Before a Board of Inquiry
Peka Peka to North Otaki Expressway Proposal
Notices of Requirement and Resource Consents

Statement of evidence of Paul Young: traffic modelling

Date: 9 August 2013

1. My full name is Paul Allen Young.

2. I hold Bachelor of Science with First Class Honours and Master of Science with Distinction degrees in physics from the University of Otago.

3. Since mid-2011 I have been employed as a researcher for the Sustainability Council of New Zealand. My work with the Council focuses on global climate change scenarios, and involves interdisciplinary research into physical climate projections, global impacts, and the economic cost associated with response measures.

Requirement to consider the effects of climate change

4. Section 7(i) of the Resource Management Act 1991 requires decision makers to have “particular regard” to “the effects of climate change”.

5. During expert conferencing for the Mackays to Peka Peka Expressway proposal, surface water experts recommended to include sensitivity testing for high range climate change scenarios to 2115.\(^1\) Conditions on the consents require that testing to be undertaken.

6. In its submission on that proposal, and on this proposal, Generation Zero noted that NZTA’s traffic modelling had not considered climate change scenarios, including high end scenarios.

7. The response from the New Zealand Transport Agency’s traffic modelling expert to the Generation Zero submission confirms that climate change impacts have not been modelled:

   i. "Paul Young (102899)

   ii. [239] "Mr Young has suggested that the traffic modelling used for the Project does not take into account climate change and a significantly raised carbon price. As explained in the body of my evidence above, the WTSM model uses land use

data, calibrated trip behaviour models predicted future year land use patterns, economic variables and assumptions about future improvements to the transport system. In the 2011 revalidation of the model, significant work was undertaken to look at fuel pricing and vehicle efficiency. This work utilised information from the Ministry of Economic Development and concluded that although significant fuel price rises are forecast, they will be offset by improvements in efficiency of vehicles. These inputs have been used for the transport modelling and future forecasting.

iii. [240] “Further, Mr Young’s submission queries whether the traffic modelling has taken into account aging population demographics. I understand that the WTSM model, following its revalidation in 2011, uses current Statistics NZ population data to reflect changing trends in age and employment.”

**Likelihood of significant temperature increase**

8. Based on current trajectories for greenhouse gas emissions, current scientific projections indicate future temperature increase on the order of 4°C above pre-industrial levels by 2100 is probable, with worst-case scenarios on the order of 6°C. The situation was summarised in the July 2013 report *New Zealand’s changing climate and oceans: The impact of human activity and implications for the future* by the Office of the Prime Minister’s Science Advisory Committee:

i. “The 4th IPCC Assessment identified that even a 2°C increase in global mean temperature is likely to have substantial environmental, economic and human impacts, however maintaining the global climate within this threshold is now extremely challenging. A recent International Energy Agency report², highlighted that if current trajectories of emissions continue, the average temperature increase by 2100 is more likely to be between 3.6°C and 5.3°C (compared with pre-industrial levels). To have even a 50% chance of staying below the 2°C benchmark means that no more than 1.8 trillion tonnes of CO₂ can henceforth be released into the atmosphere.³ At current rates of emissions, this amount would have been released before 2050.”

**Economic impacts of likely warming**

9. The economic impacts of a given temperature increase are difficult to predict, both at global and regional scales. However, there is strong reason to believe that such impacts will be severe, particularly for high end warming scenarios. A 2012 report from the World

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² Redrawing the energy climate map, IEA, June 2013.
Bank put it this way (emphasis added): 4

i. “Given that uncertainty remains about the full nature and scale of impacts, there is also no certainty that adaptation to a 4°C world is possible. A 4°C world is likely to be one in which communities, cities and countries would experience severe disruptions, damage, and dislocation, with many of these risks spread unequally. It is likely that the poor will suffer most and the global community could become more fractured, and unequal than today.”

10. Even at the globally agreed goal of less than 2°C there is likely to be “substantial impact”, as noted in the aforementioned study by the Office of the Prime Minister’s Science Advisory Committee.

11. Quantitative estimates of likely economic impact are scarce and subject to some controversy. One prominent study that attempted to do this was the 2006 Stern Review on the Economics of Climate Change, which concluded (emphasis added): 5

i. “In summary, analyses that take into account the full ranges of both impacts and possible outcomes - that is, that employ the basic economics of risk - suggest that [business-as-usual] climate change will reduce welfare by an amount equivalent to a reduction in consumption per head of between 5 and 20%. Taking account of the increasing scientific evidence of greater risks, of aversion to the possibilities of catastrophe, and of a broader approach to the consequences than implied by narrow output measures, the appropriate estimate is likely to be in the upper part of this range.”

12. Lord Stern commented this year that he now believes the 2006 review significantly understated the risks. 6

13. Scaling the global economic impact down to specific regions adds further complications. Impacts will come not only from local effects and events but also through effects on trading partners. The Office of the Prime Minister’s Science Advisory Committee stated: 7

i. “The strong dependence of New Zealand’s economy on international trade implies that the country will also be affected by the impacts of climate change [on] other nations’ economies, and by changes in production internationally as well as in New Zealand.”

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5 Page x, Executive Summary, Stern Review: The Economics of Climate Change, 2006.
6 Climate Change Worse Than Expected, Argues Lord Stern, Scientific American, 3 April 2013.
14. As an example of local impacts, the cost of the 2013 drought to the New Zealand economy is estimated to be on the order of $2 billion⁸.

Relation to traffic volumes

15. The connection between economic activity and traffic volumes is acknowledged in the AEE, which notes:⁹

i. “A small decline in traffic volume has been observed since 2009, likely due to fuel price increases and a slow-down of economic activity following the financial crisis.”

16. Traffic projections in New Zealand and abroad are entering a time of uncertainty.¹⁰ There are multiple reasons including:
   - Ongoing response to the global financial crisis;
   - Changing technology such as cell phone and internet use;
   - The effect of consistently high oil price;
   - New Zealand’s ageing population.¹¹

17. Even low end climate change, in the around degree warming range being experienced today, can cause significant, ongoing economic losses. Damage from regular events, for example, severe thunderstorms, are already causing significant economic losses in the United States.¹²

18. All expert reports on climate change suggest that high end scenarios are extremely disruptive of economic activity, and likely to be more so than some of the cultural changes noted above.

Possible impact of mitigation policy on traffic volumes

19. The figure below, from the 2011 report The Critical Decade by the Australian Climate Commission, shows the rate at which global carbon dioxide emissions must fall in line with a cumulative “carbon budget” delivering a 67% chance of meeting the globally agreed 2°C guardrail. The picture does not look much different for a lower probability of meeting the guardrail. Even without further delay, this suggests net global CO₂ emissions reductions of greater than 4% per annum may be required.

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⁹ Section 13.4.1, Assessment of Environmental Effects.
¹¹ Demand for transport services: impact on networks of older persons’ travel as the population of New Zealand ages, NZTA research report 481, May 2012.
20. Considering this sort of requirement as a potential reality, modeling the effect on traffic demand with an increased fuel price alone is inadequate. The Briefing to the Incoming Minster of Transport 2011 notes:

i. “To illustrate, even at a carbon price of $100 per tonne, the price effect at the pump would amount to around $0.27 per litre, reducing the growth in emissions by about 1 percent in the period 2010 to 2030, compared to a situation where there was no carbon price.”

21. Domestic climate change mitigation measures in line with targets to which New Zealand has made formal international commitment would likely require significant further intervention in travel demand, the effects of which on this project have not been modelled.

Conclusion

22. Modelling for climate change scenarios, including high end climate change scenarios is
accepted as a requirement under section 7(i).

23. Such analysis has not been undertaken in terms of traffic modelling.

24. Reputable reports on the economic impacts of climate change suggest that it is likely to be highly disruptive to the economy, particularly in high end scenarios, where the economy may have to bear large losses, with immediate and possibly ongoing drops in economic activity.

25. Government policy is to work with other nations to cut emissions to keep within a 2 degree global warming target. Current projections are that that would require radical cuts in emissions from all sectors, including transport. NZTA traffic modelling has not examined those possibilities either.