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Submission to the Productivity Commission's Low-emissions Economy – Issues Paper

Thank you for the opportunity to provide a response to the New Zealand Productivity Commission's low-emissions economy issues paper.

The following submission has been prepared by the Auckland Regional Public Health Service (ARPHS) and is endorsed by the Chief Executives of the Auckland, Waitemata, Counties Manukau, and Northland District Health Boards (DHBs).

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Yours sincerely,

Ailsa Claire
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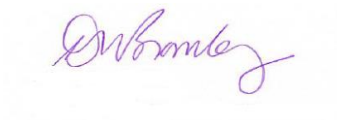

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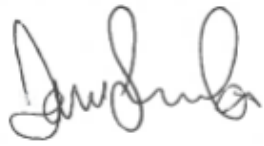

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Executive summary

1. Health services are major end-users of carbon and energy-intense products and services, and therefore have the potential to play an important role in climate change mitigation and adaptation. DHBs are already developing policies and strategies to manage and mitigate against greenhouse gas (GHG) emissions. However, further reductions in health sector emissions could be supported by future-focused policy and financial frameworks that enable DHBs and the health sector to make long term investments that result in the provision of low emission health services. Similar legislation to the UK's Climate Change Act could help to underpin and protect this investment approach.
2. Factors affecting the *demand* for emissions, and the way in which policies and institutional arrangements can reduce consumption of high emission goods and services by end-use sectors, is an important consideration when seeking to create a low emissions economy. It is therefore recommended the Inquiry examine the potential influence and impact that end-use sectors could have on reducing New Zealand's domestic GHG emissions.
3. Beyond recognising the health sectors potential contribution to reducing GHG emissions, this submission provides responses to selected questions from the Issues Paper, and recommends using economic analytical frameworks which can deal with the science, complexity, uncertainty, and scale of changes needed to deal with climate change better than current frameworks.
4. Key discussion points include:
    - A recommendation that the Commission incorporates Nicholas Stern's detailed analysis of why the economics, ethics and equity of climate change mitigation and adaptation cannot be separated.
    - A recommendation that the Commission considers the potential role of large "end use sectors" such as the health sector and demand-side strategies.
    - Purchase incentives are considered the most effective tools in promoting the uptake of electric vehicles (EVs). ARPHS and the DHBs believe there are several benefits for augmenting financial incentives that allow government and private organisations to replace their existing conventional vehicle fleets with EVs.
    - In Auckland, public transport will need to play a major role in alleviating congestion and improving the efficiency of the transport network. ARPHS and the DHBs support increased investment in active and public transport modes that take best advantage of the underlying urban form.
    - ARPHS and the DHBs sustainability advisors, in consultation with Auckland Council, are looking at ways to reduce health service waste.
    - Low emission policies, particularly those aimed at the transport and household energy use sectors, are likely to provide co-benefits for health, including improved air quality, social well-being, physical health, and obesity reduction.
    - Consideration of the potential effects on health and well-being of lower socio-economic households needs to be at the forefront when evaluating the impacts of price-based mechanisms. Any carbon

pricing initiatives should be structured in a way that supports and protects low income households from hardship while transitioning to a low emissions economy.

Health services needs to be part of planning New Zealand's Low Emissions Future

5. Health services are an important part of New Zealand's economy, with 9.5% of GDP allocated to health services (excluding capital expenditure) in 2013.[1] Health services are major end-users of carbon and energy-intense products and services, and operate major facilities with substantial energy and resource use. Health services need to be part of the preparation for New Zealand's low emissions future, and should be able to exert pressure on suppliers through procurement policy.

General comment on the Issues Paper

6. The transition to a low emissions economy raises complex social, ethical and practical issues, which cannot be separated from economic considerations. We note that although equity and social cohesion are included in the Inquiry's terms of reference, these are only briefly mentioned as a potential down sides of policies such as emission pricing, which is inadequate. We recommend that the Commission incorporates Nicholas Stern's detailed analysis of why the economics, ethics and equity of climate change mitigation and adaptation cannot be separated.[2]
7. Stern makes explicit links between the ethics, equity and economics of climate change mitigation and adaptation, and the UN Sustainable Development Goals (SDGs). This approach is being adopted by some companies; for example Auckland International Airport Ltd[3] in its corporate social responsibility strategy. The SDGs are directly relevant to many aspects of health status and health services. In the context of climate change response and sustainable development Stern states that:

   "To do this we must start by being clear about six things:

   (1) the scale of the necessary emissions reductions [which is massive and largely against trend];

   (2) that the transition to low-carbon requires radical change;

   (3) that it will have many attractive features beyond reducing climate risk;

   (4) that the next two decades, when the low-carbon transition must be strong, coincide with a strong structural transformation in the world and national economies in terms of changing balance of output, rapid urbanization, and so on, and that good management of the investments for the structural transformation (including avoiding waste, pollution, and congestion) will also provide a very powerful contribution to emissions reductions;

   (5) that the low-carbon transition is a sustainable growth story with great potential for overcoming poverty in the next few decades; and

   (6) that substantial investment resources and new technologies are required.

   As an attempt at high-carbon growth will self-destruct in the deeply hostile physical environment it is likely to create, there is little point in "equitable access to a train wreck."[4]

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[1] OECD. (2015). *How does health spending in New Zealand compare?* Retrieved from https://www.oecd.org/els/health-systems/Country-Note-NEW%20ZEALAND-OECD-Health-Statistics-2015.pdf

[2] Stern, Nicholas (2013). Why Are We Waiting?: The Logic, Urgency, and Promise of Tackling Climate Change; (Chapters 5 and 6). MIT Press. Kindle Edition

[3] AIAL. (2016). Corporate Responsibility Report. Retrieved from https://corporate.aucklandairport.co.nz/~/media/Files/Corporate/Social-Responsibility/CSR-Report-June-2016.ashx?la=en

[4] Stern, N. (2013). Op cit. (p 294)

8. A key underlying consideration is the economic framework the Commission uses. Anthropogenic climate change has been described as a market failure with global consequences, for example in the Stern review and subsequent research. On that basis, we would therefore expect major limitations in the ability of existing market structures to address climate change and the massive reduction in emissions needed. It is not simply a case of internalising existing externalities. Climate change is pushing the economy and ecology further from equilibrium, and decisions made over the last decades and from now on will not be about marginal effects; rather the future pathway has to contend with uncertainty and discontinuity. This means that standard economic analysis based on general equilibrium and marginalism and reliance on growth *per se* will not be adequate. The "integrated assessment models" used to assess economic impacts of climate change have grossly underestimated risk because of the orthodox economic assumptions and methods used.[5] Instead, it is recommended that economic models are based solidly on physical sciences (e.g. ecological economic concepts are far closer to science than neoclassical environmental and resource economics models; the economy needs to be analysed as a complex social phenomena embedded in a constrained biophysical environment and a "full world".[6])
9. Similarly, the ethics and approach to inter-temporal valuation need to be carefully thought through, since the commonly used method of discounting is often done without consideration of assumptions, framework or ethics, and frequently ignores behavioural science research findings on how people actually make inter-temporal decisions, e.g. that prospect theory has greater validity than utility theory.[7] Health benefits should be discounted at a lower rate because they exhibit a lower social time preference.[8]
10. The New Zealand Treasury's default discounting rate of 8% per annum is not appropriate for use for long term planning and is not consistent with the rate used by many OECD countries for this purpose (e.g. the UK uses 3% for long term projects and most EU countries use similar rates). This high discounting rate is a major obstacle to the long term planning needed for the transition to a low emissions economy, including for the health sector. Stern (2006 and 2013) makes an extensive analysis of inter-temporal valuation, which we strongly recommend that the Commission incorporates in its analysis. This includes using discounting frameworks concomitant with the climate impact, uncertainty and time scale of the project (e.g. < 1-2% (or even negative rates) for projects with climate change implications). Current low or negative interest rates on government bonds internationally and ongoing stagnation could be used to encourage longer term climate-adapted infrastructure development. Adopting a science-based approach to economic evaluation would make a profound difference.
11. The paragraph on page 3 states that the Commission will not, in general, be considering adaptation. However, we consider that it will be important to consider the economic impacts of adaptation on the

[5] Stern, N. (2013). "The Structure of Economic Modeling of the Potential Impacts of Climate Change: Grafting Gross Underestimation of Risk onto Already Narrow Science Models." Journal of Economic Literature 51: 838–859
[6] Daly, H., & Farley J. (2004). Ecological Economics. Washington DC, Island Press. Ch 7.
[7] Kahneman, D., & Tversky, A. (2000). Choices, values and frames. NY, Cambridge University Press; White J, Dow S, Intertemporal choices in health, in Roberto CA and Kawachi I (eds) (2016) Behavioral economics and public health, NY, OUP, Chapter 2.
[8] Oliver, A. (2013). A normative perspective on discounting health outcomes. *Journal of Health Services Research & Policy,* 18(3): 186-189.

country's low emission pathways, e.g. infrastructure choices which need to be made as part of adaptation.

12. The Issues Paper focuses primarily on topics of generation of emissions, emission sources and mitigation opportunities, and the policies and institutional arrangements which support reduced emissions and mitigation. The focus is on the *production* of emissions in the *supply* of goods, services and infrastructure. There is much less attention on the factors affecting the "*consumption*" of emissions, and the way in which policies and institutional arrangements can reduce *demand* for high emission goods and services by end-user sectors. A useful paper by Creutzig et al (2016)[9] describes demand-side issues and solutions for "end use sectors". We recommend that the Commission fully incorporates this perspective into its analysis.

The health sector's contribution to reducing greenhouse gas emissions

13. Health services have several broad areas of interest in climate change. The first is the direct and indirect impact of climate change on health (Figure 1). This is well described in the IPCC 5th assessment Working Group 2 report (Chapter 11), including health impacts of heat waves, floods, droughts, vector-borne diseases, food-borne disease, air quality, water quality, food supply and security, and ecological changes, and impacts on physical and mental health, and nutrition. Health equity and ethical issues are also of considerable importance. There are also potential co-benefits for health from a low emission society and economy including improved air quality, social well-being, physical health and obesity reduction.

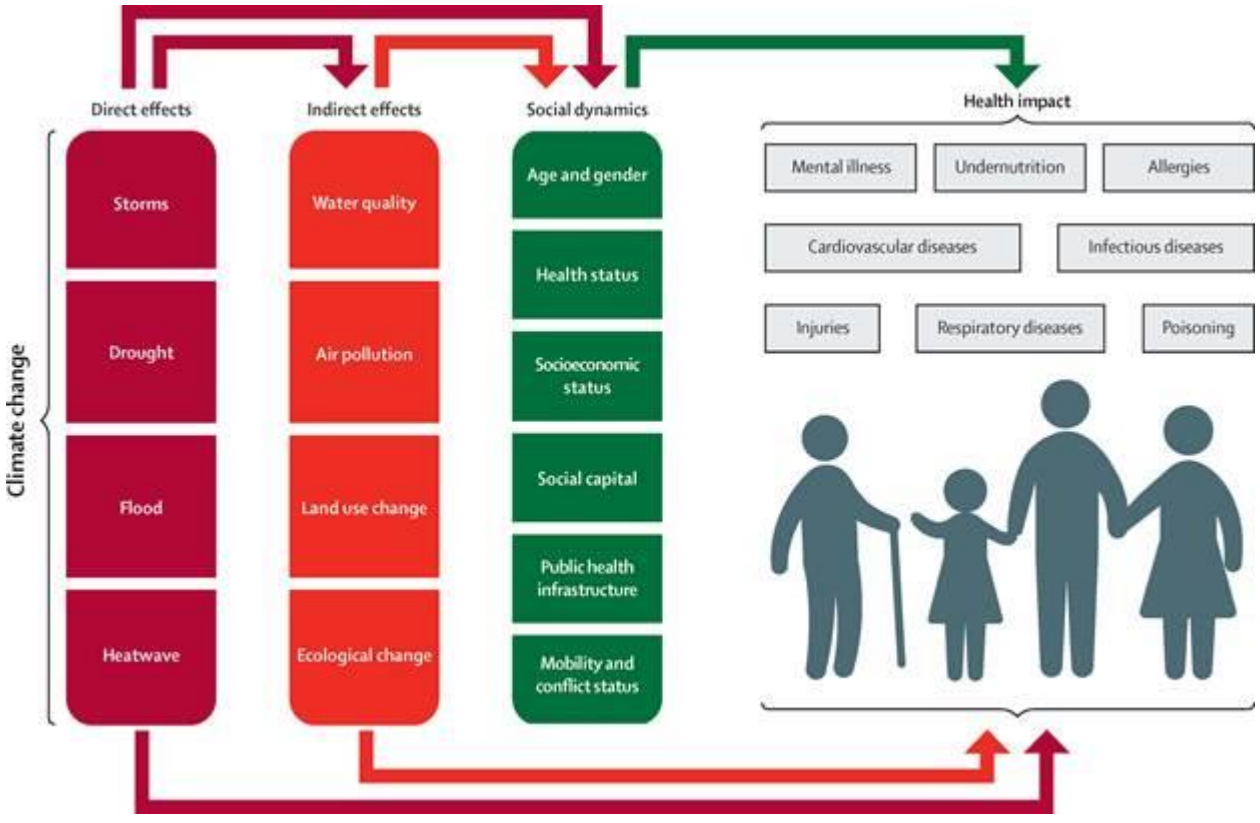

Figure 1: Health impacts of climate change (Lancet Commission on Health and Climate Change)

[9] Creutzig, F., Fernandez, B., Haberl, H. et al. (2016). Beyond technology: Demand-side solutions for climate change mitigation. *Annual Review of Environment and Resources,* 41: 173-198.

14. The second area is mitigation, the main topic of the Commission's Issues Paper. The health sector will need to make major changes to reduce its emissions and environmental footprint as part of mitigation and adaptation. Long term planning is essential for DHBs over the next several decades because of population growth, developments in medical technology, changing patterns of care, and large infrastructure and hospital re-developments. Long term policy, financial and planning frameworks which support a low emission economy and society are essential. DHBs need to be able to plan and provide low emission services rather than being left with high emission facilities and services because of short term financial considerations. A long term framework which facilitates climate change mitigation and adaptation is needed from government, as the health sector's primary funder.
15. Internationally, health service GHG emissions are well recognised, and there are many active programmes for reducing health services' carbon footprint (e.g. HCHW Europe[10]). For example, the UK National Health Service (NHS) has a very active programme through its Sustainable Development Unit (SDU)[11], which has included assessment of the NHS's carbon footprint, which amounts to about 5% of the UK's gross GHG emissions. The NHS SDU programme facilitates integration of the clinical, social, financial and environmental responsibilities of health services to act as good local corporate citizens.
16. While progress is being made here, New Zealand's health services are not international leaders in climate change response, despite requirements in the New Zealand Public Health and Disability Act 2000 for each DHB "to exhibit a sense of environmental responsibility by having regard to the environmental implications of its operations" (section 22(j)), and "to promote the reduction of adverse social and environmental effects on the health of people and communities" (section 23(h)). Current Ministry of Health and Treasury policy and financial frameworks constrain DHBs from making relevant long term investments for low emission health services.
17. Demand-side approaches are of particular relevance to the health sector since it is a major user of goods and services with high embedded carbon, as well as constructing and operating large energy-and technology-intense hospital facilities. For example, the UK NHS SDU carbon footprint assessment identified pharmaceuticals as the largest contributor to the NHS's emissions. New Zealand's health services are particularly dependent on imported materials, medical supplies, equipment and technology, much of which has a high carbon footprint and is air-freighted.
18. Some of the important emission-related aspects of DHB activities include:

    - Energy – both as user of electricity, and generator of electricity and heat
    - Construction/demolition
    - Operations of facilities

[10] Healthcare Without Harm (2016). Reducing Healthcare's Climate Footprint: Opportunities for European Hospitals and Health Systems. Retrieved from https://noharm-europe.org/sites/default/files/documents-files/4746/HCWHEurope_Climate_Report_Dec2016.pdf

[11] http://www.sduhealth.org.uk/

- Procurement
- Pharmaceuticals
- Waste
- Food
- Transport (including freight)
- Waste anaesthetic gases are an additional source of GHG emissions from health services. Some of these gases are potent GHGs (e.g. desfluorane has a GWP100 of >2000 times that of CO_2) and nitrous oxide is commonly used in large quantities. These gases account for around 5% of acute hospital emissions in the UK. There are now several programmes in New Zealand hospitals to reduce these emissions, and anaesthetic gases can be included in CEMARS assessments.

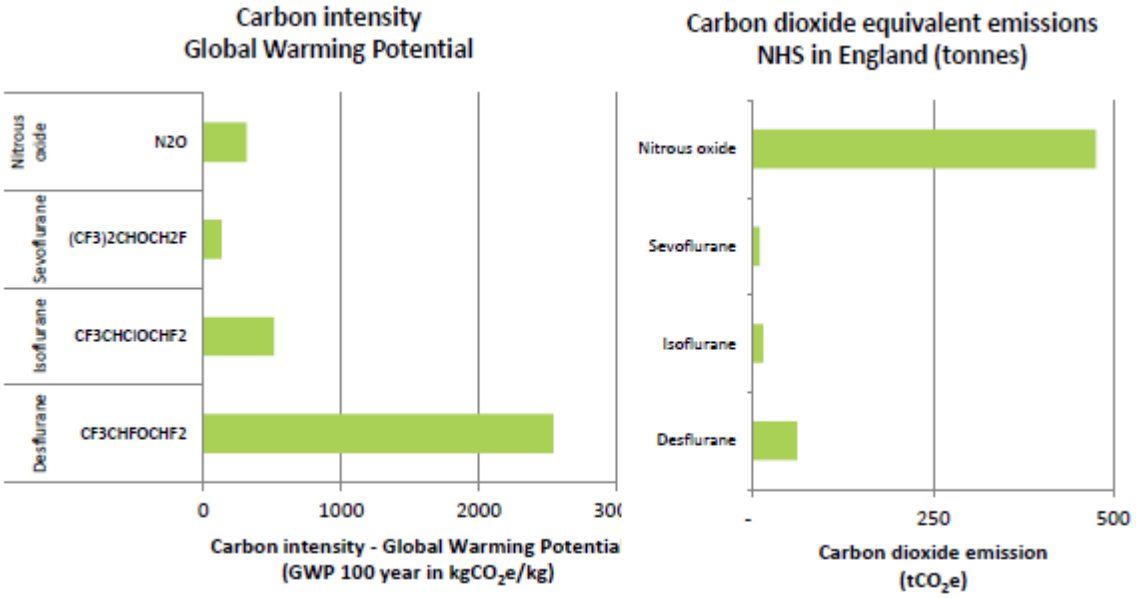

Figure 2: Contribution of anaesthetic cases to health sector emissions, UK NHS SDU

19. Several DHBs have undertaken Certified Emissions Measurement and Reduction Scheme (CEMARS) assessments. CMDHB and ADHB are CEMARS certified organisations and are both measuring and managing their GHG emissions. Other DHBs are carbon accounting (NDHB) or have gained other forms of environmental accrediting (WDHB). Many more are developing business cases to support the recruitment of sustainability managers and to develop the policy and strategies to manage and mitigate against GHG emissions.
20. The remainder of this submission addresses selected questions raised in the Issues Paper.

Q8 – What are the main barriers to the uptake of electric vehicles in New Zealand?

Q9 – What policies would best encourage the uptake of electric vehicles in New Zealand?

21. A US study by Egbue and Long found that although the sustainability and environmental benefits of EVs influence EV adoption, potential buyers ranked these benefits behind cost and performance.[12]
22. The comparative analysis carried out for the United States by Jin, Searle and Lutsey (2014) indicates purchase incentives are the most pertinent and the most effective tools in promoting EV sales.[13]
23. In particular, an incentive provided for one-car families in the lowest incomes brackets would also be beneficial as this sector is likely to be driving the oldest cars. As an example, we note the State of California has introduced a number of financial incentives in an attempt to have more low to middle income households purchase EVs.[14] [15]
24. ARPHS and the DHBs support the electrification of DHB vehicle fleets, and we are aware of a few DHBs which have started on this track, including a joint project between Christchurch City Council and the Canterbury DHB. However, Ministry of Health funding frameworks, constrained budgets and initial outlay costs make transitioning to an EV fleet difficult to justify, even if existing contestable funds become available to DHBs. Therefore additional consideration needs to be given to providing extra funding opportunities to make such a transition financially viable.
25. ARPHS and the DHBs consider there are several benefits for augmenting incentives that allow government and private organisations to replace their existing conventional vehicle fleets with EVs. Uptake of EVs in government/private fleets will have the additional benefit of expanding the second-hand availability of EVs when those fleet vehicles are sold off and replaced. Uptake of EVs by large established organisations may also provide some certainty and support to infrastructure providers when it comes to knowing where to locate infrastructure such as charging stations.
26. Another advantage is that government/private fleets would be highly visible to the public, and provide a strong lead by example message. DHB fleets would be an excellent example.
27. This view is supported by the International Energy Agency's recognition of the benefits of EV fleet procurement programs:[16]

> *"Fleet operators, both in public authorities and the private sector, can contribute significantly to the deployment of EVs: first through the demand signals that they can send to the market, and second thanks to their broader role as amplifiers in promoting and facilitating the uptake of electric cars by their staff and customers" (page 17).*

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[12] Egbue, O., & Long, S. (2012). *Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions*. Retrieved from http://dx.doi.org/10.1016/j.enpol.2012.06.009

[13] https://www.iea.org/publications/freepublications/publication/Global_EV_Outlook_2016.pdf

[14] CleanTechnica. (2015). *Incentives Of Up To $12,000 In California To Get Low-Income People To Upgrade To Fuel-Efficient Cars From Gas Hogs*. Retrieved from https://cleantechnica.com/2015/06/18/incentives-12000-california-get-low-income-people-upgrade-fuel-efficient-cars-gas-hogs/

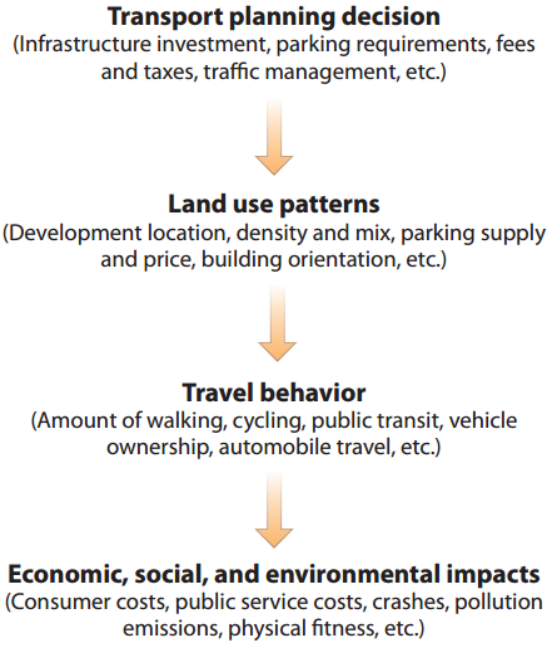
[15] Electrek. (2016). *California increases EV rebate by $500 for lower-income buyers, makes earners over $150k ineligible.* Retrieved from https://electrek.co/2016/10/18/california-increases-ev-rebate-by-500-for-lower-income-buyers-makes-earners-over-150k-ineligible/

[16] International Energy Agency. (2017). *Global EV Outlook 2017.* Retrieved from https://www.iea.org/topics/transport/

28. Aiming the incentives at sectors where travel by car is needed for service delivery (i.e. community nurses visiting patients), will help to increase the number of EVs as a proportion of the national fleet, rather than increase the per capita vehicle ownership rate.
29. The latest International Energy Agency's Global EV Outlook report provides a useful review of the policy options adopted internationally to incentivise the uptake of EVs.

Q10 – In addition to encouraging the use of electric vehicles, what are the main opportunities and barriers to reducing emissions in transport?

30. The urban form and the quality of the built environment can help to reduce GHG emissions from transport by enabling high accessibility to low-carbon modes. Spatial characteristics such as density, land use, connectivity, and accessibility can affect transport emissions.[17]
31. The WHO[18] notes that urban planning and health behaviour studies consistently find that how communities are built influences whether or not people use public transport, drive, walk or cycle to get to their destination. Importantly, transport planning decisions influence the way land is used, the development of built environments and the behaviours that follow from communities, families and individuals. The built environments and the behaviours that transport investment incentivise have a well-established evidence-based impact on social, economic and health outcomes.[19]

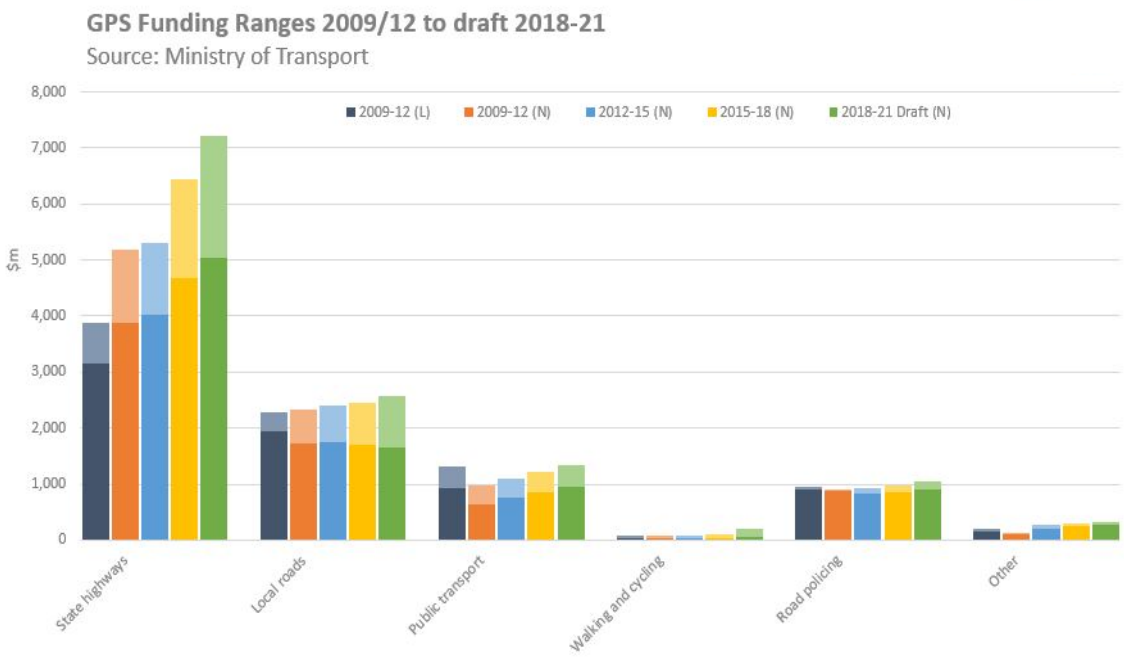


[20]

32. There needs to be strong coordination between land use and public transportation routes to reduce private vehicle use (e.g. the Auckland Unitary Plan's impetus on a quality compact urban form should help to facilitate improved and more effective public transport initiatives).

[17] Creutzig, F., Fernandez, B., Haberl, H. et al. (2016). Beyond technology: Demand-side solutions for climate change mitigation. *Annual Review of Environment and Resources,* 41: 173-198.
[18] World Health Organisation. (2006). *Promoting physical activity and active living in urban environments.* Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0009/98424/E89498.pdf
[19] Todd Litman. (2013). Transportation and Public Health. *Annual Review of Public Health,* 34: 217-233.
[20] *Ibid*

33. There is an opportunity in New Zealand to increase the level of investment in active and public transport modes. Tracking the proportion of investments in activity classes over time in previous Government Policy Statements on Land Transport indicates a serious skew towards state highway investment. Although major investment was required in highways for all of New Zealand, the investment trends highlight the relative under investment in public transport.



34. Public transport will need to play a major part in alleviating congestion and improving the efficiency of the transport network in Auckland; thereby helping to reduce GHG emissions from the transport sector. Increased allocation of funding towards active and public transport modes needs to be accompanied with good planning, design and decision-making.
35. Policies also need to directly incentivise emission reducing behaviour from end users, and ARPHS and the DHBs support other measures, such as:
    - Vehicle emission standards
    - Regional fuel tax or other alternative pricing of private motorised transport, such as congestion charging.
    - Greater use of workplace travel demand strategies such as carpooling, teleconferencing, flexible working arrangements, including working from home.

Q 16 - What policies and initiatives would best promote the design and use of buildings that produce low greenhouse gas emissions?

36. In addition to the issues and options noted on pages 31-32 of the Issues Paper, ARPHS and the DHBs would like to emphasise the health and emissions co-benefits which arise from improved thermal performance of residential buildings (see under question 33 below). This has been very well demonstrated by New Zealand research of He Kainga Oranga, the Housing and Healthy Research

programme at the Wellington School of Medicine.[21] Many homes are poorly insulated, damp and unhealthy, but recent amendments to the Residential Tenancies Act on insulation only require an out-of-date standard. We support requirements for a Warrant of Fitness for residential tenancies covering all rental housing.

37. For hospitals and related buildings and infrastructure, we support high standards for low carbon and energy efficient buildings. The operational cost savings should offset any increase in construction costs, although many improvements in thermal performance and energy use come from design. We know of proposals for a "climate-smart" construction programme for Dunedin Hospital's re-build, and gathering interest among other DHBs for low carbon/energy efficient/climate change ready construction. This will need support from the Ministry of Health and Treasury to facilitate this transition to low carbon infrastructure.

Q17 – What are the main opportunities and barriers to reducing emissions in waste?

38. In the Auckland region, Auckland Council has adopted a "Zero waste to landfill" strategy, and is currently revising its waste management strategy, under the Waste Minimisation Act 2008. ARPHS and the DHB sustainability advisors support the direction of the Council's plan, and are looking at ways of working with the Council to reduce health service waste, and hence its environmental impact.
39. The Zero Waste concept is linked to a range of conceptual tools and methods, such as, life cycle assessment and product stewardship, which aim, among other things, to design waste out of products and services, hence preventing emissions. Waste reduction can also be made through changes in production, packaging, change of pattern of use, re-use and recycling, and end of use. To support this, large organisations such as DHBs could use their purchasing leverage to require supply of products with low or zero waste through RFP and purchasing specifications.
40. Food waste from health services contributes to methane production. Several DHBs are developing programmes for reducing food waste and for collection and composting. Support for local food production may also reduce emissions from "food miles".
41. For the purpose of reducing methane emissions, ARPHS and the DHBs support the potential elimination of organic material from landfills through the investigation of alternative waste management options like composting, incineration or anaerobic digestion. However, any schemes enabling the separation of household food waste need to manage the nuisance creation potential from the accumulation, collection, storage and processing of domestic food waste. ARPHS is responsible for the management of the public health aspects of legionella infections and note the importance of appropriately managing the potential legionella risk from the inappropriate handling, storage and transportation of processed materials. We note that Auckland Council has a proposal for separation and collection of domestic organic waste in parallel with domestic waste and recycling collection, aimed in part at reducing GHG emissions.

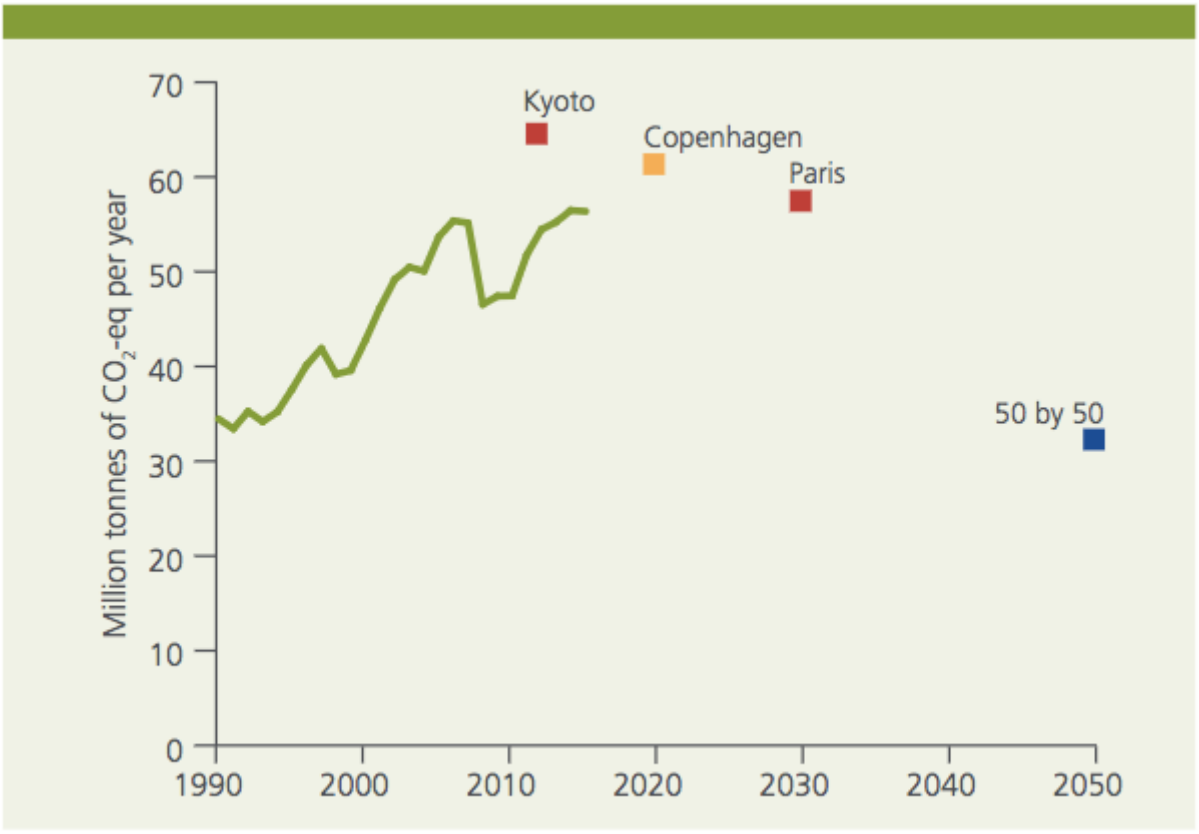
[21] http://www.healthyhousing.org.nz/

42. With our role in air quality issues, we would advise caution about waste to energy schemes, especially for municipal mixed solid wastes. There have been proposals in New Zealand in the past, e.g. for conversion of a disused coal fired power station for incineration and energy recovery, but these have major potential down-sides with emissions of toxic materials such as mercury, cadmium, lead and persistent organic pollutants.[22]
43. ARPHS and the DHBs support the principles of reduction and recycling as a way of minimising waste. However, separating and diverting waste is, to a certain extent, a pointless exercise unless there is strong demand for diverted and recycled materials. The market demand for recycled, reclaimed and new products resulting from waste needs to be understood before committing to such measures. Councils and other organisations procurement policies could be used to stimulate demand for recycled products.
44. ARPHS and the DHBs consider there are opportunities available to reduce the volume of demolition and construction waste to landfill. Building de-construction has merit both for the beneficial impact upon materials salvage, and the reduction of risk from presence of hazardous materials like asbestos. Many DIY enthusiasts would value the opportunity to salvage unused or under-used construction material, but there needs to be sensible pricing and accessible venues to facilitate this.
45. Health care waste management is covered under NZ Standard, NZS 4304:2002. This is in the early stages of much needed revision because of technology and practice changes in the last 15 years.

Q27 – What approaches, such as regulatory frameworks or policy settings, would help embed wide support among New Zealanders for effective reduction of domestic greenhouse gas emissions?

46. For effective reduction of domestic GHG emissions New Zealand will need to provide a clear legislative framework that enables people, communities, businesses and the government to plan for the long-term. The current primary means of reducing GHG emissions in New Zealand is the Emissions Trading Scheme, and under this policy, reductions in our emissions have not been able to offset the growing emissions from transport, industry, and agriculture, and in fact, GHG emissions per capita is the fifth highest in the OECD as illustrated in the Issues Paper. What is required is a framework that enables New Zealand to bend the curve, and not be solely reliant on offshore credits to meet domestic emission targets.[23]

[22] National Research Council (USA) (2000). Waste Incineration and Public Health, Washington DC, National Academy Press
[23] Parliamentary Commissioner of the Environmental. (2017). *Stepping Stones to Paris and beyond.* Retrieved from http://www.pce.parliament.nz/publications/stepping-stones-to-paris-and-beyond-climate-change-progress-and-predictability



Data: NZ Greenhouse Gas Inventory

47. An example of best practice from overseas is the UK's Climate Change Act, passed in 2008. This Act provides an effective framework as it legislates a 2050 emissions target, which creates a chain reaction of liability for other associated government legislation, policy, and plans (existing and new). Furthermore, transparent reporting and accountability are embedded in the framework, clarifying to the public, business and government about what has to be done to ensure a sustainable decline of GHG emissions. Finally, such a framework also addresses the practical concern of climate change being a long-term problem.[24]
48. ARPHS and the DHBs recommend a similar framework be implemented in New Zealand, one that recognises the different dynamics of our emissions profile, and enables consistent and long-term planning across multiple terms of government in how best to meet our emission targets. Furthermore, there is a need for domestic targets to be met with domestic structural changes, as these will have a long-term impact compared to purchasing international credits, which is a short-term solution to a long term problem.

[24] Client Earth. (2009). *The UK Climate Change Act 2008 - Lessons for national climate laws*

Q33 –What are the main co-benefits of policies to support a low-emissions transition in New Zealand? How should they be valued and incorporated into decision making?

49. Policies that support a transition to a low emissions economy will have additional and independent effects on health, most of them beneficial,[25] and these benefits will be experienced in the near term.[26] Paragraphs 13, 31 and 36 of this submission briefly touched on some of these potential co-benefits.
50. Climate change mitigation policies aimed at the household energy use, urban land transport, electricity generation, and food and agriculture sectors can result in health co-benefits. ARPHS and the DHBs consider low emission policies aimed at the transport and household energy use sectors are particularly relevant to the Auckland region.

Urban land transport

51. As mentioned on page 25 of the Issues Paper, improving the efficiency of the transport system and reducing the use of cars can reduce harmful emissions and lower levels of traffic congestion.
52. In summer, transport is the biggest cause of air pollution in Auckland, emitting approximately 3.1 tonnes of PM_{10} per day.[27] PM_{10} is the best available indicator of the sources and effects of other pollutants. Considering other emissions apart from CO_2, primary tail pipe emissions from transport that are of concern to health include $PM_{2.5}$, nitrogen dioxide, carbon monoxide, black carbon, benzene and polycyclic aromatic hydrocarbons.
53. The health effects from exposure to these harmful emissions are largely respiratory and cardiovascular. The cost of this pollution is high. Using 2006 as the base year, the Updated Health and Air Pollution in New Zealand (HAPINZ) 2012 study[28] calculated the health impacts and social costs associated with emissions from motor vehicles in the Auckland region. The study found that each year in the Auckland region, as a consequence of motor vehicle emissions:

    - 126 adults over 30 years old die prematurely.
    - Approximately 28 cardiac and 57 respiratory hospital admissions occur.
    - There are approximately 215,000 restricted activity days for all ages.
    - Social costs (for all of the above) of $465 million.

54. Congestion produces numerous economic and public health costs. It should be noted that uptake of active and public transport modes have a definitive advantage over electric vehicles if combating congestion is a

[25] Watts, G. (2009). *The health benefits of tackling climate change - An Executive Summary for The Lancet Series.* Retrieved from http://www.who.int/globalchange/publications/tackling_climate_change/en/

[26] Watts, N., Adger, N., Ayeb-Karlsson, S. et al. (2017). The Lancet Countdown: tracking progress on health and climate change. *Lancet,* 389: 1151-1164.

[27] Auckland Council. (2017). Air quality report card, Auckland area 2016. Retrieved from https://www.aucklandcouncil.govt.nz/environment/state-of-auckland-research-report-cards/Documents/air-quality-report-card-auckland-area-2016.pdf

[28] Kuschel, G., Metcalfe, J., Wilton, E., Guria, J., Hales, S., Rolfe, K. & Woodward, A. (2012). Updated Health and Air Pollution in New Zealand Study, Vol 1: Summary Report. Emission Impossible Ltd, Auckland.

priority. A recent NZIER report[29] estimated the benefits of decongestion to the current network capacity in Auckland would be between $0.9 billion to $1.3 billion (1% to 1.4% of Auckland's GDP).

55. A NZTA report[30] considered the benefits of shifting trips from car-based modes to public transport. It found that the remaining users of the road would benefit from decreased congestion, air pollution and costs. The average benefit to remaining road users applies to the peak-hour traffic, and is $1.41/vehicle-km for Auckland as shown in the table below.

Peak period average benefits to remaining road users (2008 $)

	Auckland	Wellington	Christchurch	Other
Average benefits including travel time, VOC and CO_2 (/vehicle-km)	$1.41	$1.08	$0.10	$0.00

56. A recent report on the roads of New Zealand and Australia[31] identified Auckland as performing very poorly on reliability as road users needed to budget up to an additional 45% in their travel times in order to arrive at their destinations on time during afternoon peak hours. It is not only the duration of journeys that needs to be improved but also reducing the variability of arrival times in Auckland.

Sydney, Auckland and Wellington are the worst performing cities in their respective groups

Key Congestion Measures – By City, Weekdays

City	Average Speed (Km / Hr)	Travel Time Delay (%)	Reliability (%)		Scheduling (%)	
			Morning Peak (6am to 10am)	Afternoon Peak (3pm to 7pm)	Morning Peak (6am to 10am)	Afternoon Peak (3pm to 7pm)
	How fast does traffic in the city travel?	*How much is traffic delayed from free-flow conditions?*	*What is the statistical reliability of travel times in the morning peak period?*	*What is the statistical reliability of travel times in the afternoon peak period?*	*How much time does a consumer need to budget during the morning peak period, relative to free-flow?*	*How much time does a consumer need to budget during the afternoon peak period, relative to free-flow?*
Sydney	29	31%	14%	9%	49%	50%
Melbourne	34	23%	11%	8%	34%	41%
Brisbane	52	12%	8%	6%	23%	23%
Perth	58	14%	7%	6%	22%	25%
Auckland	42	22%	12%	10%	37%	45%
Adelaide	28	11%	7%	3%	16%	17%
Canberra	61	9%	7%	4%	15%	14%
Hobart	42	8%	6%	4%	12%	15%
Wellington	55	10%	9%	9%	21%	20%
Darwin	36	4%	1%	2%	5%	6%

City Group: Group 1 Group 2 Group 3

Note: As analysis was based on 600km of the most congested roads, comparisons are better drawn among cities within the same group based on population size.

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[29] New Zealand Institute of Economic Research. (2017). *Benefits from Auckland road decongestion.* Retrieved from https://nzier.org.nz/publication/benefits-from-auckland-road-decongestion

[30] Ensor, M et al. (2010). Forecasting the benefits from providing interface between cycling and public transport. New Zealand Transport Agency

[31] Austroads. (2016). Congestion and Reliability Review. Austroads. ISBN 978-1-925451-49-8

[32] *Ibid*

57. Spending longer periods sitting in traffic helps contribute to sedentary lifestyles. A longitudinal study from a representative sample of the British Household Panel survey[33] found that switching from active travel or public transport to private motor transport was associated with a significant increase in body mass index (BMI). This relationship also held in the reverse direction. The results were adjusted for socioeconomic status and health related covariates. The implication of these findings suggests that a shift in the proportion of commuters using more active modes of travel could contribute to efforts to reduce population mean BMI.

Household energy use

58. As stated in the Issues Paper, improving the energy efficiency of buildings has co-benefits of improved comfort and health for occupants. People who live in homes with adequate insulation and heating are less vulnerable to cold related illnesses and respiratory diseases during winter.
59. Unfortunately, a high proportion of New Zealand's rental accommodation stock is of poor quality, damp, mouldy, poorly insulated, and in poor repair.[34] Statistics NZ data indicates that just under half of all renters reported they had a problem with dampness or mould[35], despite the Housing Improvement Regulations 1947 that establish the requirement for a home free of dampness.
60. The results from the recent House Condition Survey[36] report conducted by the Building Research Association of New Zealand suggest that there is still much room for improvement. The survey indicates that:
    - 47% of houses have less than 80% coverage of 120mm insulation in the roof space, and 19% of houses have less than 80% coverage of subfloor areas – indicating that 53% of houses could benefit from retrofitted insulation in the roof space and/or subfloor.
    - Of those households surveyed, 5% did not usually heat living areas at all in winter, and almost half did not usually heat any occupied bedrooms in winter.
    - Rental properties surveyed were twice as likely to smell damp than owner-occupied houses, and nearly three times as likely to feel damp.
    - Mould was visible in nearly half of all houses surveyed (slightly more common in rentals).
61. The link between cold, damp and mouldy housing and poor health has been made in multiple New Zealand[37] and international studies.[38] Each year New Zealand hospitals admit around 45,000 children for

[33] Martin A, Panter J, Suhrcke M, et al. (2015). Impact of changes in mode of travel to work on changes in body mass index: evidence from the British Household Panel Survey. *J Epidemiol Community Health*, 69: 753-761.
[34] Statistics NZ (2016). Perceptions of housing quality in 2014/15 from the 2014 New Zealand General Social Survey. Retrieved from: Statistics NZ. http://www.stats.govt.nz/browse_for_stats/people_and_communities/housing/perceptions-housing-quality-2014-15.aspx
[35] *Ibid*
[36] https://www.branz.co.nz/cms_show_download.php?id=50335e67bb00f3e0464097be1d4d71ac8a85f6bf
[37] Howden-Chapman P, Pierse N, Nicholls S, Gillespie-Bennett J, Viggers J, Cunningham M, et al. (2008). Effects of improved home heating on asthma in community dwelling children: Randomised community study. *Br Med J*, 337: 852–855.
[38] Jaakkola JJK, Hwang B-F, Jaakkola MS. (2010). Home dampness and molds as determinants of allergic rhinitis in childhood: A 6-year, population-based cohort study. *Am J Epidemiol*, 172(4): 451–9.

conditions that are exacerbated by poor quality housing (contributing factors include overcrowding, dampness, mould, fuel poverty, informal temporary housing arrangements).[39]

62. Improving the energy efficiency of homes will help to reduce demand pressures on New Zealand's healthcare system. It will also reduce heating costs for households. New Zealand research has demonstrated that retrofitting houses with insulation is good value for money.[40]
63. Regulations help to overcome market failures such as split incentives.[41] New Zealand parliament recently enacted the Residential Tenancies Amendment bill and associated Regulations, which requires ceiling and underfloor insulation to be retrofitted for income-related rent tenancies by 1 July 2016 and all other rental homes by 1 July 2019. Unfortunately the improvement in the thermal efficiency of New Zealand's existing housing stock is unlikely to be as pronounced and immediate as it could have been due to the Regulations only requiring homes with existing insulation installed before 1 July 2016 to have a level of insulation that is based on 1978 standards; provided the insulation is in a reasonable condition (as outlined in section 17 of the Regulations).
64. It cannot be assumed that every low emission policy will provide health co-benefits or other co-benefits, and care is needed to avoid unintended consequences.[42] For example, ARPHS supported the recent Energy Innovation (Electric Vehicles and Other Matters) Amendment Bill's intent to introduce incentives to encourage the uptake of EVs, but did not support the specific policy of allowing EVs to access special vehicle lanes as we have concerns that this policy would adversely affect the efficiency of existing transport network in Auckland, and therefore potentially have a negative effect on GHG emissions.
65. Any cost-benefit analysis applied during an evaluation of a low emissions policy needs to be comprehensive and holistic, accurately calculating the relevant health benefits and/or costs, with a weighting proportional to the impact.

Q35 – What measures should exist (and at what scale and duration) to support businesses and households who have limited ability to avoid serious losses as a result of New Zealand's transition to a low-emissions economy?

66. The Issues Paper considers emission pricing policies could raise household costs for basic needs such as food and fuel. Consideration of the potential effects on health and well-being of lower socio-economic households needs to be at the forefront when evaluating the impacts of price-based mechanisms.

[39] The Royal Australasian College of Physicians (2017). Make it the norm: Equity through the social determinants of health. Retrieved from https://www.racp.edu.au/docs/default-source/default-document-library/make-it-the-norm-pres-letter.pdf?sfvrsn=4
[40] Chapman, R., Howden-Chapman, P., Viggers, H., O'Dea, D. & Kennedy, M. (2009). Retrofitting houses with insulation: a cost–benefit analysis of a randomised community trial. *Journal of Epidemiology and Community Health*, 63(4): 271–277.
[41] Watts, N., Adger, N., Agnolucci, P. et al. (2015). Health and climate change: policy responses to protect public health. *Lancet,* 386: 1861-1914.
[42] Watts, N., Adger, N., Ayeb-Karlsson, S. et al. (2017). The Lancet Countdown: tracking progress on health and climate change. *Lancet*, 389: 1151-1164.

67. Dhar et al (2009) note that carbon pricing may be regressive or progressive in nature.[43] Regressive pricing would mean that there would be increased economic demands on households as the increased cost of carbon is passed on through rising prices, and in these circumstances inequalities in health and well-being would worsen. Dhar et al (2009) highlight several examples where increased pricing on carbon based commodities would have an adverse impact on low income households if regressive in nature, including:
    - A potential increase in fuel poverty as low households spend a greater percentage of their income on household fuel and power;
    - If the price of petrol increases and people are unable to switch to more carbon-efficient modes of private or public transport due to lack of infrastructure, access, or affordability, then their ability to access employment, health facilities, and social and recreational activities is sharply impaired. Alternatively, households may reduce spending on essentials such as nutritious food, household heating, electricity and water to compensate for the rising cost of travel.
68. ARPHS and the DHBs therefore consider any carbon pricing initiatives should be structured in a way that supports and protects low income households from hardship while transitioning to a low emissions economy. For example, Dhar et al (2009) note that the revenue from carbon taxation can be recycled to help insulate housing and improve public transport in high deprivation areas, or used to subsidise heating fuels for those living in the poorest and coldest areas.

Q37 - Should New Zealand adopt the two baskets approach?

69. The Issues Paper outlines a case for a "two basket" approach but without considering the atmospheric chemistry of methane, the most important of the relatively short lived GHGs in the NZ inventory. The predominant pathway for methane degradation is by hydroxylation and oxidation to produce CO_2. Hence emitted methane has a double effect, first as methane (with a half-life of around 9 years but high greenhouse effect) and then as longer-lived CO_2, in effect compounding the effect of the methane.
70. A second consideration is that the half-life for methane is a significant proportion of the time remaining for emission time horizons of 2030 and 2050. Around 1/3 of methane emitted in 2017 will still be in the atmosphere in 2030.
71. While distinct pathways for reducing methane and CO_2 emissions need to be considered, methane should not be discounted as an important GHG because of its shorter half-life.

Conclusion

Thank you for the opportunity to submit on the low-emissions economy issues paper.

[43] Dhar, D., Macmillan, A., Lindsay, G., & Woodward, A. (2009). Carbon pricing in New Zealand: implications for public health. *The New Zealand Medical Journal,* 122(1290): 105-115.

Appendix 1 - Auckland Regional Public Health Service

Auckland Regional Public Health Service (ARPHS) provides public health services for the three district health boards (DHBs) in the Auckland region (Counties Manukau Health and Auckland and Waitemata District Health Boards).

ARPHS has a statutory obligation under the New Zealand Public Health and Disability Act 2000 to improve, promote and protect the health of people and communities in the Auckland region. The Medical Officer of Health has an enforcement and regulatory role under the Health Act 1956 and other legislative designations to protect the health of the community.

ARPHS' primary role is to improve population health. It actively seeks to influence any initiatives or proposals that may affect population health in the Auckland region to maximise their positive impact and minimise possible negative effects on population health.

The Auckland region faces a number of public health challenges through changing demographics, increasingly diverse communities, increasing incidence of lifestyle-related health conditions such as obesity and type 2 diabetes, infrastructure requirements, the balancing of transport needs, and the reconciliation of urban design and urban intensification issues.