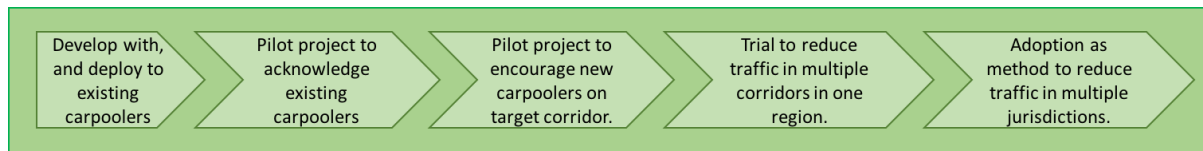
(Source: NZ Census 2013, does not include people who live outside Auckland but travel to work in Auckland)

The 200 days per year is the approximate number of days that there is really ‘traffic’ in Auckland. This will exclude school holidays and the December/January low-traffic periods, as well as statutory holidays, days payments would not be needed.

Gamification and artificial intelligence would be available for use to achieve a sustained reduction in traffic, even in the face of growing demand, because passengers can be expected to willingly share their contact details in return for the rewards on offer.

Speed of Implementation

All the technology exists for reverse tolls, there is nothing physical to install. I would suggest several levels of pilot project, but once the concept is proven it can be expanded across the whole region with little delay. My initial thought for an implementation program is shown in the following schematic, with an initial focus on carpoolers. I envisage introducing additional modes between stages 3 and 4.



Political Capital and Community Enhancement

We have seen in numerous examples around the world that people object to the traditional approach to road pricing. When pricing proposals are put to the vote, they are invariably rejected. People have an almost visceral response to being charged to use the ‘right of way’. They also do not like to pay to use something that they feel they have already paid for. Establishing a road pricing system generally involves lots of political capital, that is difficult to recover.

On the other hand, a reverse toll regime can be seen to potentially build political capital. There will be significant savings in the need for expanded infrastructure, and the traffic congestion beast will be tamed. Further, the money used to bring about the change will all go into the pockets of the people who changed – which will have an economic benefit to the community. And lastly on this point, the community will have become more resilient as people rely more on each other to collaborate for getting around.

Concerns about Misuse

In discussions about the reverse toll concept, concerns are often raised about the potential for misuse. Fraud, such as dummy passengers, will be detected, but the potential for people with time on their hands to take passenger trips just to earn the reward, or to delay travel till the time of greatest reward, seem to be vexing problems. There is little question that people will seek to maximise their returns from any system, so development of business rules will be an important activity. I envisage that rewards would be paid only to people who would otherwise be drivers – so not to people who do not have a driver’s licence; and possibly not to people who do not own a car. These issues are not dissimilar to the issues that charging regimes encounter: people wait until the tolling period ends, they turn off their transponder, they do not maintain an account. These are all issues that can be measured during pilot projects and assessed as to whether they can be countered, or are a large enough issue to cause the pilot to fail. On balance, I do not expect the rewards to be large enough that significant misuse of reverse tolls would be worth people’s while.

Future Proofing Auckland

We are in the middle of a significant potential shift in transportation. The combination of the electric vehicle (EV), the automated vehicle (AV), and the smart phone, give us an exciting but uncertain future. You will know that one scenario for the future anticipates 50% – 80% fewer vehicles and less infrastructure as we all share ‘robo-cabs’. Facing that possible future, it makes sense to defer infrastructure expansion because of the real potential for those to become stranded assets. Reverse tolls have the potential to give

breathing space – rendering expansion unnecessary for several years, saving money and avoiding assets becoming stranded, while giving us a pathway to a shared AV future.

An additional context for this shift is the current need for carbon emissions reduction. Transport is responsible for a high proportion of New Zealand’s greenhouse gas emissions. I estimate that decongesting Auckland’s roads through reverse tolls would reduce emissions by about 200,000 tonnes of CO₂-e per year. Further, with reverse tolls we could improve on this by encouraging greater use of EVs in the short term, by paying an EV bonus to passengers in EVs.

Conclusion

The purpose of the TPP is to help decide whether to proceed with introducing pricing for demand management purposes in Auckland. The objective of pricing would be to improve the performance of Auckland’s transport network, through improved congestion results. Reverse tolls are a form of pricing, and would achieve goals of fairness, equity, and positive distributional impacts. Reverse tolls would be cost-effective to implement, and flexible and adaptable to changing circumstances. They would not raise any revenue but would result in significant net savings for the existing land transport funding system. They would likely generate rather than consume political capital. They would be a positive signal to the community about the need to change to a low emissions economy.

As a researcher in this field, I hope that the TPP will incorporate consideration of reverse tolls. If I can help during the evaluation stage, or with design of a pilot project, I would be pleased to have the opportunity.

Kind regards



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