Insights

Topical commentary on the Auckland economy

April 2020

Fare deal or essential service: What cuts congestion and emissions most?

- Public transport (PT) moves people with fewer emissions and less congestion than Auckland's privately-owned mostly internal-combustion fleet.
- Working with the Auckland Forecasting Centre, we tested the impact on congestion and emissions of some of the weightier proposals to boost PT use, including large service upgrades and providing free PT.
- Free PT and the modelled service improvements have a similar impact on PT use but different impacts on emissions and congestion.
- Making PT free, but holding the network constant, reduces car trips and emissions.
- Just expanding the PT network has no net emissions gains according to the model.
- The costs of either approach, or a combination, is large relative to the emissions benefits.
- This is why the benefits from reduced congestion, other environmental outcomes, supporting equity, and creating access and choice are central co-benefits in the case for more investment in PT.

More PT is good for everyone

In Auckland, PT usage has nearly tripled since patronage reached its nadir in the mid-1990s. This surge in usage has coincided with a concerted effort to improve the PT network with investments such as the reopening of Britomart, rail network electrification, and the Northern Busway. And with improvements like City Rail Link, the Eastern Busway, and the Puhinui Station Interchange yet to come, there is little doubt service quality and PT patronage will rise.

We've said it before, but it merits saying again: when more people use PT, it is good for everyone. There is less congestion for those people still in cars, there may be fewer emissions, and over time more PT routes become viable, allowing PT to serve an even larger area of the region.

Major transport infrastructure projects are just one way of doing this, but policy-based initiatives can also play their part. There is a continued effort by politicians and policymakers to get people (especially commuters) out of cars and onto PT.

To test the impact of large interventions we worked with the Auckland Forecasting Centre to model a range of scenarios that allow us to see the impact

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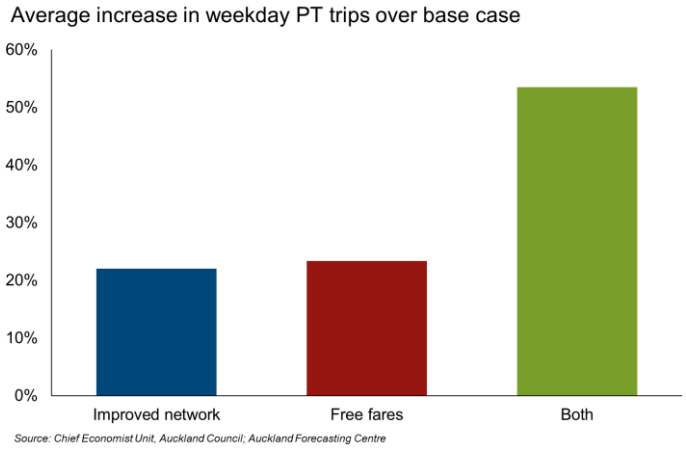
of i) planned and proposed infrastructure improvements to the network ii) more radical fare policy changes, and iii) a combination of the two. In all cases, the counterfactual is that no changes are made to either today's PT infrastructure or policy.

It's worth noting that this is a model – it won't be a perfect reflection of reality – but is a reasonable guide for the scale of likely impacts.

If you build it, will they come?

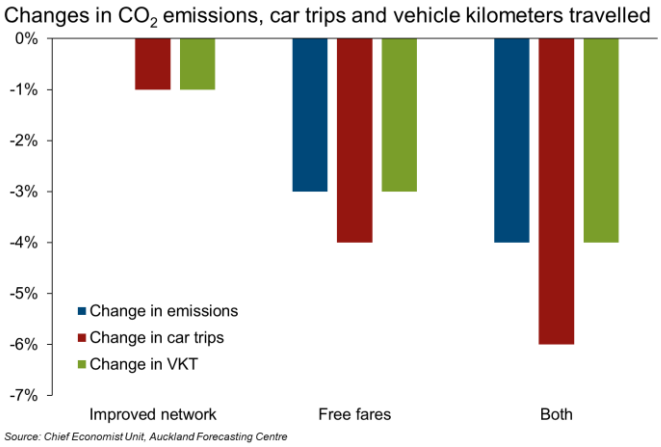
At a high level, improving the PT network – adding CRL, the Eastern Busway, more bus lanes around the city, and light rail to the airport and to Westgate in our scenarios – but keeping fares the same, is expected to increase PT patronage on average by about 22% over what would occur without them.



In this case, however, there are only about 1.2% fewer car trips, and almost no change in emissions. This is likely because while many commuters shift from driving to PT, especially in areas with improved service, other types of car trips are induced when fewer commuters are on the road and congestion falls. With reducing emissions as a goal, this analysis shows the need for policy to influence the attitudes of driving as well as PT use as the reduction in private vehicle trips is not enough to offset the increased emissions created by PT and induced demand.

Giving PT a fare deal

What if PT was free to use instead of making network improvements? We found the change in PT patronage would be quite similar to a change from network improvements – an increase of 23%, as shown in the previous figure. But we also see a more pronounced impact on private vehicle usage, with a decrease in car trips of a little more than 4% and a corresponding decrease in emissions of about 3%. This is likely because the network has not expanded in this scenario, so those further out cannot substitute from car to PT, but for those where PT is already quite good, there is a shift as a result of the fare-free option.



But how significant is a 3% reduction in vehicle emissions? To put this in context, about 36% of emissions in Auckland are from road transport, and the annual total emissions in Auckland are approximately 12,000kt. This implies a reduction from free PT of about 130kt of greenhouse gases. The social benefits of preventing these emissions are between $9 and $28 million per year, using medium and high values for the social cost of carbon emissions for 2020.

It is worth noting that both these scenarios assume a bus electrification process that will not be complete by the end of the analysis period. This might mean the reduction in emissions is underestimated, should the switch to electric buses happen more quickly (although that in itself needs to be evaluated to determine whether the emissions reduction benefits justify any additional costs).

Having it both ways

Finally, we test free fares on a PT network that includes the major infrastructure projects described above. In this case, the increase in patronage is greater than the two interventions put together, estimated at a 54% increase in PT usage (shown in the first figure).

This increase in PT usage causes car trips to fall by 6% and even though the average trip is slightly longer, the time an average car trip takes falls by 3% to 7%. While this might not seem like a big amount of time, this reduction in per-trip time would equate to millions of hours of passenger time per year. If the average value of time is roughly $15 to $20/hour, the benefits would be significant.

Unsurprisingly, this is also the scenario with the biggest impact on emissions. Here, emissions fall by about 4% (shown in the second figure) when compared to the base case. Using a similar calculation as before, this equates to around 180kt of greenhouse gases, valued somewhere between $12 and $38 million per year.

Let's talk about costs

What about the costs of service improvements and fare-free PT?

CRL is one major improvement that will cost around $4.4 billion in capital expenditure. The Eastern busway is budgeted at around $1.4 billion. Light rail will be billions more.

And at present, farebox recovery is around $300 million a year. This cost, plus the cost of any additional capacity to accommodate more demand, would be what a fare-free policy would incur.

What does this tell us?

These scenarios reveal a few things that can help inform the conversation on good transport policy. At a high level, we learn that emissions reductions alone are unable to justify a policy as radical as free PT, with a value of the reduction in the tens of millions of dollars per year but a likely cost in the hundreds of millions of dollars.

This does not imply that reducing emissions is a bad thing, but rather points out that emissions cannot make the case for free fares on their own. Naturally, there are other important reasons to consider making PT free – congestion, social equity, better access to jobs, and a nudge toward sustainable transport – but as always, the value of these impacts needs to be weighed against the costs.

We also learn that PT users respond to both changes in service quality and changes in fares. Put simply, this is because fares are not the only or even necessarily the dominant cost in someone's decision to use the service. The other costs of travelling are largely time costs – waiting, delays, transfers, headways, and total in-vehicle travel time – costs that an improved network can lower. The modelled results suggest that fare reductions and the service quality improvements we looked at are equally important to PT users.

It is important in all this thinking to remember that "bums on seats" is not the goal. PT is a ***means*** to achieving the other outcomes we have highlighted. One further implication of the analysis is that improved PT itself won't eliminate congestion and emissions. Something that cuts more to the behaviour of motorists, such as congestion charging, is still likely to be needed.

Looking to the future as Covid-19's immediate health risks appear to be subsiding in New Zealand, our city and our country's finances will be constrained in a way we haven't experienced in recent decades. In that future, PT will remain an important part of our transport solution and we expect a strong return to PT use relatively quickly, given how well New Zealand appears to have responded to the health side of the pandemic.

But whatever requirements there were to ensure we made sound transport investment decisions before the pandemic that considered not only congestion benefits (time savings), but also the social cost of emissions, social equity, and access to jobs among others, will need to be redoubled now. Financial limits will make this level of scrutiny by decision-makers imperative.

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