
JOINT STATEMENT OF ECONOMIC EXPERTS (revised)

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The Proposed Plan Change 10 is currently being heard by the Independent Hearing Panel. Pursuant to Memo 5, 1 March 2017, the Panel encouraged expert economics witnesses to caucus voluntarily and endeavour to narrow the issues, and this was further agreed at the hearing on 4 April 2017. In line with this, the economics expert witnesses called by Bay of Plenty Regional Council, DairyNZ, Rotorua Lakes Council have undertaken caucus meetings in person and by telephone and email and have agreed the following matters are issues and set out their respective positions on these as to the matters agreed and not agreed and the reasons why. All have agreed to proceed in line with the expert witness code of conduct as set out in their evidence to the Panel. There are three issues dealt with under this caucus report.

ISSUE 1: Does a grandparenting (with sector averaging) allocation result in the most economically efficient outcome?

1. This issue is centred on the treatment of physical assets and the price of nitrogen allowances in the economic modelling, and the implications of these for economic efficiency.
2. Philip Osborne contends that a grandparenting allocation with sector averaging may not result in the most economically-efficient outcome when considering the parameters of the model.
3. Graeme Doole's position is that sector averaging does result in the most economically efficient outcome, and that this has been shown in the comprehensive economic assessment of alternative allocation methods at the farm, catchment, district, regional, and national levels (Parsons et al., 2015; Market Economics, 2015).

Existing investment

4. Philip Osborne's position is that existing investment in physical capital (as per Policy WL 5B of the Regional Policy Statement principles for allocation) has played an important role in the assessment and evaluation of the most appropriate method by which to manage (allocate) nitrogen rights. Philip Osborne advocates considering the depreciation of physical capital over time, given that existing capital will depreciate across time and this will serve to lower its importance in determining the most-efficient allocation. He contends that as this physical capital devalues over time that the significance of land use efficiencies (such as soil fertility and structure) will increase in significance. While he acknowledges that depreciation is not generally included in cost-benefit analysis (due in part to the realisation of this loss on sale or disposal of the asset), he believes it is prudent to consider this in terms of the market response and the potential viability of the development of alternative land uses. At this point in time Mr Osborne does not suggest a resulting allocation mechanism.
5. Graeme Doole's position is outlined in the statements that follow.
6. The approach proposed by Mr Osborne is rarely used when addressing diffuse pollution from farms, both at the national and global scale. It conceptually provides a feasible means to address how the importance of several types of existing physical capital to allocation policy will decline over time, as it depreciates.
7. The economic model applied by Parsons et al. (2015) did not consider this allocation mechanism, given that it was not raised during the STAG process. The novelty of this approach was one driver for this.

8. The economic model applied by Parsons et al. (2015) did not study transition over time (see paragraph #28 of his EIC). Such models are commonly called equilibrium models. The use of an equilibrium model was in line with common practice and is motivated by a lack of data dictating how prices, farm management, farm technology, and the population will change over time.
9. Differences in capital costs and depreciation rates are not considered between different allocation policies in the Parsons et al. (2015) report, aside from those associated with land-use change. This is because different allocation systems are not predicted to impact the depreciation rate within each land-use; except, of course, if there is land-use change.
10. The model applied by Parsons et al. (2015) is not suited to richly describing the allocation system proposed by Mr Osborne. Nevertheless, I believe it is not an issue of significance given the many flaws of the proposed system.
11. The approach proposed by Mr Osborne provides no guidance with which how nitrogen-leaching entitlements would be allocated among land uses across time. The difficulty associated with allocating nitrogen is amplified above that we see in typical circumstances when allocation rates are required to vary over time, which his proposed system does.
12. The approach proposed by Mr Osborne assumes that owners of undeveloped or underdeveloped land will be motivated to develop land in the future, once they receive more entitlements to leach. Extensive economic modelling undertaken within this process (Parsons et al., 2015; Doole et al., 2017) highlights that the extensive development of new intensive agricultural land uses in the catchment is not advantageous, both from an economic and environmental perspective. A chief constraint is the high cost of establishing a dairy farm, both within and outside of the Lake Rotorua catchment.
13. The approach proposed by Mr Osborne does not address the allocation principle of existing land-use in Policy WL 5B of the Regional Policy Statement. This principle seeks to recognise the high value of the many types of capital found on a farm that do not depreciate. Indeed, many types of capital do not depreciate over time in a profitable farming system; examples are land, soil fertility, soil structure, and management ability. My expert opinion is that these are likely substantially more valuable than physical capital that does depreciate (e.g. fences, milking sheds). Assets that do not depreciate (e.g. land, soil fertility, management ability) were given some weight during the development of Plan Change 10, given their ties to existing land use as an important principle of allocation. In contrast, the system proposed by Mr Osborne does not.
14. Mr Osborne contends that the economic efficiency of an alternative allocation system will be superior to that proposed by Plan Change 10 (see paragraphs #1 to #3 above). This is unlikely because it involves taking nitrogen away from those land uses that are best able to utilise it, based on their available levels of physical capital that do not depreciate within profitable systems (e.g. land, soil fertility, soil structure, management ability).
15. Mr Osborne contends that the economic efficiency of an alternative allocation system will be superior to that proposed by Plan Change 10 (see paragraphs #1 to #3 above). This is unlikely because it involves nitrogen being allocated over time to those land uses that are least able to productively utilise it.
16. Under the allocation system proposed by Mr Osborne, it will take some time for owners of less-developed land to obtain enough nitrogen to allow the development of intensive agriculture. The benefits of this development, if any, will be substantially reduced because of

the time value of money. Economic theory tells us that a dollar now is worth more than a dollar in the future, as we lose the opportunity to invest a dollar that we receive at a later time. (This is the underlying theory of discounting.) The discount rate when the Parsons et al. (2015) report was generated was 8%. At this discount rate, the value of a 2015 dollar received in 2025 is \$0.45, while the value of a 2015 dollar received in 2032 is \$0.27. Overall, given that Mr Osborne's proposed allocation scheme focuses greatly on intensification in the medium- to long-term, it is important to consider that the economic benefits accruing to this action are greatly eroded due to discounting.

17. The approach proposed by Mr Osborne is based on an assertion that the value of nitrogen will be high in future years, becoming an asset for land owners with higher allocations. There is evidence to believe that, converse to this belief, the price of nitrogen will decline over time. This is outlined in detail below.
18. The approach proposed by Mr Osborne was not considered by the collaborative process. Rather, it is a proposal put forward by a limited number of submitters. This highlights that the proposed system could easily diverge from the allocation principles put forward by the STAG. Furthermore, the STAG process served to discuss the equity of each allocation system for key stakeholders, and this new system has not yet been discussed from this perspective.
19. The approach suggested by Mr Osborne has a high level of associated risk. This arises from a current failure to provide a proposed design for the scheme. These limitations are emphasised given a lack of similar systems applied throughout New Zealand or the world to limit contaminant loss from farms. In contrast, the structure of the allocation system proposed in Plan Change 10 is closely related to that observed in a significant number of environmental-management programs worldwide.
20. Ms Muller points out that an allocation system based solely on risk factors (e.g. loss risk) is uncertain as to whether it would get to the nitrogen target sought.
21. Mr Osborne remains concerned regarding the treatment of capital investment and the costs associated with it in terms of the viability of existing land uses and the potential for effective land use change and efficient nitrogen use.

The price of nitrogen

22. Philip Osborne contends that the price of nitrogen would increase over the next 15–20 years because farmers will demand more nitrogen as they seek to increase production or the value of existing production increases. Philip Osborne considers that as a scarce resource (albeit through the cap) with productive value, there is no evidence to suggest that activities will not seek to maximise utility and thereby increase the price of nitrogen. Price increases inequity.
23. Graeme Doole's position is that there is no empirical evidence to support the contention that the price of nitrogen will increase over time in a cap-and-trade system. Economic theory suggests that demand for nitrogen is unlikely to increase in the catchment over time. Lower demand (and hence lower prices) is likely to materialise in the market for nitrogen in the medium- to long-term for several reasons:
 - (a) Innovation will lead to the development of improved and new mitigation practices.
 - (b) Adaption will lead to producers learning how to profitably farm within nitrogen-leaching limits.

- (c) It will be more profitable to purchase and/or intensify unregulated land outside of the catchment, rather than seeking to increase intensity within the PC10 boundary through purchasing additional rights to leach.
- (d) Prices for products of the dairy, sheep, beef, and forestry sectors are not guaranteed to increase over the next 15–20 years, particularly given the development of synthetic milk and meat products in recent times. Thus, it is not guaranteed that producers will have an incentive to increase demand for nitrogen because of higher prices received for outputs of pastoral farming and/or forestry.

Statement of agreed facts

- 24. Economic efficiency in land use is driven by a range of criteria; the characteristics of the land are one. Others include skills and experience of landowners, access to services and markets, existing investment in physical capital, and legal aspects such as land parcel size and existing land covenants.
- 25. Trading provides a benefit in economic efficiency, and potentially provides management flexibility. However, trading does enable land use to move away from the land use it is allocated to.

Unresolved issues

- 26. Mr Osborne believes that the relative significance of the physical assets identified in para 24 changes over time, and it is this change that is fundamental to sustainable and efficient land use. Mr Osborne contends that the choice of allocation method can have an impact upon the rate of devaluation of physical assets.
- 27. There is a disagreement about whether efficiency should be measured in terms of cost, production, or environmental impact.
- 28. The direction of the price of nitrogen over time. While Graeme Doole suggests price of nitrogen is likely to decrease over time for the reasons discussed above, Mr Osborne contends that the method by which the nitrogen is allocated plays a role in the treatment of these assets by the market and thereby their relevancy in the assessment process. Philip Osborne considers that as a scarce resource (albeit through the cap) with productive value, there is no evidence to suggest that activities will not seek to maximise utility and thereby increase the price of nitrogen.

ISSUE 2: Is the sector range allocation the most equitable allocation method?

- 29. In relation to Issue 2, the Appearance Notes for Phil Osborne dated 3 April 2017 refer to ‘specifically the impact on Māori land holdings’ (para 13).¹ The Regional Policy Statement Policy IW 1B requires council to enable development of multiple-owned Māori land.² The analysis for Proposed Plan Change 10 included analysing whether Māori were

¹ The economic caucusing discussed a definition of underdeveloped land as encompassing forestry, drystock and dairy land where the characteristics of the land suggest it could be used in a more nitrogen intensive way. However, based on the Appearance notes the caucusing report focuses on underdeveloped Māori land.

² Defined in Footnote 3 (RPS, p.151) as “land in multiple ownership under *Te Turi Whenua Māori Land Act 1993*.”

disproportionately impacted in relation to developing their land relative to other land owners in the Lake Rotorua catchment. This analysis was summarised in the s32 evaluation report.³ In this regard, the s32 report:

- (a) Quantifies the proportion of Māori Freehold land in the catchment, and the proportion of Māori land in dairy, drystock, forestry and non-productive trees.
- (b) Describes the issues relating to development, and the implications of Rule 11 on Māori Freehold land development.
- (c) Details the impact of the plan change on Māori Freehold land development beyond what is already in effect as a result of Rule 11. Where pastoral land has been benchmarked, the impact of the proposed rules on low-intensity pastoral farms has been quantified.⁴
- (d) Estimates how land values (specified on a per-hectare basis) would be impacted for dairy, drystock, and lifestyle block. These were estimated by Telfer Young, and are recorded in the s32 report (including p. 167, p. 175, and pp. 230-232). These impacts affect all landowners in the catchment.
- (e) Provides the results of the Parsons et al. (2015) report, which shows the impacts in terms of changes in land use and income for different sectors, and for the catchment.

The Parsons et al. (2015) report presented the impact of eight diverse allocation policies on land-use, land management, trading, and income across different sectors. However, equity is not studied in a formal fashion. Rather, the collaborative process implemented within PC10 was used as a pragmatic means to address the equity of each allocation policy through open debate and structured decision making based on assessments of relative economic efficiency performed with the economic models. The value of a collaborative process to considering equity issues is reinforced when considering that, “[in] most cases, it is not possible to determine an allocation approach that both maximises economic efficiency and is considered equitable by all affected parties” (Daigneault et al., 2017, p. 449).

30. The affect the Proposed Plan Change 10 on the capital value of Māori Freehold land was not assessed, given the limited ability to sell Māori Freehold land due to the restrictions on alienation under the *Te Ture Whenua Māori Land Act 1993*.
31. Following the completion of submissions for Proposed Plan Change 10, BOPRC undertook additional analysis that included both Māori Freehold land and settlement land in the catchment. Here, modelling was used to quantify the impact of an alternative distribution of nitrogen based on a submission from PF Olsen:
 - (a) The area of land in each of the five main land uses was identified and compared to land use capability for both Māori land (including and excluding settlement land) and the rest of the catchment. This quantified the differences between Māori land and the rest of the catchment. Refer to the rebuttal evidence of Gemma Moleta

³ The baseline in the s32 evaluation was defined as Rule 11 in the Operative Regional Water and Land Plan. The work underlying Proposed Plan Change 10 has quantified distributive effects relating allocation decisions by identifying groups perceived to be disadvantaged by the allocation of nitrogen, and the land use relevant to this.

⁴ Quantification is consistent with Section 32 (3)(b) of the RMA, which requires that an assessment of the efficiency and effectiveness of provisions must ‘if practicable, quantify the benefits and costs’ of the environmental, economic, social and cultural effects that are anticipated from the implementation of the provisions. Guidance on the section 32 evaluation notes that ‘to quantify means to place a numerical value on, not necessarily to monetise’ (MfE, 2014, p.18).

- (b) The current cost of moving into pastoral farming from other land uses (e.g. bush and scrub, forestry) was presented, to illustrate the current situation in the absence of a price for nitrogen. This is described in detail in the rebuttal evidence (2) of Sandra Barns.

Equity is defined in the Oxford English Dictionary as ‘the quality of being fair and impartial’.⁵

32. Mr Osborne’s position is that equity is a specific RPS allocation principle, and identification of those who gain and lose is the second step in the CBA policy evaluation process outlined by Treasury.⁶ Mr Osborne contends that the assessment undertaken for PC10 does not provide information that illustrates the value of lost opportunities for land owners. While the impacts borne, in terms of changes in activity, by different sectors are evident the opportunities lost to land owners has not been illustrated either for the allocation methodology identified through PC10 or for the alternative allocations which in turn would give some relativity to the distribution of costs.
33. A key consideration in deciding which impacts to assess is the appropriate baseline. Mr Osborne believes that the uncertain nature of Rule 11 may have meant that its impact was not fully considered in land decisions made preceding it. In specific cases such as Maori Settlement land this would mean that the restrictions of Rule 11, subsequently solidified in PC10, were not adequately considered, due to their temporary nature. PC10 offers an opportunity to rectify these potential inequities.

Statement of agreed facts

34. The role of economics is to assist in informing the debate about equity through the provision of information, but the question of what is most equitable is determined by a range of factors including economics.
35. Any allocation method will have distributional impacts that will affect groups and sectors differently.
36. A robust method to monetise the distributive effects of nitrogen allocation was not able to be envisaged within the period of caucusing.

Unresolved issues

37. Whether sufficient information has been provided on where the relative costs fall for potential options.
38. Using the price of nitrogen multiplied by hectares in forestry or bush and scrub is not a useful proxy for distributive costs because it takes no account of the usefulness of the land for any particular purpose, assumes it is economically sensible to develop land into a more intensive nitrogen use.

⁵ <https://en.oxforddictionaries.com/definition/equity>

⁶ The Treasury (2015). Guide to Social Cost Benefit Analysis. Of the role of equity (distributional) issues, paragraph 39 (page 33) of this document reads “*Cost benefit analysis is not well suited to assessing equity (fairness) issues and impacts on social infrastructure. Where there might be concerns about how the benefits and costs fall on different groups in society, or how a project might impact on the social infrastructure, the best approach is to draw attention to these issues in the narrative section of the report.*”

ISSUE 3: What are the economic costs of a moratorium on trading prior to 2022?

39. Policy LR P7 in Proposed Plan Change 10 enables the transfer of nitrogen loss entitlements between properties/farming enterprises from 1 July 2022. Prior to 2022 the Incentives Board will purchase 100t of nitrogen entitlements from landowners willing to sell. The risk faced by the Incentives Board is that high demand will prevent the purchase of the 100t required and the Council will have to look to address the shortfall. The Incentives Fund is part of the Integrated Framework, and represents part of the community contribution to reducing nitrogen in the lake.
40. Philip Osborne has asked what the costs of a moratorium on trading are and whether these have been weighed against the benefits associated with it.
41. Three-quarters of the farms that have participated in the process to establish their current state discharges are currently achieving their 2022 targets. The balance of farms would be required to make changes in farm practices to achieve their 2022 targets. Approximately half of those farms that would be required to make reductions have not made reductions from their benchmarks to date. Based on these figures, Sandra Barns' position is that most farmers will not have additional costs to achieve their 2022 N discharge targets.
42. The information on the status of farms in achieving their 2022 reduction targets has been made available to the economics experts.

Statement of agreed facts

43. Three-quarters of farmers will not face additional costs in achieving their 2022 targets because most farmers are at that point currently (assuming that those who have engaged with the process to date are reasonably representative of farmers in the catchment)
44. Farmers who are currently above the 2022 nitrogen discharge target will have to make changes to on-farm practices to reduce nitrogen under a moratorium.
45. It was agreed during caucusing that given the low level of trading under Rule 11D, and that three-quarters of the farmers who have engaged with the process and had their current discharges assessed are currently at the 2022 targets, the cost of the moratorium over the 5-year period is likely to be limited.

Unresolved issues

46. There are no unresolved issues.

ISSUE 4: The potential economic risks associated with the WWTP treatment

47. Philip Osborne remains concerned that no economic assessment has been undertaken with regard to the allocation of nitrogen for the WWTP. The economic significance of facilitating population growth in Rotorua is vital to the community's economic well-being. Notwithstanding that RLC population growth figures in line with the latest Statistic NZ population projections, the ability for an economy to facilitate growth in a timely and efficient way is fundamental to economic wellbeing. The lack of specific provision in PC10 for this growth has the potential to put this growth at risk.
48. **Issue 4 was put aside by the economic caucus as a planning matter.**