



Tax Working Group
Te Awheawhe Tāke

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This paper contains advice that has been prepared by the Tax Working Group Secretariat for consideration by the Tax Working Group.

The advice represents the preliminary views of the Secretariat and does not necessarily represent the views of the Group or the Government.

Coversheet: Tax and the environment – Paper II: Assessments

*Discussion Paper for Session 13 of the Tax Working Group
July 2018*

Purpose of discussion

This paper:

- **assesses** at a high level selected pollutants and resources against the updated environmental tax frameworks from the first environmental paper
- **assesses** at a high level the fiscal potential of environmental taxes;
- **introduces** the concept of the circular economy.

Key points for discussion

- **Frameworks:** Does the Group agree with updated frameworks?
- **High level assessments:** Does the Group agree with the high level assessments?
- **Interim report:** Which analysis or recommendations would the Group like to include in the interim report?

Recommended actions

We recommend that you:

- a **indicate** if you agree with the updated frameworks for inclusion in the interim report;
- b **indicate** whether you wish to provide comment on the following topics in the interim report

Topic	Suggested specific paragraphs to include
Frameworks	Box 1
GHG emissions	50 (a) – (d)
Water pollution	72 (a) – (e)
Water abstraction	88 (a) – (b)
Solid waste	107 (a) – (c)
Transport	125 (a) – (b)
Fish	134 (a)
Fiscal assessments	Various (“Fiscal potential” sections in each of the six pollutant/resource sections)

- c **indicate** what other recommendations or analysis you would like included in the interim report (from either this paper, or other environmental papers considered by the Group)

Tax and the environment – Paper II: Assessments

*Discussion Paper for Session 13
of the Tax Working Group*

June 2018

Prepared by Inland Revenue and the Treasury, in consultation with the Ministry for the Environment, the Ministry of Transport, and the Ministry for Primary Industries

1. Introduction	5
2. Revisiting frameworks	6
3. What is an environmental “tax”?	8
4. Resource-specific assessments	9
<i>(A) Greenhouse gas emissions</i>	<i>10</i>
<i>(B) Water pollution</i>	<i>16</i>
<i>(C) Water abstraction</i>	<i>20</i>
<i>(D) Solid waste</i>	<i>23</i>
<i>(E) Road transport</i>	<i>28</i>
<i>(F) Fisheries</i>	<i>32</i>
5. Future possibilities – environmental footprint tax	34
6. Circular economy	35
Appendix A: Overview of submissions from organisations to the TWG on the environment	38
Appendix B: New Zealand map of water quality for swimming	39
Appendix C: Impact of increased landfill levies in New Zealand	40
Appendix D: Comparison of fuel taxes with OECD countries	41
Glossary	42
Bibliography	44

Executive summary

This report examines, at a high level, opportunities for using environmental taxes for particular resources and pollutants, specifically: greenhouse gases, water pollution, water abstraction, solid waste, road transport, and fisheries. It revisits and applies the frameworks laid out in the Secretariat's first discussion paper on tax and the environment. This paper also overviews the concept of the circular economy, and the potential role for the tax system.

In the short term, our assessments suggest that there may be benefits in expanding the coverage of the Waste Disposal Levy (WDL), and for reassessing landfill externalities to see if higher rates are warranted. There is also appears to be benefits from strengthening New Zealand's Emission Trading Scheme (NZ ETS) and advancing congestion charging, and the various initiatives underway to progress these issues should be encouraged.

Over the medium term, there could also be benefits from greater use of tax instruments to address challenges in both water pollution and water abstraction. Meaningfully addressing Māori rights and interest in fresh water should be central to any changes.

Further work to develop externality modelling and measurement tools, especially for diffuse water pollution, would be helpful. However, further technical advances need not be a precondition for greater use of tax instruments for the resources examined in this report. The relatively simplistic approaches available today are likely to be, in general, an improvement over the status quo in accounting for externalities, and could help inform better land use decisions and drive innovation. The perfect shouldn't be the enemy of the good.

It is beyond the scope of this paper to design specific environmental tax instruments. However, many of New Zealand's environmental challenges (including those for water) are local challenges and pricing tools which reflect local circumstances should preferably be developed to reflect this. These tools could include local tradable permits, or locally variable tax rates. National frameworks and template tools could be developed, and customised for local environmental conditions where appropriate.

Not all environmental problems are well suited to current environmental tax tools and regulation will continue to play an important role in complementing any new tax tools. Over the longer term, new innovations in measuring and modelling of externalities and resource rents might allow for an expanded use of environmental taxes, ensuring we do a better job of valuing and protecting our natural capital.

1. Introduction

Context

1. This is the second of two Secretariat papers on tax and the environment. The first environment paper, *Tax and the environment – Paper I: Frameworks*, was considered on 4 May 2018 at Session 8 of the TWG.¹ That paper introduced potential frameworks for using environmental taxes, as well as surveying different tax levers for addressing environmental challenges. This paper is primarily focused on application of those frameworks.

Scope

2. This paper aims to provide a high level assessment of environmental tax opportunities for particular resources, as directed by the Group at Session 8. It is beyond the scope of this paper to develop recommendations for specific tax instruments. Rather, it aims to provide direction around the potential for greater use of environmental taxes, and to identify potential future work programmes for the development of specific environmental taxes.
3. The rest of the paper is divided into five sections:
 - *Section 2*: Reassess the frameworks from Paper I in light of feedback received from the Group and external reviewers;
 - *Section 3*: Clarify the scope of “environmental tax” for the purposes of this report to encompass revenue raising economic instruments;
 - *Section 4*: Provide a high level assessment of selected pollutants/resources against the frameworks, and their fiscal potential;
 - *Section 5*: Identify future potential opportunities for environmental tax;
 - *Section 6*: Provide an overview of the concept of the circular economy.
4. The *Frameworks* paper also discussed environmental tax concessions, and the Group requested further advice on these. There was further discussion of some tax concessions in the *Effective tax rates* paper considered at Session 12 (e.g. farming). The Secretariat is also producing a note on environmentally-related revenue negative proposals identified by submitters for Session 13. Further advice could be provided by the Secretariat if requested by the Group.
5. The Secretariat has been able to consider submissions to the TWG in preparing this paper. Appendix A contains a one-page summary of submissions received from organisations on environmental issues. A fuller 13-page summary is available in the Secretariat’s paper *Submissions from organisations and academics* considered at Session 11.

¹ Referred to in this report as the *Frameworks* paper.

2. Revisiting frameworks

Overview

6. In April, the Secretariat provided the TWG with the discussion document *Tax and the environment – Paper I: Frameworks*. This introduced frameworks for two different types of environmentally-related taxes: negative externality taxes, and resource taxes.
7. The Group considered the frameworks at Session 8 of the TWG. The Group also decided to engage two external academic reviewers to critically assess the paper. Prof Frank Scrimgeour and Dr Viktoria Kahui were subsequently engaged, and a summary of their findings was presented to the Group at Session 12 (29 June).
8. Tina Porou has also been engaged by the Group to provide advice on the impact of environmental taxes on Māori. Tina is not due to report back until late June / early July, after the presentation of this paper.

Critiques of frameworks

9. Both Dr Kahui and Prof Scrimgeour were broadly supportive of the frameworks and did not suggest specific changes. Feedback from Tina Porou on the frameworks has not yet been received.
10. At Session 8 of the TWG, several potential additional principles and criteria were discussed. Some of these (e.g., administrative costs and complexity) are generic tax policy principles, and could be considered complementary to the environment-specific framework.
11. There was discussion about whether or not behavioural responsiveness should be added as an additional criterion (i.e., that a tax should only be adopted if it reduces the level of the targeted environmentally damaging activity). Behavioural responsiveness was also suggested as a criterion for environmental taxes by a number of submitters.
12. If pollution does not abate in response to a relatively high tax rate, and the tax rate accurately reflects the external costs, this suggests polluters derive significant value from the polluting activity greater than the environmental damage. The efficient outcome might therefore be to allow the pollution.
13. However, behavioural responsiveness could still be a desirable attribute, allowing the Government to meet environmental policy objectives. Behavioural responsiveness has therefore been added to the “additional criteria” section of the externality taxes framework, reflecting the fact that it could be a desirable but not necessary attribute. The revised frameworks are shown in Box 1 below.
14. Independent of behavioural responsiveness, governments still have the choice of whether or not to allow a particular pollutant at all (i.e., banning it).

Box 1: Revised frameworks for environmental taxes

For further details, see *Tax and the environment – Paper I: Frameworks*

(A) Framework for negative externality taxes

Criteria for deciding when to use externality taxes (instead of regulatory approaches)

Necessary conditions for using externality taxes

- *Measurability*: The damaging activity, or a reasonable proxy of it, is able to be measured
- *Risk tolerance*: There is sufficient time for a tax instrument to be developed and refined
- *Sufficient scale*: The environmental problem is sufficiently large-scale and persistent to justify administration and compliance costs

Additional criteria for when the relative benefits from a tax approach are potentially larger:

- *Diversity of responses*: There is a range of abatement responses with differing costs, including investment in innovation, such that regulating a particular response could impose high costs.
- *Revenue raising potential*: The revenues that could be raised from the tax are large, allowing for the reduction of more distortionary taxes (or spending on other government priorities)
- *Behavioural responsiveness*: The level of damaging activity is relatively responsive to feasible price signals (i.e., it is relatively price elastic)

Principles for designing externality taxes

- *Māori rights and interests* should be acknowledged and addressed
- *Distributional impacts* should be assessed and mitigated
- *Marginal external cost* should be the price of the tax
- *Localisation principles*:
 - The price should preferably vary locally where there is local variation in impacts
 - Revenue allocation should consider compensation for harm, claims to ownership, and efficient of revenue use
 - The level of administration (i.e., local versus central government) should be based on information availability and alignment of incentives
- *Impacts on industry*, through international linkages, should be considered

(B) Principles for taxing resource rents

- *Ensuring a “fair” return to the resource owner*. The tax should seek to recover the resource rent, while ensuring adequate incentives for investors to develop resources.
- *Efficiency*: Deadweight losses should be minimised. In theory, a tax levied on pure rent will be non-distorting. In practice, it is difficult to tax pure rent and resource tax instruments will introduce distortions and deadweight losses.
- *Administrative complexity*: Tax instruments should aim to be simple and transparent. There is often a trade-off between the theoretical efficiency of a resource tax, and its administrative complexities and costs.
- *Risk sharing between the Crown and industry*: Risk should be allocated to the party best able to manage or tolerate it. Different tax instruments split risk differently between the Crown and industry, especially commercial risk and price risk.

3. What is an environmental “tax”?

15. In the *Frameworks* paper, we introduced a broad definition of tax for the purposes of considering environmental taxation – specifically, *economic instruments that can be potentially revenue raising for central or local government*. We continue with that definition in this paper.
16. Potential tax instruments therefore include:
 - a) Nationally-uniform taxes or levies
 - b) Locally-variable taxes or levies
 - c) Tradable emission permits, for both national and local markets, where the permits could be partially or fully auctioned or sold by the Government
17. Some of these economic instruments might not be always thought of as taxes. They might be administered by agencies other than Inland Revenue, and revenue raised might be directed towards local instead of central government. Nonetheless, they are instances of contributions to state revenue mandated by the Government.
18. This is a broader understanding of “environmental tax” than was taken in the McLeod tax review. Prof Scrimgeour, who reviewed the *Frameworks* paper and was also a reviewer for the McLeod review, noted that the *Frameworks* paper “helpfully adopts a view broader than that of the [McLeod] review”.

4. Resource-specific assessments

19. In the *Frameworks* paper, we identified five pollutants/resources for high level assessments against the frameworks:
 - Greenhouse gas emissions
 - Water abstraction
 - Water pollution
 - Solid waste
 - Road transport
20. This section makes these high level assessments, analysing how well the particular resource meets the relevant criteria from the frameworks presented in the previous section, and highlighting significant issues relating to the design principles. It also aims to identify scope for further work, and provide an indication of the fiscal potential of the different resources².
21. In addition to the resources listed above, we also consider fisheries. Several submitters to the TWG raised the issue of resource rents being attached to fish – an issue not considered in the *Frameworks* paper. Dr Kahui also raised the issue of resource rentals attached to fish in her review.
22. Petroleum / mineral royalties were discussed in the *Frameworks* paper, and are not further assessed in this paper, as per the Group’s decision at Session 8. The *Frameworks* paper explained that royalty rates have been reviewed in recent years, and there is likely to be limited fiscal potential from any further review in light of the Government’s decision not to grant further exploration permits for offshore petroleum mining.
23. In the following section, we briefly explore the potential for emerging environmental tax instruments to address other environmental challenges in the future, such as biodiversity loss.

² Fiscal assessments aim to provide guidance on order-of-magnitude ranges. We make no adjustments for potential tax deductibility of environmental taxes or charges. If a tax is a deductible business cost, revenue raised by companies will need to be reduced by the company tax rate (28%) as the paying company will have higher expenses as a result of the tax.

(A) Greenhouse gas emissions

24. The emission of greenhouse gases creates negative externalities. Emitters are imposing significant costs on others, for example, from sea level rises and climate changes. The OECD has estimated the climate change will reduce New Zealand's GDP by 1% by 2060, and 2% globally (OECD, 2015).

Assessment against criteria

25. Greenhouse gases are, in general, well suited to the use of externality taxes, meeting the criteria in our framework. In particular:
- *Diversity of responses:* There is a wide range of abatement opportunities. This means abatement of emissions is likely to be achieved at a lower cost by using a tax than by mandating particular actions through regulation. There is also evidence that putting a price on greenhouse gas externalities drives innovation in abatement (Dechezlepretre, Martin, & Bassi, 2016).
 - *Revenue raising potential:* Greenhouse gases could be a significant source of revenue over the medium-to-long term – see *Fiscal potential* discussion below.
26. There is likely to be a role for complementary regulation. Other market failures also impact climate change, including positive externalities from research and innovation, and information and behavioural barriers to the adoption of lower emissions technologies (Stern N. H., 2007). This suggests the pricing of greenhouse gas externalities might not be sufficient on its own to address climate change.
27. Greenhouse gases have the added challenge of being a global problem. New Zealand accounts for a relatively small share of global emissions. We are therefore dependent on the widespread international adoption of mitigation measures to reduce the impacts of climate change on New Zealand. The importance of globally co-ordinated action is discussed further below (see *Competitiveness concerns* below).

Design considerations

28. New Zealand already has an environmental tax tool for pricing greenhouse gases in the form of the New Zealand Emissions Trading Scheme (NZ ETS). The NZ ETS reveals a price on greenhouse gas emissions, and if emission units are auctioned, the NZ ETS could also deliver fiscal benefits.

Pricing concerns

29. By the standard of external marginal cost pricing, the NZ ETS has significantly under-priced carbon. Stiglitz-Stern estimate that a pricing corridor of US\$40 – 80/t-CO₂e (NZ\$58 – 116/t-CO₂e) in 2020 and \$50 – 100/t-CO₂e (NZ\$73 – 145/t-CO₂e) in 2030 is needed to meet the Paris Agreement objectives (Stern & Stiglitz, 2017). New Zealand Unit prices in the NZ ETS are currently priced at approximately \$21/t-CO₂e, and NZU prices collapsed to \$1.50/t-CO₂e in 2013.

Further, biological emissions are currently excluded from the ETS meaning almost half of New Zealand's greenhouse gas emissions face no emissions charge.

30. Pricing to the external marginal cost suggests the need for significantly higher carbon prices, and an expansion of the ETS (or the use of complementary tax instruments) to include biological emissions.
31. The approach to carbon pricing in New Zealand has generally not been to reflect the external marginal cost of emissions, but rather to meet policy objectives such as meeting carbon abatement goals arising from the Paris Agreement, or delivering on and devolving to the private sector international commitments arising from the Kyoto Protocol, while also managing for international leakage and competitiveness concerns (see *Competitiveness concerns* discussion below).
32. Meeting future abatement targets through the ETS is also likely to require higher prices and/or expanded coverage – the Productivity Commission finds that New Zealand's carbon price will need to rise to at least \$75/t-CO₂e and possibly over \$200/t-CO₂e over the next few decades to achieve a net zero emissions 2050 target (New Zealand Productivity Commission, 2018). A recent modelling exercise by NZIER found that a price of over \$600/ t-CO₂e was needed by 2050 to reach net zero emissions (NZIER, 2018).

Measurement of emissions

33. Like other diffuse sources of pollution, measuring agricultural emissions is more difficult than measuring point source emissions. There are various approaches to doing this, with varying levels of complexity and precision.
34. At the more complex and precise end of the spectrum are farm-level estimates obtained from tools such as OVERSEER. These attempt to account for farm-specific characteristics. However, these can be expensive to administer, and do not account for some differences in on-farm management practices.
35. At the simplified end of the spectrum are processor-level charges, or flat per animal charges. These approaches are simpler to administer and encourage some mitigations. For example, changing land use or reducing output. However, they do not reflect differences in farming practices, and therefore may fail to incentivise some on-farm mitigation measures.
36. Even these simplified approaches are likely to be sufficiently accurate to provide a useful price signal that is at least sensitive to land use and intensity decisions (i.e., high emission land uses would face a cost for their emissions, improving the relative business case for lower emission land uses).

Competitiveness concerns

37. If greenhouse gases are taxed so that New Zealanders face the global social costs of carbon, but few other countries do the same, production in New Zealand could contract, accompanied by an increase in production in countries with weaker

climate action, with no global reduction in emissions (“emissions leakage”) (Levinson & Taylor, 2008). This is why it is important that any action is as globally co-ordinated as possible, and why the issue is often framed in terms of meeting international obligations. It is also a supporting rationale for free allocation to trade-exposed industries.

Carbon tax

38. A carbon tax (or, more accurately, a greenhouse gas tax) is another economic instrument that can be used to price greenhouse gas emissions. It could be introduced as an alternative to the ETS, or potentially sit alongside the ETS (although to have a carbon tax and an ETS could add significant administration and compliance costs).
39. A carbon tax has different strengths and weaknesses to an ETS. However, a new carbon tax is not necessary to meet the key deficiencies and challenges identified above as these can be addressed through improvements to the NZ ETS:
 - *Price*: The NZ ETS can put a significantly higher price on emissions and/or be used to achieve greater cuts in emissions if the Government decides to implement a meaningful cap on emissions, or place a floor on emission prices.
 - *Coverage*: Both an ETS and a carbon tax are subject to sector coverage decisions – for example, whether or not biological emissions are included.
 - *Fiscal*: The NZ ETS can raise the same fiscal benefits as a comprehensive carbon tax if the Government decides to reduce free allocation.³
40. A key part of New Zealand’s strategy to reduce its emissions is afforestation. An ETS is potentially better suited than a carbon tax to providing incentives for afforestation. An ETS is also simpler to align with trading partners, and to encourage efficient abatement through international trading of units with high environmental integrity.
41. Both MfE and the Productivity Commission support continued use of the ETS as New Zealand’s main vehicle for pricing greenhouse gas emissions.

Fiscal potential

42. The Government does not currently sell emission units. The Government could realise significant fiscal benefits by auctioning units, and is currently introducing provisions to allow for this. As noted above, if all free allocation was removed, the NZ ETS could raise the same amount of revenue as a carbon tax⁴.
43. The fiscal potential of greenhouse gas emissions is highly dependent on the treatment of biological emissions / agriculture and limits to free allocation.

³ Net fiscal impacts will also depend on the relative treatment of forestry under a carbon tax and an ETS.

⁴ Assuming that the carbon tax rate was equal to the auction-clearing price, that the number of units auctioned was equal to the emissions allowed by New Zealand’s emission reduction targets (emission budgets), and that the tax was accompanied by a subsidy to forestry equivalent to the auction-clearing price.

Different scenarios are modelled below based on carbon budget forecasts from MfE.

Figure 1: Fiscal potential from auctioning emission units

Note: Modelling is based on current MfE carbon budget projections, assumes no change in emission volumes as a result of changes in free allocation or biological emission charging, and a linear increase in the emissions price from \$20/t-CO₂e in 2021 to \$50/t-CO₂e in 2030.

	Share of biological emissions charged for	Change in free allocation (relative to current rates)	Average annual forecast revenues, 2021-30
Status quo	0%	0%	\$130m
Scenario 1	5%	Reduction of 1%-point p.a.	\$240m
Scenario 2	5% in 2021, increasing 3%-points p.a.	Reduction of 3%-points p.a.	\$530m
Scenario 3	100%	100%	\$2,100m

Source: Ministry for the Environment and Tax Working Group Secretariat modelling

44. Under current settings (as at June 2018), and assuming the NZU price rises to \$50/t-CO₂e in 2030, the fiscal contribution from auctioning NZUs is forecast to be in the order of \$130m per annum over the coming decade.
45. If agriculture faces a price for 5% of its emissions, and free allocation is reduced linearly by 1%-point each year, the fiscal potential roughly doubles to \$240m, assuming no change in emission volumes. (The Government has indicated that revenue collected from charging for 5% of agricultural emissions will be recycled back into the agricultural sector.)
46. If free allocation reductions were to increase to 3%-points each year (the upper end of broad-based reduction rates being considered by other countries⁵), and this same reduction rate was also applied to agriculture, revenue forecasts double again to \$530m.
47. The total potential revenue that could be raised by removing all free allocation is estimated to be \$2.1b per annum, again, assuming no change in emission volumes. This is equivalent to replacing the ETS with a comprehensive carbon tax, assuming prices are the same.
48. Revenues raised will be sensitive to the emissions price. If the emission price rises to \$80/t-CO₂e in 2030 (the highest rate in scenarios used by the Productivity Commission), revenues increase by approximately 40% compared with the figures outlined above. At \$30/t-CO₂e (the lowest rate in Productivity Commission scenarios), revenues decrease by approximately 25%.

⁵ Some specific sectors in the EU ETS face much higher phase-out rates of 20%-points p.a.

49. Longer term, greenhouse gas emissions may not be a reliable tax base if New Zealand substantially reduces its net emissions.

Next steps

50. The Group could consider including the following comments and recommendations in the interim report:
- a) There is a strong case for reforming the NZ ETS to address problems of pricing and coverage. Significant efforts are underway within Government (or being considered) to better align the cost of carbon that polluters face with the true social cost of carbon and the price needed for New Zealand to meet its greenhouse gas targets.
 - b) There is ongoing work to reform the NZ ETS being led by MfE, for example, removal of the one-for-two policy.⁶
 - c) The Productivity Commission has an active inquiry into transitioning to a low emissions economy (New Zealand Productivity Commission, 2018). Their interim report makes a number of useful suggested changes to the pricing of greenhouse gas emissions including:
 - i. The ETS should remain the centrepiece of New Zealand's emissions reduction efforts as it has the potential to provide this much-needed policy certainty. However, the ETS needs to be made credible and effective.
 - ii. New Zealand's emissions price will need to rise to at least \$75/t-CO₂e and possibly over \$200/t-CO₂e over the next few decades to achieve a net zero emissions target.
 - iii. To ensure clear and credible investment signals, the Government should introduce mechanisms that provide guidance about the path of future emissions prices. Key steps include setting rolling five-year forward caps for the ETS, to provide certainty about the supply of NZUs (and ambition for domestic emission reductions). A second important step will be auctioning NZUs to achieve the cap but with mechanisms to discourage prices from moving outside of a wide band.⁷
 - iv. An emissions price that covers all land use, including agriculture, should become the main driver of land-use change. A well-designed

⁶ The one-for-two transitional measure allows non-forestry businesses to pay one emissions unit for every two tonnes of CO₂e emissions

⁷ Cabinet decided in-principle to make these changes in mid-2017. These decisions are being followed up by the current Government.

and stable ETS will incentivise land-use change, including more afforestation, as well as a search for, and adoption of, low-emissions practices and technologies in agriculture. To reflect the trade-exposed nature of the sector and current technological limits, the entry of agriculture into the ETS should be supported with free allocation of NZUs for a transitional period.

- d) The Interim Climate Change Committee (the precursor to the Climate Commission) has been established and is currently considering the inclusion of agriculture in the ETS, and planning for a transition to 100% renewable electricity.

(B) Water pollution

51. Pollution of fresh waterways is a significant environmental problem in New Zealand. The release of pollutants can negatively impact the value that New Zealanders derive from freshwater, including access to healthy drinking water, recreation, appreciation of a healthy freshwater eco-system, and the aesthetic value of clear water.
52. There are a range of water pollutants impacting water quality including nitrogen, phosphorous, sediment, and pathogens such as *E. coli*.
53. Water pollutants come from a range of sources. In urban environments, contaminants enter water bodies mainly through stormwater and wastewater networks, illegal connections to the networks, and leaky pipes, pumps, and connections. In agricultural areas, nutrients and pathogens come from primarily from animal waste and urine, and fertilisers (Ministry for the Environment & Stats NZ, 2017). Water extraction and hydro-generation can also affect water quality by reducing the dilution of pollutants and altering freshwater flow regimes.

Assessment against criteria

54. Tax instruments have the potential to be a useful tool for some types of water pollutants.
55. There are currently significant measurement challenges for water pollutants, meaning estimates of emissions can be imprecise, and coverage of pollutants is incomplete. For example, our capacity to model sediment, pathogens and phosphorous run-off is significantly less advanced than nitrogen.
56. Regulation, education and support will therefore likely need to continue to play an important role in complementing potential tax instruments.

Design considerations

Māori rights and interests

57. A number of submitters to the Group representing Māori interests indicated their support for using economic tools to protect and enhance the environment, while also expressing reservation about being subject to environmental taxes within their rohe.
58. The development of tax instruments applied to water discharges should take account of Māori rights and interests, and other non-tax approaches might be preferable if these rights and interests cannot be adequately addressed. Water quality and water abstraction are linked, and water pollutant taxes may need to be considered alongside water abstraction policy.

59. There is ongoing work to better address Māori rights and interest in water, including through the Waitangi Tribunal, and discussions between the Crown and iwi/Māori.

Localisation and pricing

60. Water pollution costs vary significantly by location. The marginal external cost of emissions will differ significantly across catchments based on a range of geophysical variables, and the level of current emissions. This means a first-best approach to pricing should also allow for local variation. See Appendix B for an assessment of waterways for swimming.
61. Locally-variable pricing tools could take various forms. For example:
- Catchment-level nitrogen discharge trading schemes which have already been used in the Lake Taupo catchment and is currently planned for the Rotorua Lakes.
 - National tax system levied on estimated emissions (either input based or modelled emissions) with catchment-level variation in rates. Rates could be higher in catchments with more sensitive receiving environments.

Equity

62. As noted above, urban centres are significant contributors to water pollution. Water pollution tax instruments should preferably cover all sources of the taxed pollutant, both urban and rural.

Measurement

63. There are a range of water quality issues, spanning both urban and rural environments, and a range of pollutants, including nitrogen, phosphorous, pathogens and sediment.
64. This presents a range of measurement challenges, and our current ability to measure or estimate pollution flows varies significantly by pollutant and environmental setting. Notably, our ability to estimate sediment, pathogens and phosphorous run-off in rural environments is particularly limited, and taxes might play a more limited role for these issues. Nitrogen modelling is more advanced.
65. As with greenhouse gas emissions, estimate approaches have varying degrees of precision.
66. At the simpler end of the spectrum are input-based approaches such as livestock headcounts and fertilizer application. Nutrient runoff can be estimated on a per head of livestock or per tonne of fertilizer basis. However, actual nutrient runoff will depend on a large number of other variables such soil type, weather, and farm management practices.
67. At the more precise end of the spectrum are measuring tools such as lycimeters (which currently have limited use due to their cost), and modelling tools such as OVERSEER. OVERSEER attempts to account for local variables and is already

being used as part of a pricing tool in Taupo and is proposed to be used in Rotorua. However, it has significant limitations. OVERSEER is not designed to model some significant types of water pollutants, such as sediment and pathogens. For the pollutants it does model (nitrogen and phosphorous), the uncertainties in the estimates are large, especially for phosphorous. For nitrogen, the pollutant currently best represented in OVERSEER, the model provides a quantitative estimate of the long run risk of nitrogen leaching, not an estimate of leaching in a particular year. OVERSEER also does not account for all beneficial changes in on-farm management practices.

68. Nonetheless, even relatively coarse estimates using current tools may be better than the status quo for some pollutants, such as nitrogen.⁸ They provide a price signal that is sensitive to land use and intensity decisions, and provide incentives to abate below consent levels. The perfect shouldn't be the enemy of the good.
69. There are also people capability and capacity challenges, for both using modelling tools such as OVERSEER, and for verifying compliance.

Fiscal potential

70. We have not found comprehensive estimates of revenues that could be raised from water pollutant taxes in New Zealand.
71. Proposals for a \$2/kg charge on leached nitrates would theoretically raise approximately \$270 million at current leaching rates and assuming 100% coverage.

Next steps

72. The Group could consider including the following comments and recommendations in the interim report:
 - a) If Māori rights and interests can be adequately addressed, there could be a role for making greater use of tax instruments to address water quality with current tools, especially for nitrogen, and especially for regions struggling with excessive discharges. Even tax instruments using simple estimation approaches are likely to be preferable to having no tax or pricing instruments.
 - b) Water pollutant tax rates should preferably be sensitive to local catchment conditions (i.e. through local trading markets, or locally differentiated rates). Pricing / charging frameworks and systems should be developed, potentially at a national level for local application, to reflect this.
 - c) Further development of tools to estimate (and ultimately directly measure) diffuse water pollution should be encouraged to enable more accurate and effective water pollutant tax instruments. For example, it would be helpful

⁸ A hybrid approach could be to implement an input-based charge, but allow polluters to demonstrate lower use subject to auditing.

for OVERSEER to better account for a wider range of soils and land uses (including wetlands and vegetable cropping), and we note increased investment into OVERSEER in Budget 2018.

- d) Capabilities and capacity for applying modelling tools and verifying compliance may also need to be strengthened for water pollutant taxes to be effective.
- e) The imposition of any new taxes should also be accompanied by a review of regulation and consent conditions to ensure that regulation is complementary to tax instruments.

(C) Water abstraction

Objectives of a water tax

73. There are different possible objectives for applying tax instruments to water abstraction:
 - a) Rationing the total water take (i.e., pricing externalities)
 - b) Improving the efficiency of water use within allowable water takes (i.e., ensuring that those who use the water are those that get the most benefit from it, and that the benefit that users get from the resource reflects its full social cost)
 - c) Capturing resource rents
74. The first two objectives can be complementary. For example, a tradeable rights scheme could set the allowable volume in a way that the marginal social cost of a unit of water is equal to the marginal social benefit. Trading of those rights can facilitate water going to its highest value use.
75. The Government has taken a regulatory approach to the first objective – minimum flows and maximum takes are set following processes outlined in the National Policy Statement of Freshwater Management. Water tax instruments can play a complementary role to water take regulations, supporting the second and third objectives. (Note, as discussed in Section 2, “tax instruments” refers to any kind of revenue raising economic instruments, including tradable permits.)
76. Allocative efficiency could be improved by establishment of catchment-level tradeable water rights and/or charging for access to water.
77. Resource rents could be captured by either the Government charging for access to water, or by the Government auctioning or leasing rights to water.

Assessment against criteria

78. Fresh water abstraction generally meets the criteria in our framework, although we note some ongoing measurement challenges highlighted submitters. There are, however, significant design considerations that would need to be addressed before advancing potential water tax instruments.

Design considerations

Māori rights and interests

79. Any potential water taxes will need to take account of Māori rights and interests in water. Other non-tax approaches might be preferable if these rights and interests cannot be adequately addressed. There are well established concerns about not only questions of ownership, but also of access. Māori have less access to water than other land owners – in drier regions, only 3% of good quality Māori land is irrigated, compared to 27% of all good quality land.

80. As noted in the previous section on water pollution, a number of submitters representing Māori interests expressed concerns about being subject to environmental taxes for resource use within their rohe. One submitter representing Māori interests was expressly opposed to water taxes.
81. There is ongoing work to better address Māori rights and interest in water, including through the Waitangi Tribunal, and discussions between the Crown and iwi/Māori.

Pricing

82. Water allocation pressures vary significantly by both time of year and catchment.⁹ Tax instruments should therefore preferably be sensitive to both time and place to reflect differences in the scarcity and value of water.
83. Better pricing of water has the potential to not only incentivise a broad range of efficiency measures by water users, but also increased investment in water storage and transport infrastructure.
84. There are risks to having tradeable water rights in highly localised water markets – there may be a small number of participants making it difficult to ensure competitive processes in auctions for the purposes of capturing rent.

Equity

85. Equity and efficiency considerations suggest environmental and resource taxes should, by default, have broad coverage. Applying this to water abstraction, this means all exclusionary users of water should be in scope for potential water taxes, including agriculture, hydroelectric generators, and urban users. Special consideration may be warranted for non-consumptive users of water, such as hydroelectric generation, where water has economic value after its non-consumptive use.
86. There may be equity concerns if the Government chooses to sell water rights rather than grandfathering them – the value of water rights is likely capitalised in land prices and hydroelectric generator share prices. These equity concerns will need be balanced against the interests of those who currently do not have (and cannot get) abstraction rates, as well as the expectations of a fair return to the public, Crown or Māori.

Fiscal potential

87. We have not found comprehensive estimates of revenues that could be raised from water abstraction taxes in New Zealand. NZIER and AgFirst have estimated the net annual value of irrigation at the farm gate as being approximately \$2 billion per annum suggesting the potential for significant rents for water from agriculture, although we have made an assessment of rents from this number (AgFirst & NZIER, 2014). We note, for example, it may not fully account for irrigation

⁹ The value of water will also be sensitive to the prices of the products produced using the water e.g., milk and electricity

infrastructure capital costs. Rent will also likely be accruing to other water users. Statistics NZ estimated that resource rents for water from hydrogenation were approximately \$600 million in 2015 (Stats NZ, 2017).

Next steps

88. The Group could consider including the following comments and recommendations in the interim report:
- a) If Māori rights and interests can be adequately addressed, water tax instruments (including auctioned tradable permits) could be a useful tool for improving the efficiency of water use. They could also be a means of capturing resource rents of an economically significant resource, and be a significant and sustainable source of Government revenue over the long term.
 - b) For the potential benefits of water taxes to be fully realised, local water markets and/or pricing tools should be developed.

(D) Solid waste

89. Solid waste taxes help price negative externalities produced in waste disposal, while also being a tool for supporting a transition to a lower-waste, more circular economy.

Assessment against criteria

90. Waste taxes (depending on the form they take) broadly meet the criteria for externality taxes, and there are various tax instruments already in use both in New Zealand and overseas. Measurement challenges may partially limit their use, as discussed further below.
91. There is a diverse range of waste reduction opportunities, strengthening the case for tax instruments. Tax instruments such as waste levies can incentivise greater resource recovery and recycling, and also investment in product designs that minimise waste and maximise reuse. This means waste reduction is likely to be achieved at a lower cost by using tax instruments than by mandating particular actions through regulation.
92. Waste taxes have the potential to be a significant source of revenue. The Government currently collects approximately \$30 million a year from the Waste Levy. There is potential to collect significantly more – see below for discussion of fiscal potential.

Design considerations

93. New Zealand already has an environmental tax tool for waste disposal in the form of the Waste Disposal Levy (WDL) – see Box 2 below. By regulation, the WDL is set at \$10/t and applies only to waste going to landfills that accept household waste. This restriction in scope means the levy is currently only applied to approximately 10% of landfills, covering approximately 30% of waste disposed to landfills.
94. Increasing the number of landfills subject to the waste disposal levy and increasing the levy rate is currently being considered for inclusion in the waste and resource efficiency work programme led by Minister Sage.

Box 2: Waste Disposal Levy

The Waste Disposal Levy was introduced in 2008 as part of the Waste Minimisation Act. The Act (s25) sets out two purposes for the levy:

- to raise revenue for promoting and achieving waste minimisation, and
- to increase the cost of waste disposal to recognise that disposal imposes cost of the environment, society and the economy.

The levy has remained at a rate of \$10/t (ex GST) since its introduction.

Revenue raised by the levy is collected by MfE and allocated as follows:

- Half of the revenue is paid to local councils to spend on promoting or achieving waste minimisation
- MfE deducts administration costs
- The balance is allocated to the Waste Minimisation Fund to pay for projects that promote or achieve waste minimisation

Pricing

95. Well-run landfill sites internalise many of the environmental costs in the disposal fees they charge. (Where landfill operations are subsidised by council funding, there may be a case for shifting to a user-pay system to ensure waste producers see the full disposal cost of their waste.)
96. However, there will still be externalities even at well-run sites – for example, disamenity to the area, and air emissions (other than greenhouse gases). Robust estimates of these externalities are challenging and will be site and waste product specific. However, estimates prepared for MfE are that externalities to the environment (over and above the disposal costs of the landfill), specifically disamenities, leachates, and emissions to the air other than greenhouse gases, are likely to be in the range of \$1 - \$19 per tonne (Covec, 2012). The WDL is currently in the middle of this range. While this analysis might not support a rate increase, there could remain a case for extending the coverage of the levy beyond the 30% of landfill waste currently covered, albeit potentially at a split rate to take account of different external costs associated with different types of waste.
97. A more expansive view of externalities could suggest a higher value. For example, there could be a widely held public preference for less landfill. We have not found a quantitative assessment of this view, but note that waste reduction has been adopted as a policy objective for a number of countries, and there has been a willingness in these countries to levy much higher rates than the current rate in New Zealand.
98. New Zealand's comparatively low rate has not, to date, been successful in reducing flows to landfill. The volume of solid waste going to landfill has continued to increase since the introduction of the levy – up by 20% between 2014 and 2017.

99. Higher rates would likely change behaviour. Waste literature confirms that waste is price elastic, and overseas experience suggests that significantly higher landfill taxes can spur reduced waste production and increased recycling. A 2012 review of 19 European countries found that nine countries had landfill taxes of EUR50/t (NZ\$84) or higher with a further two banning landfill altogether (Covec, 2012). In the UK, Denmark and the Netherlands, relatively high landfill tax rates were associated with significant reductions in landfilling, especially in the construction and demolition sector where it has provided incentivised recycling.

Measurement

100. As noted above, the Waste Disposal Levy is currently only charged to 30% of landfill waste. Increasing coverage will require addressing measurement and administrative challenges, for example, installation of weighbridges or alternative means of ensuring confidence with reported waste quantities.
101. Current waste tax instruments may not be administratively practical for all waste streams – for example, for on-farm waste. This underlines a need for complementary regulation and education efforts to support better waste disposal practices in these areas.

Administration and compliance

102. Increases in rates, given the current level of coverage, could further incentivise leakage to non-levied landfills – i.e., waste might be diverted from levied landfills to non-levied landfills. It may also increase incentives for incineration which has its own set of negative externalities. This suggests an increase in coverage of the levy might be desirable before large increases in the rate.
103. Increased compliance and enforcement efforts may also be needed. There is a risk that increases in the levy could incentivise illegal dumping, although international literature appears to be inconclusive about the impacts on illegal dumping. As outlined in Box X, territorial authorities currently approximately half of levy revenue such that increases in the levy would likely result in them receiving additional resources that could be applied to monitoring and enforcement. Consideration should also be given to resourcing requirements for regional councils, who hold primary responsibility for monitoring and enforcement of resource consents for landfills.

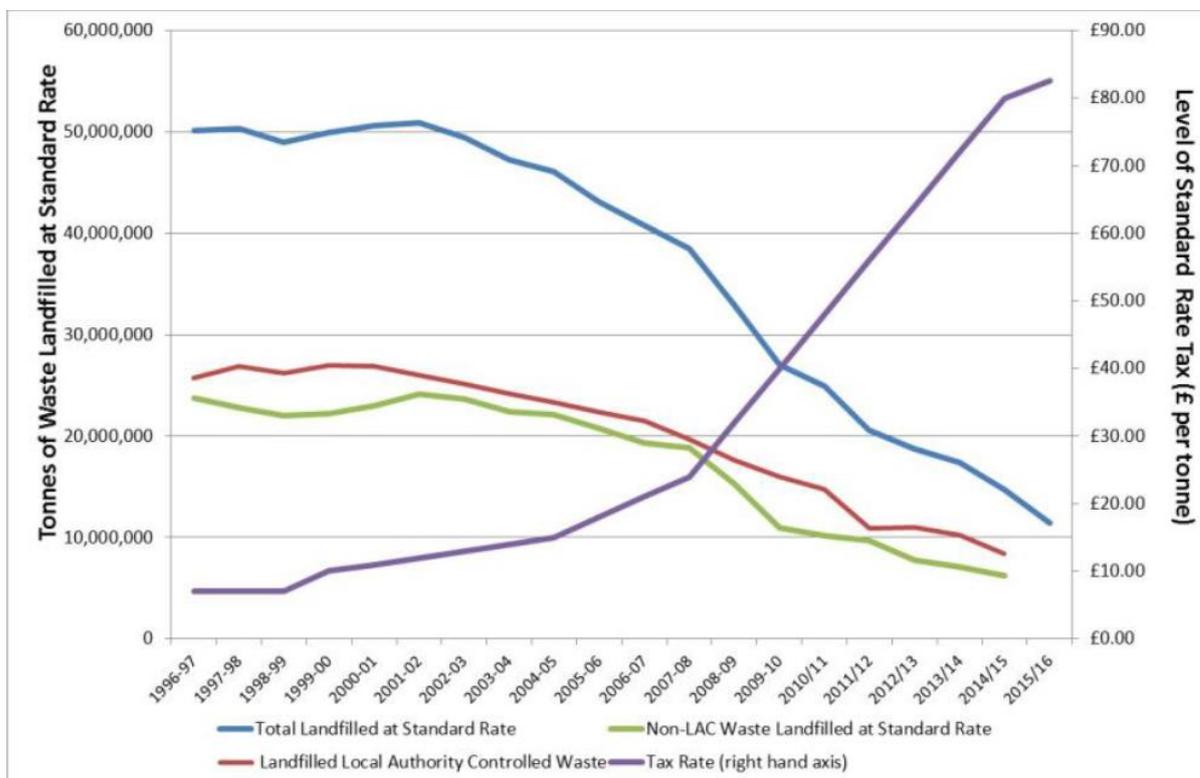
Fiscal potential

104. The Landfill Waste Levy currently raises approximately \$30 million per annum. As noted in Box X, approximately half of this goes to local councils and half is hypothecated to waste reduction projects through the Waste Minimisation Fund.
105. A recent study by Eunomia, commissioned by the New Zealand Waste Levy Action Group, modelled revenue changes from increases in the levy to up to \$140/t for standard waste with a lower rates for inert rate (Eunomia, 2017). (Local Government New Zealand has endorsed a local government waste management manifesto recommending a rate of \$140/t.) The modelling exercise found up to

\$200m in additional annual revenue from rate increases, although we have been able to fully assess modelling assumptions or approaches. See Appendix C for key findings.

106. At high levels, landfill waste taxes may not be a sustainable sources of revenue if successful in eliminating disposal to landfill. This has been the case in the Netherlands where a landfill tax at EUR108/t (NZ\$180/t) saw the use of landfilling decline to just 3% of total waste (Covec, 2012). Similarly, in the UK, landfill tax peaked at GBP1.2b in 2013/14, falling to GBP0.7b in 2017/18 as rate increases have driven sharp decreases in landfill volumes – see Figure 2 below (ONS, 2017).

Figure 2: Landfill tax rates and waste volumes in the UK



Source: Elliot, 2016

Next steps

107. The Group could consider including the following comments and recommendations in the interim report:
- a) There is a case for expanding the coverage of the Landfill Waste Levy beyond the 30% of waste currently covered, potentially with split rates to account for different external costs associated with different types of waste.
 - b) A reassessment of negative externalities associated with landfilling in New Zealand would be helpful to test for externalities beyond the scope of studies to date, and to ascertain if higher rates are warranted. If higher rates

are introduced, they may benefit from being implemented after the expansion of coverage to prevent leakage to unlevied landfills, and may require accompanying incineration levies if the intention is to drive a reduction in waste generation.

- c) The current approach to hypothecation of the waste levy may warrant revisiting, especially if there are significant increases in funds raised, to ensure they are being used in the most effective way. Some submitters expressed concern with how effectively councils were using levy funds for addressing waste issues, and the cost-effectiveness of projects funded by the Waste Minimization Fund.

(E) Road transport

108. There are a number of different negative externalities associated with road transport. Not all of these are environmental or ecological impacts, but they can be assessed through the negative externality framework. Key externalities are:
- Road damage
 - Congestion
 - Greenhouse gas emissions
 - Air pollution
 - Noise
 - Surface pollution
 - Injuries and death
109. Different externalities better meet the criteria for externality charges than others, as explored below. There are already tax instruments that attempt to address some of these externalities.

Road damage and congestion

110. The largest of the externalities associated with road transport are usually estimated to be road damage (primarily caused by heavy vehicles), and congestion (largely caused by lighter vehicles). If priced appropriately, revenues from road damage charging and congestion charging should, in theory, cover the cost of an optimised road network (Small, 2015).
111. There are deficiencies in how we currently price these externalities. Currently, road infrastructure costs are funded through a combination of fuel excise duties, road user charges, and local government contributions.
112. Congestion is likely to be the largest unpriced externality in road transport. In Auckland, the cost of congestion has been estimated at \$200 – 300 million per annum.¹⁰ The Government and Auckland Council are currently working on the Congestion Question project (formerly known as the Auckland Smarter Transport Pricing Project) to investigate whether or not to introduce congestion pricing in Auckland.
113. Road user charges are an effective tool for charging for road damage, accounting for the weight of the vehicle and distance travelled. They could be improved by moving to location-based road user charges, accounting for the different amount of damage done by heavy vehicles on different types of road. An enhanced road

¹⁰ Congestion costs are frequently reported as being \$1 – 2 billion, but that represents the GDP impact, which is in effect a turn-over measure. The economic cost of congestion has been found to be \$200 – 300 million (NZIER, 2017)

user charging system that captures information on location, time, type of vehicle and load could allow for more refined pricing of a broad range of externalities, including congestion.

114. Fuel excise duties are a relatively poor proxy for either road damage or congestion, although they have practical advantages (e.g., high compliance rates and low administration costs). A combination of enhanced road user charges and congestion charging would more closely align road charges paid with road transport costs generated.

Greenhouse gas emissions

115. New Zealand's primary mechanism for pricing greenhouse gas emissions is the ETS. Insofar as the ETS has underpriced emissions, fuel excise duties could be seen as a means of trying to better price emissions for road transport, and a number of submitters expressed concern at the lack of a diesel excise duty. The OECD notes that energy use taxes in developed countries are generally too low to combat climate change (OECD, 2018). However, the first-best approach for addressing underpricing of greenhouse gases is likely to be improving the ETS, ensuring all emitters face the cost of emissions.

Death and injuries

116. Motor vehicle death and injury costs are covered by ACC's Motor Vehicle Account. The account is funded by:
 - a levy on petrol (6 cents per litre)
 - a levy on registration (\$18 - \$80 for light petrol vehicles, \$86 - \$149 for light diesel vehicles)
117. There could be scope to revisit the funding model to better align the levies with activities that generate injury risks, for example, distance-based charging for non-petrol powered vehicles. Death and injury risk also vary by time and location, suggesting scope for further refinement of pricing through enhanced road-user charging technology.

Local air pollution and other externalities

118. The externalities of local air pollution, surface pollution and noise are highly specific to time, place, and type of vehicle. This can make them difficult to accurately price using simple distance-based charging mechanisms. As noted above, enhanced road user charging technology could allow for better charging for these externalities.
119. Measures to reduce congestion will have flow-on benefits for the emission of localised harmful air pollutants. Vehicles (and especially trucks and buses) are at their most polluting when accelerating from a standstill. Measures to improve traffic flows can therefore also reduce local air pollutants.
120. A more targeted tax lever to address local air pollution is the use of charges for vehicles entering specified low emission zones on emission standards. These types of instruments are relatively common in city centres in Europe. A 2014 report prepared for the Ministry for Transport found there was little evidence of low emissions zones are effective, except to the extent that they lead to overall reductions in traffic flows (Covec, 2015). However, we understand that more recent analysis of road toll discount schemes in Europe (where the discounts are given to vehicles complying to higher emissions standards) has achieved reductions in harmful emissions.
121. Regulatory options for improving local air pollution include emissions testing, low emission fuels, low emission zones which ban vehicles below a certain emissions standard, and retrofits of emission reduction technologies.

Equity

122. Several submitters raised equity concerns with transport pricing, especially with regards to the impact of fuel taxes on low income households. It is difficult to generalise about the impact of transport taxes. It will be important to assess the distributional impacts of specific proposals, and equity constraints could mean that pricing is used to signal some types of externalities, rather than accurately price them.

Fiscal potential

123. As noted above, congestion externalities in Auckland are currently estimated to be approximately \$200 – 300 million per annum. However, if road damage and congestion charges are set to accurately price those two externalities, they would not be revenue raising beyond covering the costs of an optimised road network (i.e., additional revenue from congestion charges would be offset by reductions in

fuel excise duties and road user charges). Similarly, ACC levies are set with the objective of meeting the costs of motor vehicles injuries, and increase or decrease based on the costs of these injuries.

124. New Zealand petrol taxes are relatively low compared to other OECD countries. The Netherlands, Norway, Italy and the UK all have petrol taxes roughly twice as high as New Zealand – see Appendix D. Revenues from fuel excise duties amounted to approximately \$2 billion in 2016/17 (NZTA, 2017). As noted above, fuel taxes can be poorly targeted at some of the largest road transport externalities.

Next steps

125. The Group could consider including the following comments and recommendations in the interim report:
- a) There is ongoing work with the Congestion Question to assess congestion charging options for Auckland which is to be encouraged. Successful introduction of congestion charging would address the largest unpriced externality in road transport.
 - b) The Government’s Urban Growth Agenda also includes (as part of its transport pillar) scoping the future of the transport revenue system. This could be a forum for assessing in further detail opportunities to better align road transport charges with externalities.

(F) Fisheries

126. Two submitters suggested the introduction of a resource rental tax on fishing quotas.
127. New Zealand fish stocks are currently managed by the Quota Management System (QMS). Quota shares entitle a harvest share in perpetuity, with the Total Allowable Commercial Catch (TACC) being adjusted from time to time to ensure sustainability.¹¹
128. There are likely to be significant resource rentals attached to fishing quotas. Since 2004, quotas for new QMS species have been auctioned by the Government. Assuming a competitive auction process, it could be expected that resource rentals attached to those fishing quotas will have been transferred to the Government through the sale price at auction. This would seem to meet the principle of a fair return to the resource owner identified in the resource rental framework (assuming the Crown is the resource owner – see a discussion of Māori rights and interests below), and further taxes might not be justified on resource rental grounds.
129. Most quota rights, though, pre-date the introduction of recent auctions, and were largely attained through grandparenting approaches, although there were significant sales of deepwater quota. We have not investigated the history of specific quotas, but there may be instances where these quotas were obtained without consideration to the Government. In these cases, it is not clear that the principle of a fair return has been fulfilled, and there could be a role for tax instruments to capture resource rents. We note, though, that grandparenting was likely an important provision for securing industry support for the transition from open access to QMS fisheries.
130. As noted in the *Frameworks* paper, there are different mechanisms for capturing resource rentals, including auctions and resource rental taxes. New Zealand is already effectively operating the auction approach for new quotas. In the early years of the QMS (1986 - 1994) New Zealand did briefly have a resource rental tax applied to quotas, and this system is currently in use in Iceland. There was difficulty administering the resource rent tax in New Zealand – in particular, estimating the value of the resource rent to tax. Cost-recovery for the commercial sector was introduced as resource rentals ceased.

¹¹ For each QMS stock a Total Allowable Catch (TAC) is set, which limits the combined catch of commercial, recreational and customary fishers of that stock. Within the TAC, a Total Allowable Commercial Catch (TACC) is set, which is the limit for commercial catch. Holders of Quota shares (which are registered and tradeable and can be used as security for loans) are entitled to a proportionate share of the TACC.

Māori rights and interests

131. The introduction of the QMS triggered widespread assessment of Māori rights and interests in fishing, including Court action. All claims were settled through a Deed of Settlement with the Crown, implemented through legislation. There are outstanding questions relating to the exact extent of Māori rights and interests in fish stocks established through the Settlement. These may need to be further addressed before particular tax instruments could be adopted, without undermining the stability and solid basis for management and investment that the Settlement achieved.

Equity

132. Resource rentals attached to fish are likely capitalised into the value of quotas. Current quota holders who have purchased their quota will have therefore paid for the resource rental.

Fiscal potential

133. The total value of quotas in the QMS has been estimated to be approximately \$4 billion, which could be indicative of the rents attached to fisheries quotas (Stats NZ, 2010). This is the net present value attached to perpetual harvesting rights, not a recurring annual value.

Next steps

134. The Group could consider including the following comments and recommendations in the interim report:
- a) We are not aware of current work to assess whether or not the treatment of resource rentals attached to fish should be revised. This could be an area for further work by the Government.

5. Future possibilities – environmental footprint tax

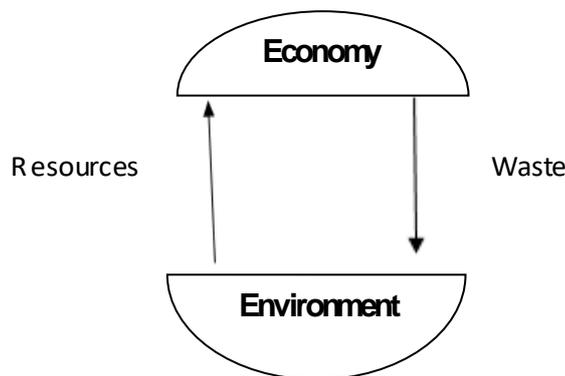
135. There are significant environmental challenges in New Zealand that have not been directly addressed in the previous section. These tend to be environmental problems where activities driving environmental change are more challenging to measure, and therefore less well suited to the use of tax instruments. For example, biodiversity loss, and impacts on ecosystem services.
136. The Tax Working Group received several submissions highlighting new approaches that could be developed to address some of these challenges. We note, in particular, the suggestion of the environmental footprint tax. An environmental footprint tax is a form of land tax, set according to the intensity of land use and consequent impact on the environment.¹² The intensity of land use could potentially be evaluated using satellite imagery.
137. Discussions with submitters highlighted that significant further work is likely needed to better validate approaches like this, calibrate prices with externalities, and work through potential overlaps with other environmental taxes. Nonetheless, the environmental footprint tax is an example of the potential for new environmental tax instruments in the future. Advances in modelling tools and sensing technology could help improve measurability, as well as reducing administrative and compliance costs, and improve pricing accuracy.

¹² As outlined in the submission from the Environmental Defence Society

6. Circular economy

What is the “circular economy”?

138. The term ‘circular economy’ is commonly used in discussions about moving towards a system where the resources and waste involved in creating products are reduced.
139. From an academic perspective, the concepts underpinning the “circular economy” has a history spanning several decades. It relates to the interaction between the inputs and outputs of the environment and the economy. It reflects the idea that the interaction between the economy and the environment is characterised by a closed, circular relationship (Pearce & Turner, 1990). The concept is broadly similar to the way that specific interactions between the environmental and physical/financial capitals in the Living Standards Framework are conceptualised.
140. The diagram below shows the economy relying on resources (inputs) from the environment. Resources are not destroyed as part of the industrial process, but are converted into another form. For example, coal consumption will appear as slag, carbon dioxide etc.¹³ Whatever is used up in terms of resources by the economy must end up somewhere in the environmental system as a waste product (output).



141. Some of this waste from the economy can be recycled, and therefore re-used within the economy. However, most waste is not recycled. If waste is not recycled it must be assimilated into the environment. The waste output could consist of carbon dioxide which goes into the atmosphere, sewage into waterways, solid waste into landfill etc.
136. The environment has a finite ability to assimilate waste in a way that converts it back into harmless or ecologically useful products. Where more waste is produced than can be assimilated into the environment, it will reduce the environment’s resources, its aesthetic functions (e.g. polluted rivers), and/or the environment’s ability to assimilate further waste (the environment’s sink function).

¹³ Capital equipment created in past periods will eventually wear out, and become a waste flow.

137. The concept of the circular economy is therefore a useful way of conceptualising waste that is neither recycled nor assimilated into the environment as a negative externality (that is, where the costs are not borne by the producer or consumer, but by third parties). There are negative environmental externalities that are not accounted for as a result of excess waste.
138. Addressing the negative externality of waste requires:
- Reducing use of resources, and therefore reducing waste flows into the environment, and/or
 - Appropriately dealing with waste when it occurs.
139. The macroeconomic implications of transitioning to a more circular economy have been assessed in an OECD working paper. The paper finds that the economic impacts are complex – transitions “involve multiple interactions between different sectors and countries, and will take place in parallel with other trends”, and they also find there is insufficient *ex-post* data on circular economy policies to allow for a robust empirical assessment (OECD, 2017). Notwithstanding, in their assessment of *ex-ante* models, they conclude “most economic models find these shifts will have an insignificant or even positive impact[s] ... for economic growth or overall employment.”

How does tax play a role?

140. Measures to reducing resource use, and therefore reducing waste flows into the environment, could include:
- Taking fewer materials from non-renewable sources to create products and operate services;
 - Keeping resources in higher-value uses for longer periods; and
 - Recirculating (recycling) resources into other productive uses when they no longer add value in their original use setting.
141. It is possible that tax could play a role in encouraging these measures, and our framework on externality taxes is consistent with this.
142. The *Frameworks* paper looked at the use of resource taxes to capture economic rent. The tax did not aim to change the miner’s behaviour, because the miner was already incentivised to manage the resource in a way which maximises its value, as determined by the market. However, from a circular economy perspective, resource taxes do aim to change behaviour, which will effectively reduce the use of natural resources.
143. Taxes to reduce resource use and minimise waste can be levied either upstream as resource extraction taxes, or downstream on consumers in the form of a material consumption taxes.
144. To be effective, downstream consumption taxes have to be more targeted at material consumption than broad-based consumption taxes like New Zealand’s GST. A

potential way of targeting is differentiating the rates to reduce resource use.¹⁴ The Secretariat's paper on GST from Session 2 explores in more detail broader considerations for GST. A differentiated approach was not recommended.

145. Another approach that would support a reduction in resource use and therefore a reduction in waste flows is to tax:
- waste that is not recycled back into productive use (such as a landfill tax, or a tax on non-reusable packaging)
 - pollution (taxation of producers who emit greenhouse gases).
146. In many instances, tax on excess waste or pollution would be complementary to taxes used to price negative externalities.

¹⁴ For example, new goods could attract higher rates than services or second-hand goods. Another example could be lowering GST rates on labour-intensive services could incentivise repairs and reduce waste; while raising rates on energy and resource-intensive products and services.

Appendix A: Overview of submissions from organisations to the TWG on the environment

Eighty-nine submissions commented on tax and the environment. Forty submissions were in favour of greater use of environmental tax (either generally or with regards to specific types of environmental tax). Twenty-seven submissions were either opposed or had significant concerns. The remainder commented on various issues relating to environmental taxes.

Submitters had varying expectations for what the Working Group should do regarding environmental taxation. Some were looking to the Working Group to progress specific environmental taxes. Others questioned whether the Working Group was the right body to be considering environmental policy, and recommended that it limit its scope to recommending frameworks for the use of taxes to address environmental problems. Several submitters called for the Working Group to be mindful of the work of other reviews, especially the Productivity Commission and the Climate Change Commission.

Many submissions stressed that tax should be considered alongside, or in combination with, other policy tools. While some submissions saw tax as a complementary policy lever, other submissions saw it as potentially conflicting with regulatory efforts.

Several submissions suggested principles and frameworks for environmental taxes. These were generally similar to those highlighted in the Environmental Tax Frameworks discussion paper. In particular, submitters generally saw environmental taxes as a way to internalise negative environmental externalities, and resource taxes as a way for resource owners to capture rents. Eight submissions that environmental taxes should also be judged by their ability to achieve behavioural responses.

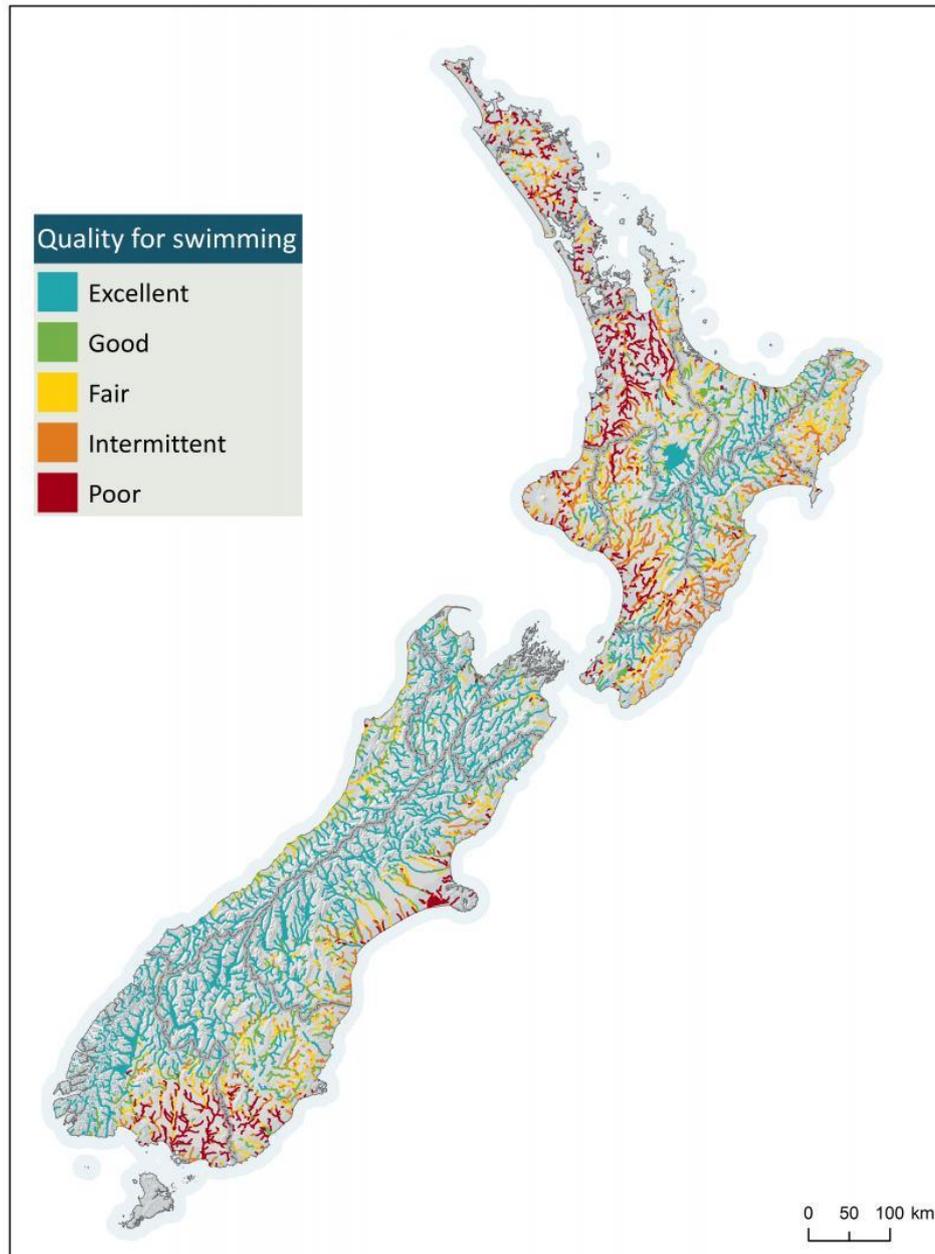
The most common specific tax issues raised were water abstraction taxes, water pollution taxes, greenhouse gas taxes, and waste taxes which are explored further below. We also overview submitters feedback on transport and fuel taxes, tourist levies, tax concessions, resource taxes, hypothecation, and Māori perspectives on environmental taxes, and an environmental footprint tax.

Secretariat comment

The Secretariat put up initial advice on tax and the environment in its *Frameworks* paper on 27 April 2018. Several submitters suggested that elasticity should be a core part of an environmental tax framework – a view echoed by some Working Group members at the 4 May 2018 meeting. We will pass this feedback on to the external reviewers of the *Frameworks* paper.

Submissions generally focused on arguments for or against specific types of taxes. Resource-specific taxes will be considered in the upcoming second paper on tax and the environment. We note that several submitters suggested there could be resource rentals attached to fish – an issue not identified in the *Frameworks* paper. The Secretariat is following up with relevant officials for further advice.

Appendix B: New Zealand map of water quality for swimming



Note: The maps are based on sampling of *E. coli* and toxic algae (by regional councils, NIWA and Cawthron), as well as information on catchment conditions such as climate, land use and geology.

Source: Ministry for the Environment, 2017

Appendix C: Impact of increased landfill levies in New Zealand

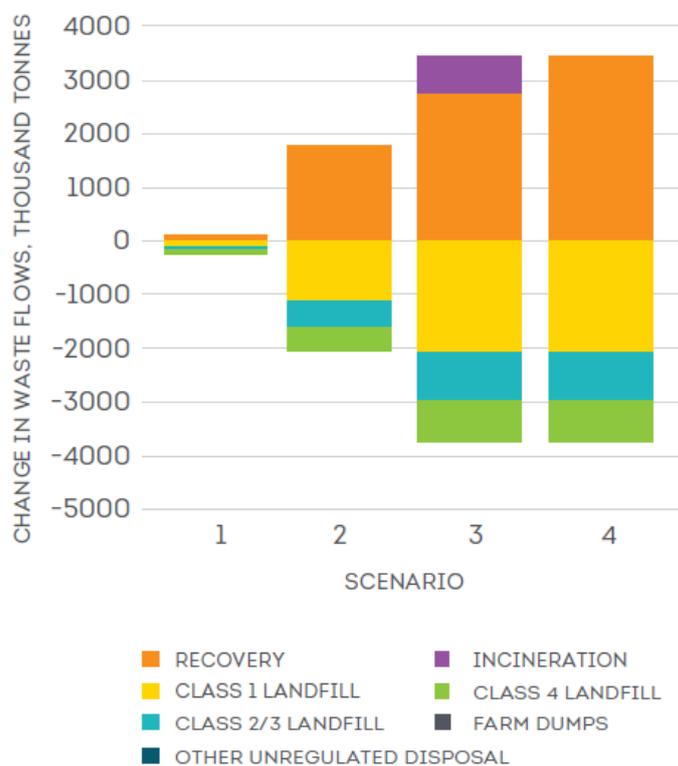
Note: Extracts from modelling by Eunomia on the impact of changes to the Waste Disposal Levy

Scenarios modelled, and forecasted revenues

	Levy on standard waste (\$/t)	Levy on inert waste (\$/t)	Incineration levy (\$/t)	Change in levy revenues (2025)
Status quo	\$10/t	\$10/t	-	Not modelled ¹⁵
Scenario 1	\$20/t	\$2/t	-	+\$45m
Scenario 2	\$90/t	\$10/t	-	+\$210m
Scenario 3	\$140/t	\$15/t	-	+\$200m
Scenario 4	\$140/t	\$15/t	\$40/t	+\$200m

Source: Eunomia, 2017

Change in waste flows, thousand tonnes (2025)

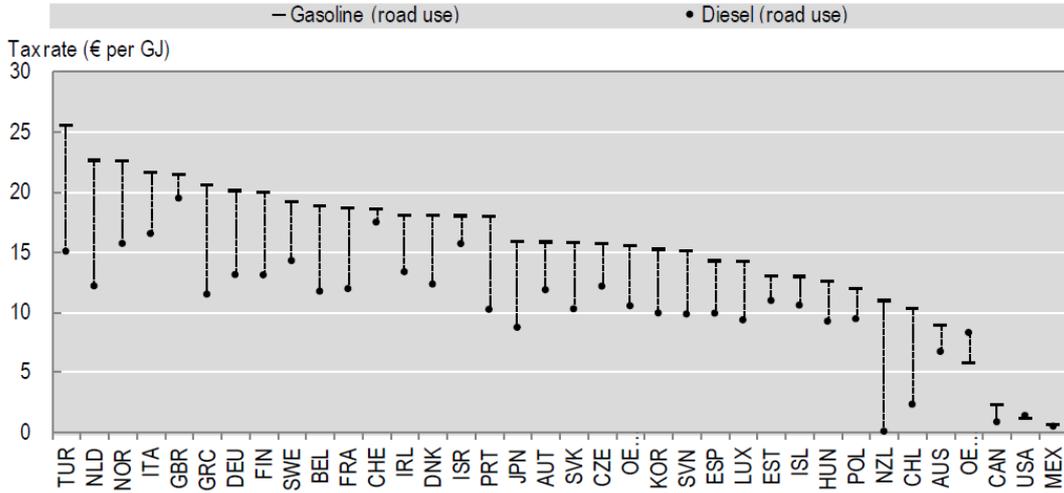


Source: Eunomia, 2017

¹⁵ A baseline is not specified but current revenues from the levy are approximately \$30m per annum

Appendix D: Comparison of fuel taxes with OECD countries

Effective tax rates on energy: Gasoline vs diesel (road use)



Source: OECD calculations. Tax rates are as of 1 April 2012 (except 1 July 2012 for Australia); emissions are based on data for 2009 from the IEA. Figures for Canada and the United States include only federal tax rates.

Source: OECD, 2013

Glossary

Accounting Profits Royalty (APR). A charge that is levied as a percentage of accounting profits. An APR is only due if a profit is generated.

Ad Valorem Royalty (AVR). A charge that is levied as a percentage of sales revenues. An AVR must be paid whether or not a profit is generated.

Circular economy. An industrial system that aims to design out waste.

Corrective tax. A tax designed to make markets more efficient by exposing producers and consumers to prices that reflect the costs that they impose on others (such as pollution).

Deadweight loss. The loss of economic efficiency that can occur when equilibrium for a good or service is not achieved – that is, when marginal social costs are not equal to marginal social benefits.

Deduction. Losses or outgoings incurred in producing income or running a business that can be used to reduce taxable income.

Depreciation (economic). The decline in the market value of an asset over its life.

Depreciation (tax). The decline in the value of an asset for taxation purposes, which may differ from economic depreciation.

Distortion. Any action or thing that reduces economic efficiency. Distortions generally arise when private action (such as price-fixing by a cartel), or public action (such as a tax imposed by government), changes an individual's or firm's behaviour.

Ecosystem services. The benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling.

Environmental tax. A tax levied on activities which are considered to be harmful to the environment and is intended to promote environmentally friendly activities via economic incentives.

Externalities (negative) / external cost. A cost that affects a party who did not choose to incur that cost.

Externalities (positive). A benefit that affects a party who did not choose to incur that benefit.

Fiscal regime. The fiscal regime of a country is a set of laws, regulations and agreements which governs the economic benefits derived from exploration and production of a resource, especially for petroleum and mineral mining.

Hypothecation. The earmarking of revenue raised from a specific tax for a particular programme or service.

Marginal cost / marginal damages. The cost added by producing one additional unit of a product or service.

Pigouvian tax. A tax on an activity that generates negative externalities.

Rents (economic). An economic rent is the excess of the return to a factor of production above the amount that is required to sustain the current use of the factor (or to entice the use of the factor). For example, if a worker is paid \$100,000 but would still be willing to work at the same job if they were paid \$75,000, their economic rent would be \$25,000.

Resource rent tax. A tax that applies to the super normal profits, or economic rent of a resource project.

Revenue recycling. Using revenue from the introduction of a tax to reduce other taxes.

Royalties. Payments made for the use of an asset.

Social costs. The total costs of an activity. This includes the private cost as well as the spillover or external cost imposed on people who are not directly involved in the activity.

Tax instruments. In this paper, tax instruments is broadly defined to include any potentially revenue raising economic instrument. This includes nationally-uniform taxes or levies, locally-variable taxes or levies, royalties, and auctions of tradable emission permits or exploration rights.

Windfall gains. Large, unexpected gains resulting from fortuitous circumstances.

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