Before a Decision-Making Committee
Of the Environmental Protection Authority

APP203660

Under	the Hazardous Substances and New Organisms Act 1996
In the matter of	the modified reassessment of methyl bromide
By	**Stakeholders in Methyl Bromide Reduction Inc** Applicant

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STATEMENT OF EVIDENCE OF KIERAN O'NEILL MURRAY

27 JULY 2020

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INTRODUCTION

1. My full name is Kieran O'Neill Murray.

Qualifications and Experience

2. I am a professional economist working primarily in the fields of economic analysis of regulation, cost benefit and competition analysis, and market design. I have served as an economic consultant on these matters in more than 15 countries.

3. My expertise as an economist has been recognised in my appointment, by the Governor General, as an expert lay member of the New Zealand High Court under the Commerce Act 1986, and my appointment by the Governor General of Papua New Guinea as an International Arbitrator for appeals from the PNG Independent Consumer and Competition Commission.

4. I am a Managing Director of Sapere Research Group, a firm I co-founded. Sapere is one of the largest expert services firms in Australasia, employing 60 specialist advisers, and a leader in providing independent economic, forensic accounting and public policy services.

5. Serving as an expert economist, I have testified on more than 30 occasions. I have testified before Select Committees of New Zealand's House of Representatives, the High Court, the Environment Court, the Environmental Protection Authority, the Human Rights Review Tribunal, the Waitangi Tribunal, the New Zealand Commerce Commission, and the Energy Regulatory Commission of the Philippines. I have provided expert evidence and reports to the Australian Federal Court, the Australian Consumer and Competition Commission, the Australian Energy Market Commission, the Australian Energy Regulator, the (former) National Electricity Code Administrator in Australia, the Energy Market Authority in Singapore, and presented to the Federal Energy Regulatory Commission of the United States.

6. Earlier in my career I served in public policy roles, including as an economic advisor to the Rt Hon Mike Moore (subsequently Director-General of the World Trade Organisation) during his term as Leader of the Opposition; a member of the Rt Hon James Bolger's Prime Ministerial Task Force on Targeting Social Assistance; an economic advisor to the New Zealand

Minister of Finance, the Hon David Caygill, and as an economist at the New Zealand Treasury Department.

Scope of Evidence

7. I have been engaged by Stakeholders in Methyl Bromide Reduction Incorporated (**STIMBR**).

8. My evidence assesses the economic costs and benefits that would result from amending the controls—for methyl bromide fumigations on log exports and fresh produce imports and exports—as sought in STIMBR's reassessment application ('**the Application**').

9. My evaluation has been guided by the Schedule to the Hazardous Substances and New Organisms (Methodology) Order 1998, and in particular sections 9(b) and 13. Accordingly, I focus on the economic costs and benefits accruing to New Zealand as a whole and consider:

   (a) impacts that affect the capacity of communities and people to provide for their economic well-being;

   (b) whether the costs and benefits are monetary or non-monetary;

   (c) the magnitude and expected value of the costs and benefits and the uncertainty bounds on the expected value; and

   (d) the distributional effects of the costs and benefits over time, space and groups in the community.

10. I do not assess environmental or health impacts as I am not qualified to comment on those effects.

11. I list in Appendix A the materials I have reviewed in preparing my evidence. Where I rely on specific information, I cite the relevant document in my evidence.

Code of Conduct

12. I have read the Code of Conduct for expert witnesses in the Environment Court Practice Note 2014 and I have complied with it when preparing this evidence. Other than when I state that I am relying on the advice of another

person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

EXECUTIVE SUMMARY

13. I have compared the economic benefits and costs between two alternative futures—a future with the methyl bromide recapture controls that were scheduled to take affect on 28 October 2020, and a future with a reassessed control that avoids those economic impacts. In summary, if the controls that were scheduled for 28 October take effect, there would be an economic impact on the exports of logs to India and China and on the import and export of several types of fresh produce. The Application seeks a reassessment so as to avoid those impacts. Avoiding those impacts on New Zealand exporters and importers would result in an economic benefit of at least $2.2 to $3.2 billion over ten years. Because of the economic uncertainties due to Covid-19, the economic benefits are more likely to lie at the upper end the range.

I ASSESS TWO ALTERNATIVE FUTURES

14. Under the existing approval to import, manufacture and use methyl bromide, the requirements to recapture methyl bromide when used as a fumigant will increase significantly from 28 October 2020. Methyl bromide will be prohibited as a fumigant unless used with technology that results in a residual level of methyl bromide in the enclosed space of 5 parts per million (ppm) or 19 milligrams per cubic metre (the '**October Recapture Control**').[1] I am aware that the Decision-making Committee responsible for determining the Application has granted a waiver that, for now, extends the 28 October 2020 deadline to 28 April 2020; but for the purposes of my assessment it makes no material difference whether the recapture control takes effect in October 2020 or April 2021: from an economic perspective these can be treated as the "same" future scenario. My reference to the 'October Recapture Control in this evidence, is a reference to the recapture requirements and my analysis does not turn on whether those requirements take effect in October of this year or April of next year.

[1] Clause 13, Table C2, Appendix C of Decision HRC08002.

15. STIMBR seeks a reassessment of the October Recapture Control.

16. I understand from the Application (page 7), and Mr Hammond's statement of evidence (paragraphs 19–21), that the log export industry relies on methyl bromide to meet the phytosanitary requirements of two key markets, India and China. I also understand (Application, page 8; Mr Hammond, paragraphs 48–51) that there is presently no technology that can achieve a 5ppm residual capture level when fumigating logs stacked on a wharf, or in the hold of a ship.

17. I understand from the Application (page 8), and from submissions made to the Environmental Protection Authority by United Fresh NZ Limited (page 4), T&G Global Limited (page 2), NZ Apples and Pears (page 2) and Mr Apple NZ (page 2) that some fresh produce exports and imports also rely on methyl bromide for fumigation. From these submissions, I understand that no systems are available that would meet the October Recapture Control, without significantly reducing the quality and shelf-life of the relevant (discussed below) fresh product exports and imports.

18. Consequently, if the October Recapture Control takes effect, there would be an impact on the exports of logs to India and China and on the import and export of several types of fresh produce. The Application seeks a reassessment so as to avoid those impacts. My evidence compares the economic benefits and costs between these two alternative futures—a future with the October Recapture Control and a future with a reassessed control that requires recapture to a less onerous level, namely a level that is achievable with the best technology presently known (and assuming sufficient lead time for implementation).

19. Consistent with the request in the Application to extend by 10 years the deadline for achieving recapture from ship hold fumigations, I quantify over a 10 year period the economic costs that would be avoided through reassessing the recapture requirements. The implicit assumption is that, after ten years, there would be no difference between the two scenarios. This convergence may occur if technology is developed that allows greater recapture, alternative fumigants become available, or the standard is again reassessed. The economic costs and benefits approximately scale with the period over which they are assessed, so if this convergence occurred one

year earlier (or one year later), the costs would reduce (or increase) by approximately 1/10th in nominal terms.[2]

20. In the analysis that follows, I consider first the impact of the October Recapture Control on log exports, and then the impact on fresh product exports and imports.

IMPACTS ON THE EXPORT OF LOGS

Current methyl bromide treatment rates for logs

21. Table 1 below illustrates the volume and value of logs treated with methyl bromide in 2018. There are other wood products treated with methyl bromide but the volume and value of those products are comparatively small and would not materially alter the quantification of economic costs and benefits.

Table 1 Volume and value of logs treated with methyl bromide, by destination (2018)[3]

Country	**All logs volume m³**	**Percent of log trade**	**MB Treated logs by volume**	**%MB use, by volume**	**Approximate export value of treated product ($NZ million)**
TOTAL	**21,479,921**	**100%**	**4,749,163**	**22%**	**791.5**
China	17,251,264	80 %	3,052,042	18%	508.7
India	1,696,444	8 %	1,696,444	100%	282.7
Other countries	2,532,213	12 %	677	0.03%	0.1

22. The table shows that currently around 22 percent of logs by volume and value are treated with methyl bromide. Volume measures are presented using the Japanese Agricultural Standard (JAS), which is the method used in the New Zealand forestry sector since the 1980s.[4] China takes around 80 percent of log exports and India takes around 8 percent. While other

[2] With discounting to recognise the time value of money, a cost has less monetary impact the further into the future that it is incurred, so reducing the period from 10 years to 9 years, for example, would reduce the cost in today's dollars by about 7.6% and not 1/10th.

[3] Ministry for Primary Industries "Information on the biosecurity use of methyl bromide in New Zealand (July 2019) at 6.

[4] Logs for export from New Zealand are typically measured on truck and only the small-end diameter and length are used for the calculation of the JAS volume. JAS is calculated by assuming a rectangular solid shape with square rather than circular ends and, for logs greater than 6m, a pre-determined standard allowance for the increase in log diameter from the small end to the large end.

countries, including South Korea, take 12 percent of log exports, methyl bromide is very rarely used in those markets (accounting for less than a third of a percent of methyl bromide use).[5] The total volume of logs treated annually with methly bromide is 4.75 million JAS m^3.

Cost of exporting logs to China would increase signficantly

23. Table 1 above shows that 18 percent of the logs that went to China in 2018 were fumigated with methyl bromide. As all logs exported from New Zealand to China must be fumigated, I assume the remaining 82 per cent were treated with alternative methods including phosphine and debarking.

24. Phosphine treatment is an alternative to methyl bromide for fumigating logs. However, this treatment is only applied in a ship's hold as phosphine use on shore is not practical (Hammond, paragraph 57). Therefore, if the October Recapture Control were implemented, the vast majority of logs exported to China would need to be transported in a ship's hold (there would be a small percentage of logs that can be de-barked to an acceptable standard that can be carried as top stow).

25. PiNZ Management Limited (2019) estimated a 50 per cent increase in the number of ship journeys would be required to transport logs to China if all logs were shipped in-hold (rather than the current practice of in-hold and on-top stowed).[6] PiNZ estimated that these additional ship journeys would increase the unit cost for shipping logs by $18.37 per JAS m^3.[7]

26. I obtained (commercially sensitive) shipping rates charged to exporters over the past 5 years. This data shows that shipping rates change frequently, including varying with exchange rates. From this data, I estimated that shipping prices for Chinese-bound log exports would have ranged from an additional NZD$17 to $23per JAS m^3, if ship capacity had to increase by a factor of 1.5.[8] The PiNZ estimate is within, and toward the lower end, of this

[5] If markets that currently treat logs on arrival were to change practice and require New Zealand to treat logs prior to exporting, the economic impacts of the October Recapture Control estimated below would increase.

[6] PiNZ Management Limited, (22 March 2019) "*Impact of the loss of methyl bromide as a phytosanitary treatment for forest products*". Included in the further information response to the EPA, filed by STIMBR on 28 June 2019.

[7] PiNZ (2019) slide 13.

[8] I have not attempted to ascertain whether the additional shipping capacity is available, or whether shippers would increase their charges per journey in response to the additional

range. The lower end of my range is consistent with commentary that the cost of moving logs to China has fallen about 40 per cent in recent months.[9]

Exports of logs to India would cease

27. India currently requires all logs imported from New Zealand to be fumigated with methyl bromide (Hammond, paragraph 21). Log exports to India would therefore cease, if the October Recapture Control is implemented, until an alternative phytosanitary measure is accepted by the Government of India or technology emerges that can meet the recapture requirements.

28. It seems that the only export market capable of taking the 1.7 million m^3 currently exported to India is China.[10] I have estimated the cost increase for log producers in a scenario in which logs, previously exported to India, are sent to China and treated in-hold with phosphine. Shipping charges for logs to China are typically 65 per cent to 82 per cent of the price to ship logs to India. If the price differential stayed the same, but the shipping price per m^3 was 1.5 times higher to account for the increased number of ships, then I estimate shipping costs for the logs that were previously India-bound would be NZ$8 - $14 per JAS$m^3$ more if sent to China.

29. Implementing the October Recapture Control might therefore result in a weighted average increase in shipping costs of $15.91 to $22.15 per JAS$m^3$, with a mid point of $18.88 per JAS$m^3$.[11] This mid-point estimate is close to the $18.37 per JAS$m^3$ estimated independently by PiNZ.

30. The additional transport costs would be offset somewhat by the lower cost of phosphine treatment relative to methyl bromide treatment. From interviewing methyl bromide applicators, I understand the methyl bromide treatment for logs bound to China is priced around $4/JAS$m^3$,[12] whereas phosphine treatment in the ships hold is about $1/JAS m^3, a difference of around $3/JAS$m^3$. This reduction would apply to the logs currently exported

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demand. Nor do I consider whether the shipping technology for transporting logs may change in the future, as these factors are outside of my expertise.

[9] ANZ AgriFocus June 2020, page 16.

[10] Ministry for Primary Industries "Information on the biosecurity use of methyl bromide in New Zealand (July 2019) at 6.

[11] These averages are weighted by the percentage of logs exported to India, China, and Taiwan, as shown in table 1 above.

[12] Rounded figures have been used due to commercial sensitivity.

to India and the logs currently exported to China that are fumigated with methyl bromide; that is, to a total of 25 per cent of the logs currently exported to those markets.[13] Hence, there would be an average unit reduction in fumigation costs of $0.75 ($3 x 25% = $0.75).

31. Adjusting the weighted average increase in shipping costs (from paragraph 29) for this saving in fumigation costs results in an estimated additional average cost to export logs of $15.16 to $21.40, with a mid point of $18.13 per JASm^3.

Increased transport costs means lower returns for New Zealand exporters

32. New Zealand exporters and importers are typically considered 'price takers' in international markets. That is, New Zealand exports and imports make up a reasonably small percentage of the total world supply or demand for a commodity. While our exporters have established relationships in some markets, and might meet a significant share of a particular customer's demand, their customers have alternatives. New Zealand exporters (and importers) are therefore not of sufficient size to profitably raise (or lower) world prices.

33. As price takers, exporters and importers bear any increase in transport charges above those prevailing internationally. The additional transport costs for logs of $15.16 to $21.40, calculated at paragraph 31 above, would be equivalent, in commercial terms, to a price reduction of the same magnitude.

34. I understand that the majority of the India-bound logs, and the logs exported to China, are the lower grade, unpruned K, KI and KIS grade logs. Export (FOB) prices for these grades over the past 12 months have ranged from NZ$109 to $160 per JAS m^3.[14] I am advised that the average grade of log going to India is lower than that going to China, and hence prices for that grade of log are likely to be lower than prices received for exports to China.

[13] From table 1, the logs exported to India = 1,696,444; logs exported to China and fumigated with methyl bromide = 3,052,042, at total of 4,748,486. Total logs exported to India and China = 18,947,708; 4,748,486/18,947,708 = 25%.

[14] MPI log price series, observation of FOB log price data across the 2019 year, available at: https://www.teururakau.govt.nz/news-and-resources/open-data-and-forecasting/forestry/wood-product-markets/historic-indicative-new-zealand-radiata-pine-log-prices/

35. The best case for exporters would occur if high log prices and low shipping costs coincided; the worse case would be a combination of low log prices and high shipping costs. Table 2 shows the results of these combinations and the mid-point estimates:

Table 2 Effective reduction in export log prices—percentage change

	Worst	**Mid**	**Best**
Log price, K, KI, KiS	$109	$134.50	$160
Increase in transport costs	$21.40	$18.13	$15.16
Effective decrease in log prices	19.6%	13.5%	9.5%

Economic costs of lower returns to New Zealand log exporters

36. A reduction in the price received by exporters would negatively affect the capacity of communities and people to provide for their economic well-being through:

(a) reducing the volume of logs that could profitably be harvested and exported

(b) reducing the returns for logs that continue to be exported.

37. Economists refer to the responsiveness in quantity supplied to a change in price for a specific good (in this case, export logs) as the price elasticity of supply. Estimating the price elasticity of supply of log exports can be complex, as the estimate needs to control for the volume of plantations coming to maturity, exchange rate variations, and other factors that influence the supply of logs for export. A careful study by Japanese and New Zealand economists estimated the elasticity of supply of New Zealand radiatia logs for export to East Asian countries over a period of 18 years.[15] They estimated a price elasticity of supply of 1.6;[16] that is, for each percentage point change in price, export volumes change by 1.6 percentage points. This study was completed some time ago (it was published in 2011); however, from a review of published literature it appears

[15] Tetsuya Michinaka; Satoshi Tachibana, James Turner, (2011) Econometric Analysis of Radiata pine log trade between New Zealand and East Asian Countries, JARQ 45(3), 327-336.

[16] Ibid, table 2.

to still be the best study and I have found no basis for concluding that log exporters would now be more or less sensitive to price changes.

38. As an estimate of price elasticity is a measure of the percentage change in volume divided by the percentage change in price, the equation can be reordered to calculate the change in volumes supplied for export for a given change in price.[17] Table 3 shows the reduction in log export volumes that could be expected, for the reduced log prices estimated in table 2 and an elasticity of supply of 1.6.

Table 3 Reduction in volume of log exports

	Worst	**Mid**	**Best**
Change in price	19.6%	13.5%	9.5%
Price elasticity of supply	1.6	1.6	1.6
Change in quantity supplied	31.4%	21.6%	15.2%

39. Hence, if the October Recapture Control is implemented, the quantity of logs exported to the Asian market could be expected to reduce by approximately 22 per cent (with a range between 31 per cent and 15 per cent); it would not be profitable for those logs to be exported at the lower effective price. For the logs that continue to be supplied for export, effective gross returns to log exporters would be reduced by about 13 per cent (with a range between 10 per cent and 20 per cent).

40. This reduction in effective export prices would translate directly into the capacity—in this case the income available to—communities and people to provide for their economic well-being. There is no offsetting cost reduction; New Zealand communities would be less well-off by an amount equal to the reduced price multiplied by the volume of logs sold. These figures are shown in table 4:

[17] Price elasticity = percentage change in demand / percentage change in price. Therefore, price elasticity x percentage change in price = percentage change in demand.

Table 4 Reduction in community income from reduced log prices

Aggregate log exports m^3 to China and India (from table 1)			18,947,708	A
	Worst	**Mid**	**Best**	
Supply reduction (from table 3)	31.4%	21.6%	15.2%	B
New aggregate export volume m^3	12,995,982	14,860,528	16,074,711	C= A x (1 – B)
Effective price reduction (from table 2)	$21.40	$18.13	$15.16	D
Annual loss in income	$278 million	$269 million	$244 million	E = D xC
Present value, 10 years, 6% discount rate (6% is NZ Treasury default rate for cost benefit analysis)[18]	$2.05 billion	$1.98 billion	$1.79 billion	

41. Thus, the annual loss of income to New Zealand communities, from lower log prices, could be expected to range from around $244 million to $278 million. Over ten years, the present value of this loss in the capacity of communities and people to provide for their economic well-being would have a present value of between $1.8 billion and $2.0 billion.

42. As the prices paid to domestic sawmillers reflects export prices, the price received for logs sold into the domestic market could also be expected to reduce because of the higher effective costs of exporting logs. I have treated this domestic price change as a transfer between New Zealand communities and therefore not a net benefit or cost—the well being of forest growers would be reduced and the well being of New Zealand wood processors improved by the price change.

Economic costs of reduced log exports

43. In addition to reduced income from exported logs, the effective reduction in log prices would mean it would no longer be profitable to export between around 15 per cent and 31 per cent (from table 3) of the aggregate volume

[18] https://treasury.govt.nz/information-and-services/state-sector-leadership/guidance/financial-reporting-policies-and-guidance/discount-rates

of logs previously exported. This aggregate volume is currently 18.9 million m^3 (from table 1). Hence, the volume of logs that would no longer be profitable to export is shown in table 5:

Table 5 Volume of logs no longer exported

Aggregate log exports to India and China m^3 (from table 1)			18.9 million
	Worst	**Mid**	**Best**
Supply reduction (from table 3)	31.4%	21.6%	15.2%
Volume not exported m^3	6.0 million	4.1 million	2.9 million

44. There is no ready domestic market for the logs that would otherwise have been exported to India and China. Radiata pine forests in New Zealand are grown as either a pruned (direct sawlog) or structural regime. The tree "stem" is cut into a range of logs. The lower part of the tree is the most desirable—either pruned sawlog for appearance or high-density structural sawlog for framing timber. Log quality deteriorates up the tree stem and results in a mid-range category known as utility-grade logs or A and K-grade logs. It is these utility-grade logs that make up the bulk of the 18.9 million m^3 currently exported each year to China and India.

45. These utility-grade logs do not yield a high proportion of valuable clearwood (from a pruned log) or framing timber (from a high-density sawlog). Existing New Zealand saw mills cannot profitably process large volumes of K-grade logs as there is insufficient value recovery to justify the log price.[19] A recent study for the Ministry of Business, Innovation and Employment identified only one sawmill relying on utility grade timber—Sequal Lumber in Kawerau, which focuses on custom cutting timber to customer sizes as opposed to industry standard dimensions.[20]

46. In any event, there is limited capacity for New Zealand mills to absorb the volume of wood that would otherwise have been exported to China and India. Ministry of Primary Industries data shows that the total input capacity

[19] Price series such as the *Wood Matters* publication produced by PF Olsen do not include at-mill prices for K, KI and KIS grades. This indicates that there is no New Zealand market for these grades.

[20] Ministry of Business, Innovation and Employment, Spotlight Paper, *Can New Zealand be internationally competitive in selling sawn timber into the Chinese market?* page 3.

of New Zealand sawmills in 2018 was 12.8 million cubic metres, as shown below in Table 6:

Table 6 MPI, Estimated processing of roundwood from New Zealand forests by wood supply regions 2018[21]

	2018
Wood supply regions	(000 cubic metres)
Northland	1 501
Auckland	40
Central North Island	6 003
East Coast / Hawke's Bay	1 325
Southern North Island	594
Total North Island	**9 463**
Nelson / Marlborough	1 520
West Coast	175
Canterbury	652
Otago / Southland	1 004
Total South Island	**3 350**
Total New Zealand	**12 813**

47. Nor does it seem likely that there will be any substantial increase in New Zealand sawmill capacity to process a large volume of logs. The number of sawmills operating in New Zealand has diminished, as has the profitability of local mills. Only the larger sawmills that have modern processing facilities in place are able to compete with the export market.[22] Many of New Zealand's sawmills have not invested in the technology required to be globally competitive.[23] Papers prepared for the Ministry of Business, Innovation and Employment suggest that domestic opportunities are limited, and any new sawmill development today would require a major export market opportunity for the sawn timber based around lower-quality industrial K-grade logs.[24]

48. In short, local buyers are highly unlikely to pay higher than export prices for the wood that would become unprofitable to export (table 5). Without a buyer willing to pay prices that would make it profitable to harvest large volumes of K-grade logs, forest owners may opt not to harvest the trees until profitability returns (which may be indefinitely). Alternatively, if the lower

[21] MPI "Estimated processing of roundwood by wood supply region, 2002 to most recent" https://www.teururakau.govt.nz/news-and-resources/open-data-and-forecasting/forestry/wood-processing/

[22] ANZ Research AgriFocus, June 2020, page 17.

[23] Ibid, page 17.

[24] Forest Economic Advisors, Overview paper on key factors for consideration in attracting new investment to the sawmilling sector in New Zealand, Ministry for Business, Innovation, & Employment, page 3.

parts of the trunk can be harvested profitably, the forester may leave the K-grade material with the slash on the ground.

49. The result is that the October Recapture Control would be a regulatory intervention that unintentionally diverts logs, previously destined for a competitive export market, to waste on the ground or to a waiting pattern as mature trees. Both outcomes reduce economic welfare relative to a situation in which a reassessed recapture standard still allows for logs to be exported to India and to go to China on top-stow of ships.

50. As the logs would have been exported at the higher export price, but become unprofitable if additional transport costs must be incurred (to stow all logs in a hold for phosphine treatment), the difference between these prices would reflect the margin that would have been available to communities and people to provide for their economic well-being, after meeting all costs of harvesting and processing. These amounts are shown in table 7 below:

Table 7 Income lost from communities because of reduced log exports

	Worst	**Mid**	**Best**
Volume not logged m^3 (from table 5)	6.0 million	4.1 million	2.9 million
Lost margin (from table 2)	$21.40	$18.13	$15.16
Annual income loss to communities	$127.4 million	$74.1 million	$43.6 million
Present value, 10 years, 6% discount rate	$937 million	$545 million	$321 million

Reduced household income in the forestry sector, and attendant social impacts in forestry communities

51. NZIER (2017) estimate a total of 12,410 full time equivalent employees (FTEs) are employed either directly in plantation forests or in forestry road transport and in transport support (that is, stevedores, marshallers, fumigations services, etc).[25] Te Uru Rakau estimate that these employees removed 33.1 million m^3

[25] NZIER, (2017), *Plantation Forestry Statistics: Contribution of forestry to New Zealand*, page ii.

of roundwood from planted forests in 2018, for both domestic and export markets.[26]

52. Reduced logging of 2.9 million to 6.0 million m^3 (table 7), would amount to 9 per cent to 18 per cent of the total amount of roundwood removed from planted production forests, with a mid-point of 12 per cent. Reduced logging would in turn mean fewer jobs in forestry. However, the loss of jobs might not scale precisely with the loss in logging due to economies of scale. For this reason, I assume that job losses would be limited to the low to mid-point range (9 per cent to 12 per cent).

53. I use the values from The New Zealand Treasury's CBAx Tool to estimate the economic impact from the loss of jobs.[27] The Treasury CBAx allows a consistent approach for analysts to estimate the economic benefits (or costs) of policy changes that result in additional (or loss of) jobs, including the impact on government revenues and benefits. The Treasury CBAx parameters allow for alternatives—a person losing a job will usually find alternative employment after a period of time—and opportunity cost—a person losing a job loses income but may gain some benefit from having more time for other activities.[28] I consider further below whether the Treasury CBAx parameters may underestimate economic impacts of job losses in the current environment as its parameters were prepared prior to the Covid-19 pandemic.

54. The CBAx model requires estimates of the wages earned by those who would lose their jobs. There is a mix of skills represented in forestry harvesting, road transport and support services. These are not low-skilled positions and NZIER (2017) describes a range of salaries.[29] Accordingly, I apply inputs related to annual incomes and impacts assuming the jobs lost are for a mid-skilled person, not in a professional role.

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[26] Available at: https://www.teururakau.govt.nz/news-and-resources/open-data-and-forecasting/forestry/wood-processing/

[27] Available at: https://treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/plan-investment-choices/cost-benefit-analysis-including-public-sector-discount-rates/treasurys-cbax-tool

[28] The Treasury allow a 50 per cent reduction for each of these effects, so that economic value of the income loss to an individual losing a job is estimated at (50% x 50% =) 25% of their income prior to the job loss.

[29] Op cit, page 43.

Figure 1 NZ Treasury CBAx assumptions for economic impact of labour

Assumption/input	Value	CBAx description	Economic cost of 9 percent reduction in forestry jobs	Economic cost of 12 percent reduction in forestry jobs
Economic value of income for additional employment	$12,608 per FTE	25% of Average annual income - Level 4-6 certificate or diploma	$13.57 million	$19.31 million
Government revenues from additional employment	$3,079 per FTE	25% of Income tax and ACC levy: Average annual income - Level 4-6 certificate or diploma.	$3.31 million	$4.72 million
Jobseeker benefit decrease	$10,034 per FTE	Jobseeker Support - Single, 20 to 24 years, without children	$10.80 million	$15.37million
Total annual cost			**$27.69 million**	**$39.39 million**
Present value, 10 years, 6% discount rate			**$203.79 million**	**$289.91 milion**

Social impacts relating to reduced harvest, not quantified

55. There are many other costs that I have not quantified in these estimates. For instance, the Ministry for Primary Industries found that jobs and employment can have social benefits other than the direct monetary impacts.[30] The additional impacts affect not only the employee but also can have positive impacts on their children and the wider community. These benefits from employment include:

[30] See Ministry for Primary Industries, 2014, The social value of a job, MPI Information Paper No: 2014/24. Available from www.mpi.govt.nz

(a) improved long-term employability;

(b) improved health resulting in lower mortality, decreased morbidity and associated decreased health care use;

(c) decreased substance abuse;

(d) improved mental wellbeing;

(e) improved health of children;

(f) improved mental wellbeing of children;

(g) improved future employability of children; and

(h) improved social contacts, connections and cohesion.

56. While the social value of a job has been often discussed and studied, I am not aware of any studies that attempt to monetise these benefits. This is primarily due to the difficulty in assigning a value to impacts such as mental health outcomes, as well as estimating an accurate causal effect.

Distributional considerations for forestry workers, not quantified

57. Job losses can be expected to be concentrated in districts where forestry's contribution to the share of regional Gross Domestic Product (GDP) is significant. Three regions stand out where forestry is particularly important to the local economy:[31]

(a) Gisborne region where forestry is the most significant contributor with between 5% and 6% of regional GDP;

(b) Tasman/Nelson where forestry contributes nearly 3% to the regional GDP; and

(c) Northland where forestry contributes approximately 2.5% to regional GDP.

[31] NZIER (2017), op cit, page 53.

58. In the Bay of Plenty, Waikato, Hawkes' Bay, Marlborough, West Coast, and Southland/Otago the forestry contribution to the regional economy is higher than the national average.

IMPACT ON IMPORT AND EXPORT OF FRESH PRODUCE

59. From the submissions made to the EPA from fresh produce importers and exporters, the October Recapture Control would impact on the:

(a) export of apples to Japan and the potential expansion of that market;

(b) export of other fruit and vegetables; and

(c) import of products to New Zealand.

60. I assess the economic costs of each of these categories of impact.

Impacts associated with export of apples to Japan

61. Japan regulations requires methyl bromide use on apples to control coddling moth. T&G Global submit that 157,000 - 334,000 cartons of apples are exported to Japan each year.[32] The industry expects this to be a growth market, with New Zealand Apples and Pears submitting that the market could increase from its current $15.3 million FOB value to $100 million by 2030 as import tariffs are removed.

62. The Japanese market is counter seasonal to New Zealand and therefore allows the supply of medium sized apples without conflict with Japanese growers who supply large speciality apples to the local Japanese market and for export.

63. From the submissions, I understand that no alternative to methyl bromide has been identified that would be effective on codling moth and not compromise fruit quality. Therefore, this trade would be threatened in its entirety if the October Recapture Control is implemented. The investment in

[32] T&G Global submission to EPA in relation to methyl bromide, available at https://www.epa.govt.nz/database-search/hsno-application-register/view/APP203660.

building these markets and gaining the trust of Japanese buyers would be lost.

64. Similar to logs, estimating the ongoing economic impact of diverting this trade requires assessing where else these apples might be sold, and for what price. Key apple markets are in Europe, North America, Asia, India and the Middle East. The varieties currently sent to Japan (Rockit, NZ Queen, , Diva, Pink Lady and Fuji) have buyers in China and Taiwan, but at a lower price. I have not found public data that would allow me to assess what the price impact might be from diverting applies from Japan to other markets; the table below gives an indication of the loss in income to New Zealand communities if the price achieved is 1 per cent, 5 per cent or 10 per cent lower.

Table 8 Economic loss if Japanese apple trade is prevented

	1 percent export value decrease for apples not able to be sent to Japan	**5 percent export value decrease for apples not able to be sent to Japan**	**10 percent export value decrease for apples not able to be sent to Japan**
$15 million export market in 2018 (157,000 – 334,000 cartons)	Economic loss $150,000	Economic loss $750,000	Economic loss $1.5 million
Present value at 6 % of economic loss over 10 years, if Japanese market grows to $100 million by 2030	$3.9 million	$10.2 million	$18.1 million

Impacts associated with export of other fruit and vegetables from New Zealand

65. Exporters are required to fumigate various traded consignments destined for the Pacific Islands (in particular those containing potatoes, tomatoes, aubergines and capsicums) and all containers destined for Fiji.[33] These consignments have a NZD$5m value annually.[34] Containers (3 to 4 weekly) are fumigated with methyl bromide to achieve full penetration through the product for insect control. This trade would be stopped if the October

[33] per United Fresh Technical Advisory Group submission to EPA in relation to methyl bromide, available at https://www.epa.govt.nz/database-search/hsno-application-register/view/APP203660

[34] op cit, note 33.

Recapture Control is implemented, and the produce sold into the New Zealand market.

66. I have not separately quantified this impact as the relative value is small compared with logs, particularly if the product can be sold into the New Zealand market. The loss to the residents of the Pacific Island is not an economic loss to New Zealand and therefore not counted, consistent with the methodology specified in the Schedule to the Hazardous Substances and New Organisms (Methodology) Order 1998.

Impacts on imported produce to New Zealand

67. In 2018 there were 2061 methyl bromide fumigations on imported vegetables and fruits.[35] The impact of the recapture controls on imports is time—imports would risk spending too long in treatment to achieve the October Recapture Control levels, impairing product quality and value.[36] These losses may mean the product would no longer be profitable to import, resulting in less choice and variety for consumers.

68. The impact on table grapes, beans, and citrus is potentially significant, but cannot reliably be quantified on the data available (United Fresh submission to the EPA). The impact for cucurbits, capsicum and tomato imports appears to be less significant, but depends on seasonal weather events and climatic swings as these can, in some seasons, lead to almost exclusive imports across these categories in the winter months.

69. Some highly perishable crops such as green beans would be rendered uneconomical to import under the October Recapture Control as the post-treatment process will take longer than the expected product shelf-life.[37]

70. Less choice and variety would impact negatively on the capacity of communities and people to provide for their economic well-being in two ways:

[35] op cit, note 33.

[36] op cit, note 33.

37 United Fresh submission to the EPA.

(a) when people have highly differentiated tastes and needs, more choices let them satisfy their own particular wants (for example, for fresh green beans in the off season); and

(b) when people have similar needs, more choice can be beneficial if it promotes competition among providers that leads to lower prices or improved quality.

71. I have not attempted to quantify these detriments.

COVID-19 LIKELY TO MAGNIFY THE ECONOMIC COSTS

72. New Zealand is currently experiencing an economic downturn as a result of measures to combat Covid-19; economic forecasters remain uncertain as to the depth of downturn, its duration, and the global economic environment post the pandemic.[38] This context will likely magnify the economic costs of any regulatory requirements that impact on trade for four reasons:

(a) With international tourists shut out of New Zealand, communities and people must rely to a greater extent than usual on other sectors of the economy to provide for their economic well-being; in this environment, people might reasonably be expected to value the contribution of growth sectors of the economy more highly than they might have otherwise.

(b) Economic tools used to estimate economic costs and benefits, such as the Treasury CBAx, assume there are other opportunities available to people and for the use of resources. For example, skilled people who lose employment in one sector are assumed to find work in another sector, after a short transition; these assumptions may not hold in the current environment (for example, a net 21 per cent of firms responding to the latest ANZ Business Outlook survey report employing less staff than this time last year).[39]

[38] See for example, https://treasury.govt.nz/publications/research-and-commentary/rangitaki-blog/weu-special-topic-economic-developments-budget

[39] ANZ New Zealand Business Outlook — Preliminary data for July 2020 (https://www.anz.co.nz/content/dam/anzconz/documents/economics-and-market-research/2020/ANZ-BusinessOutlook-20200709%20-%20Prelim.pdf).

(c) Economic shocks result in heightened uncertainty, and when people are uncertain about the future they invest less and consume less (increase precautionary savings) exacerbating the economic downturn;[40] implementing the October Recapture Control would be a further source of uncertainty for businesses and communities engaged in log exports or fresh produce imports and exports.

(d) Implementing the October Recapture Control would impose changes to our produce import patterns. This disruption would occur during a period of increased international trade tension—for example the United States redefining of its trading relationships with Canada, Mexico, and China and with producers of steel and aluminium (including New Zealand) and the Breixt negotiations between the United Kingdom and Europe. There must be some risk that a regulatory impost on imports could be viewed with suspicion by our trading partners as a non-tariff barrier, making it more difficult to maintain and extend New Zealand's access to other markets.

73. For these reasons, the best estimate of the economic costs of the October Recapture Control will likely lie above the mid-point estimate; that is, within the range from the mid-point to worst case/high end of the range.

REGULATORY AND COMPLIANCE COST IMPACTS OF A REASSESSMENT

74. Should a reassessment result in a change to the existing (pre October 2020) control standards, costs would be incurred to meet that new standard. In the period post-decision, firms that specialise in fumigation treatments would gear up to respond to a revised methyl bromide standard.

75. As there is no practicable way to meet the October Recapture Control for logs, apples or imported products, no products would be treated with this level of recapture and there would be no regulatory cost or on-port costs associated with this standard. Hence, the economic costs of meeting a reassessed standard would be costs not incurred under the October Recapture Control (and assessed above).

40 Kamber, G., Karagedikli, Ö., Ryan, M., & Vehbi, T. (2016). International spill-overs of uncertainty shocks: Evidence from a FAVAR. CAMA Working Paper No. 61/2016.

76. The investment to meet a reassessed standard would be recovered by fumigators charging for methyl bromide recapture. This charge is a regulatory cost, as it would not be incurred by exporters and importers if there was no government standard. There would also be compliance costs associated with registering and administering the system (for example, keeping documents to allow for appropriate monitoring).[41]

77. I consider that the current price charged for recapture on logs, apples and fruits is a reasonable proxy for the regulatory and compliance costs associated with meeting an achievable recapture standard. This charge is in the vicinity of NZ$1.48 per JASm^3 for logs and wood products and $127 per container for fruit and fresh products. This price excludes GST and is separately itemised to exporters and importers on invoices, so is in the public sphere.

78. Assuming the same volume of logs would continue to be treated under a reassessed recapture standard as is currently treated, 4.75 million JASm^3 would be treated per annum. At a cost of NZ$1.48 per JASm^3, the regulatory cost associated with methyl bromide on logs would be in the vicinity of $7.0 million annually for logs.

79. There may be further regulatory costs, if a reassessed standard were to require reduced log stack sizes. I understand that smaller stacks may lead to improvements in recapture rates but larger stacks are preferred by ports because it is most efficient for their operation in terms of land use and in terms of marshalling time.

80. Japan is the only market that requires methyl bromide use on apples currently. The T&G Global submission suggested that 157,000 - 334,000 cartons of apples go to Japan each year. New Zealand Apples and Pears submission estimated that this market could go from its current $15.3 million FOB value to $100 million by 2030. Assuming these apples are shipped in 40 ft containers, 134 – 325 containers would be used to transport them (depending on carton size). Genera Ltd informs me that the methyl bromide recapture cost associated with fumigating a typical refrigerated shipping

[41] I have applied the definition employed by the Commerce Committee's 1998 Inquiry into compliance costs: "…the costs to affected parties of interacting with government in meeting an obligation or obtaining a service. Compliance costs are incidental to the obligation itself and are often related to the processing and providing of information."

container is $127 (excl. GST). This gives an annual regulatory cost of $17,000 to $41,000, which could grow to $270,000 if the market grows according to projections.

81. For imported fruits and vegetables, the regulatory cost associated with recapture is similarly small in comparison to logs. United Fresh's Technical Advisory Group submission to the EPA sets out some background about methyl bromide treatment of imported fruits and vegetables. The products most affected by the recapture standard would be green beans, table grapes, citrus and melons. Taro and fruit from the Pacific Islands would also be affected. The submission notes that 2061 consignments were fumigated with methyl bromide at the border in 2018.

82. Hence, if a similar number of consignments were fumigated in the future, then the recapture cost would be (2061 x $127) $262,000. This estimate is likely to be at the top end of a range, as the number of consignments fumigated with methyl bromide is expected to fall. Irradiation has recently been approved as a phytosanitary measure for export of Australian grapes and citrus to New Zealand.

SUMMARY OF EXPECTED COSTS AND BENEFITS

83. If the October Recapture Control takes affect, there would be an impact on the exports of logs to India and China and on the import and export of several types of fresh produce. The Application seeks a reassessment so as to avoid those impacts.

84. I have compared the economic benefits and costs between these two alternative futures—a future with the October Recapture Control and a future with a reassessed control that requires recapture to a less onerous level, namely a level that is achievable with the best technology presently known (and assuming sufficient lead time for implementation). Table 9 shows the economic benefits and costs of reassessing the October Recapture Control. A calculation spreadsheet underpins these findings, and is available upon request.

85. The economic benefits of replacing the October Recapture Control with a reassessed, technologically achievable control, are of a far greater magnitude than costs: quantified benefits in sum are $2.3 to $3.3 billion over ten years while the economic costs are $74.7 million over the same period (all

of which are regulatory costs). Because of the economic uncertainties due to Covid-19, the economic benefits are more likely to lie at the upper end the range.

KIERAN O'NEILL MURRAY
27 July 2020

Table 9 Summary of the economic costs and benefits of reassessing the October Recapture Control

BENEFIT FROM REASSESSMENT	**Magnitude, per year**	**Magnitude, ten years**	**Monetary or non monetary**	**Uncertainty associated with estimate**	**Benefit type**	**Distributional considerations**
Avoided reduced returns from log exports because of higher transport costs	$243.7 to $278.1 million	$1.79 to $2.05 billion	Monetary	Moderate	Avoided cost	Benefit to forestry industry, regional NZ
Avoid economic cost of reduced log harvest	$43.5 to $127.4 million	$320.6 to $937.4 million	Monetary	Moderate	Avoided cost	Benefit to forestry industry, regional NZ
Reduced household income in the forestry sector, and attendant social impacts	$27.7 to $39.4 million	$203.8 to $289.9 million	Monetary; social impacts unquantified	Moderate	Avoided cost	Regional New Zealanders
Exports of apples to Japan	$1.5 to $2.0 million (based on current market size)	$3.9 to $18.1 million	Monetary	Low	Avoided cost	Regional New Zealanders
Exports and imports of other fresh products	Unquantified	Unquantified	Unquantified	Unquantified	Avoided cost	Fruit and foliage growers; regional New Zealanders; purchasers of fruit
Total quantified benefits	***$316.4 to $446.9 million***	***$2.3 to $3.3 billion***				

COST FROM REASSESSMENT	Expected magnitude, per year	Expected magnitude, over ten years	Monetary or non monetary	Uncertainty associated with estimate	COST TYPE	Distributional considerations
Additional regulatory and compliance costs for log exporters and shippers related to treatments	$7.0 million	$51.8 million	Monetary	Low	Regulatory and compliance	Cost falls on exporters
Additional regulatory and compliance costs for apple exporters and shippers related to treatments	$0.02 to $0.2 million	<$1 million	Monetary	Low	Regulatory and compliance	Cost falls on exporters
Additional regulatory and compliance costs for other fruit and vegetable exporters shippers related to treatments	$0.3 million	$1.9 million	Monetary	Moderate	Regulatory and compliance	Cost falls on exporters
Total quantified costs	***$7.5 million***	***$55 million***				
Net economic benefit	***$309 - $439 million***	***$2.2 – 3.2 billion***	***Net economic benefit***	***$306.3 - $436.7 million***	***$2.2 – 3.2 billion***	***Net economic benefit***

Appendix A: Material reviewed

Don Hammond's expert statement (27 July 2020)

ANZ New Zealand Business Outlook — Preliminary data for July 2020

STIMBR's Application for a modified reassessment (22 March 2019)

Forest Economic Advisors, Overview paper on key factors for consideration in attracting new investment to the sawmilling sector in New Zealand, Ministry for Business, Innovation, & Employment

Kamber, G., Karagedikli, Ö., Ryan, M., & Vehbi, T. (2016). International spill-overs of uncertainty shocks: Evidence from a FAVAR. CAMA Working Paper No. 61/2016

Ministry of Business, Innovation and Employment, Spotlight Paper, Can New Zealand be internationally competitive in selling sawn timber into the Chinese market?

Ministry for Primary Industries, 2014, The social value of a job, MPI Information Paper No: 2014/24.

Ministry for Primary Industries "Information on the biosecurity use of methyl bromide in New Zealand" (July 2019)

Ministry of Primary Industries, data sets at https://www.teururakau.govt.nz/news-and-resources/open-data-and-forecasting/forestry/

NZIER (2020), The Potential Impact of the Forests Amendment Bill, Report to the New Zealand Forest Owners' Association

NZIER, (2017), Plantation Forestry Statistics: Contribution of forestry to New Zealand

PiNZ Management Limited, (22 March 2019) "*Impact of the loss of methyl bromide as a phytosanitary treatment for forest products*".

PF Olsen, Wood Matters

Submission to the EPA: SUBMISSION127540_United-Fresh-NZ-Inc

Submission to the EPA: SUBMISSION127528_Mr-Apple-NZ

Submission to the EPA: SUBMISSION127555_NZ-Apples-and-Pears

Submission to the EPA: SUBMISSION127580_T-and-G-Global-Ltd

Tetsuya Michinaka; Satoshi Tachibana, James Turner, (2011) Econometric Analysis of Radiata pine log trade between New Zealand and East Asian Countries, JARQ 45(3), 327-336