

Chair  
Cabinet Business Committee

## **Amending the PM<sub>10</sub> Air Quality Standards: Final Recommendations**

### **Proposal**

1. This paper seeks agreement to changes to the regulations for particulate matter smaller than 10 microns in diameter (PM<sub>10</sub>) in the *Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004*.

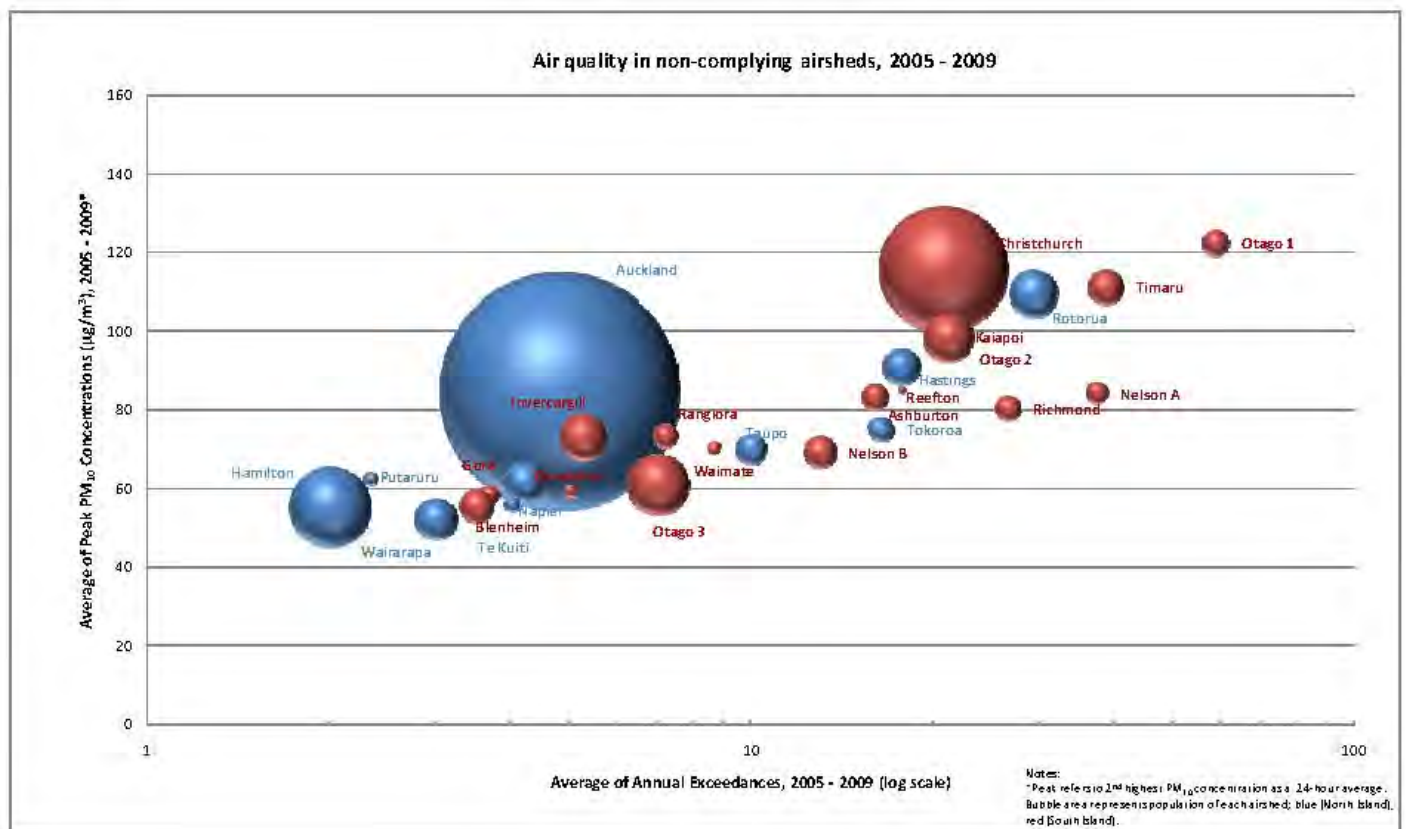
### **Executive summary**

2. National committed its 2008 policy to review the national environmental standard on PM<sub>10</sub> air quality. The need for a review was reinforced in the Jobs Summit as a consequence of the concern of significant employment implications of the unachievable standard and the disproportionate penalties on industry for non-compliance.
3. The process of reviewing the standard has consisted of establishing a technical advisory group in June 2009, the releasing a discussion paper on changes to the PM<sub>10</sub> air quality standard in June 2010, and substantial cost benefit analysis on various policy options since. This paper contains the final decisions.
4. There is sound scientific evidence to support improvements in air quality. A comprehensive evaluation of the research finding provides persuasive evidence that exposure to fine particulate air pollution has adverse effects on cardiopulmonary health. The effects of inhaling particulate matter have been widely studied in humans and include asthma, lung cancer, cardiovascular issues, and premature death. Studies indicate that there is no 'safe' threshold for PM<sub>10</sub>. This means that the standards for PM<sub>10</sub> must identify an 'acceptable' level of risk.
5. It is unrealistic to achieve the current PM<sub>10</sub> air quality standard. The current regulations require that by 1 September 2013 no place in New Zealand shall have PM<sub>10</sub> greater than 50 micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ ), measured over a 24-hour period, with one permitted exceedance per year. Any airshed exceeding this standard must not issue resource consents for discharges to air from industry forcing them to relocate or close down.
6. My proposals are to:
  - retain the PM<sub>10</sub> air quality standard of 50  $\mu\text{g}/\text{m}^3$ , measured over a 24-hour period
  - remove existing restrictions on industry consents for significant discharges of PM<sub>10</sub>
  - require mandatory offsets for resource consents permits for significant new PM<sub>10</sub> discharges in over allocated airsheds from 1 September 2012
  - prohibit the installation of new open fires in homes in over allocated airsheds from 1 September 2012

- require highly polluted airsheds (those currently with 10 or more exceedances of the PM<sub>10</sub> standard) to have no more than three exceedances per year by 1 September 2016
  - require polluted airsheds (those currently with less than 10 exceedances of the PM<sub>10</sub> standard) to have no more than one exceedance per year by 1 September 2016
  - require all airsheds to meet the PM<sub>10</sub> standard with no more than one permitted exceedance by 1 September 2020
  - provide for exceptional events in the measurement of the exceedances (eg. bush fires), not currently provided for.
7. The cost benefit analysis supports the recommended approach with a positive present value of \$1.55 billion (\$2008) and a benefit to cost ratio of 8.9:1 over the period 2008 and 2020. The proposed approach will deliver the maximum net benefit taking into account the economic, social and environmental benefits and costs of air pollution.

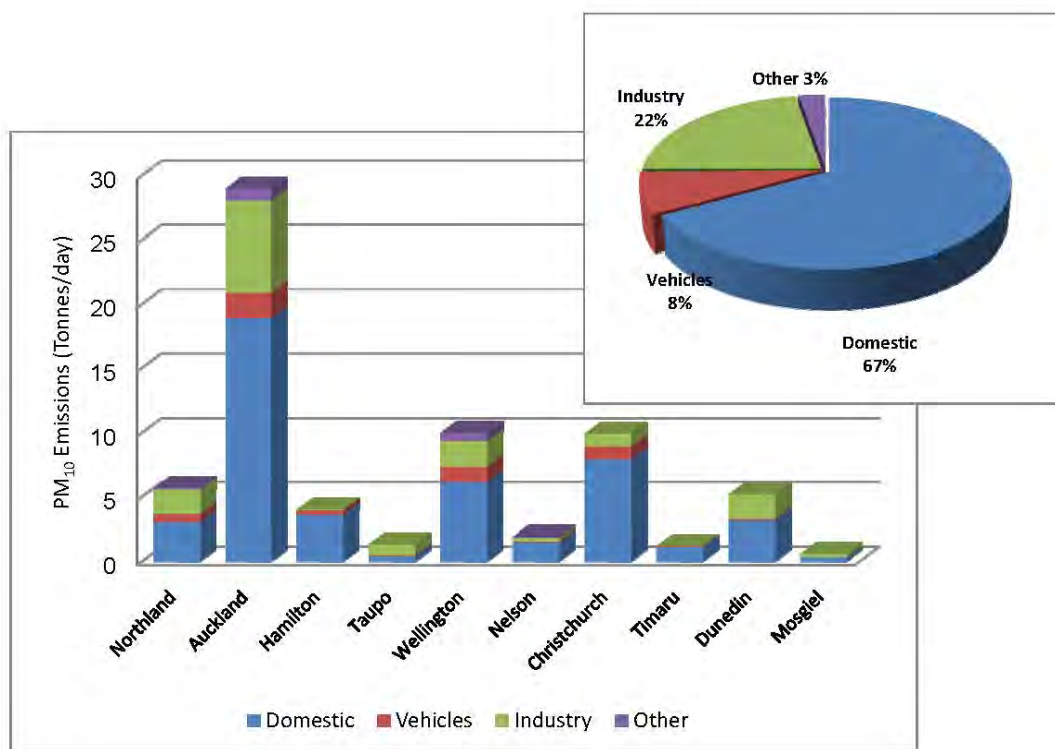
## Background

8. Around 27 urban areas in New Zealand suffer poor air quality due to elevated levels of particulate matter, mainly in winter due to emissions. 52% of New Zealand's population lives in defined airsheds, as identified in Figure 1 (a larger version of this figure is contained in the Regulatory Impact Statement).



**Figure 1 - Air Quality in non-complying Airsheds, 2005 – 2009**

9. Emissions of PM<sub>10</sub> vary by region but in wintertime, when air pollution is worst, emissions from solid fuel combustion (wood and coal) for domestic heating is the primary source of pollution as shown in Figure 2.



**Figure 2 - Sources of PM<sub>10</sub> in New Zealand<sup>1</sup>**

10. PM<sub>10</sub> is small enough to be inhaled into the lungs and can cause a range of health related problems including respiratory illness through to serious adverse health effects including premature death (more information is provided in Annex 1). Studies indicate that there is no 'safe' threshold for PM<sub>10</sub>. This means that standards for PM<sub>10</sub> must represent an 'acceptable' level of risk.
11. New Zealand's air quality standards are contained within the *Resource Management (National Standards Relating to Certain Air Pollutants, Dioxins and other Toxics) Regulations 2004*. These regulations include an ambient air quality standard for PM<sub>10</sub> of 50 µg/m<sup>3</sup>, measured over a 24-hour period, with one permitted exceedance per year and a target compliance date of 1 September 2013.
12. In June 2009, I notified my intent to review three aspects of the regulations (CAB Min (09) 20/5):
- Whether disallowing industry consents (as required by the regulations after 2013) is equitable when industry contributes only a small proportion of PM<sub>10</sub>;
  - Whether the 2013 timetable is achievable, and whether it attains a suitable cost/benefit balance; and
  - Whether the current number of permitted exceedances of the ambient PM<sub>10</sub> standard is appropriate for New Zealand.

<sup>1</sup> *Emission Inventories for PM<sub>10</sub> in New Zealand*, Ministry for the Environment, August 2003. Pie chart contains composite wintertime emissions for all listed regions/cities.

13. I subsequently appointed a technical advisory group (TAG) and they reported back to me in November 2009. On 31 May 2010, based on the recommendations of the TAG and my officials, Cabinet agreed in principle (subject to consultation) to the following proposed amendments to the PM<sub>10</sub> air quality standards (CAB Min (10) 19/10 refers):
  - Increasing the number of permitted exceedances of the ambient PM<sub>10</sub> standard from one to three;
  - Making provision for the exclusion of exceptional events (e.g. volcanic eruptions, bushfires and Australian dust storms);
  - Requiring information on airshed implementation plans from councils (s27 of the Resource Management Act 1991);
  - Requiring the mandatory reporting of PM<sub>10</sub> monitoring data by regional councils post-2013 to improve transparency and accountability;
  - Developing a compliance strategy that would demonstrate the Minister for the Environment's intent to monitor and follow up non-compliance by councils; and
  - Investigating the feasibility of funding links (e.g. making government funding conditional on councils using regulatory powers to improve air quality).
14. Cabinet also agreed to include in the discussion document the options of:
  - Repealing the prohibition on industry resource consents post-2013 but retaining a revised offset provision which requires mandatory offsets for new industry with significant discharges of PM<sub>10</sub> in over-allocated airsheds after 2018; and
  - Relying on existing regulatory measures for compliance.
15. Public consultation on the discussion document "*Proposed Amendments to the National Environmental Standards for Air Quality*" over four weeks received 114 submissions (44% industry, 25% general public, 19% local government, 12% others). Public meetings were also held in main centres. No single option emerged as the clear favourite, although there was a clear theme that the existing regulations are not equitable. Sectors also differed in what they expressed opposition to.
16. As a result of the consultation feedback, I directed officials to investigate other options.

### **Preferred option**

17. Based the analysis outlined in the regulatory impact statement my proposal is to:
  - Retain the PM<sub>10</sub> air quality standard of 50 µg/m<sup>3</sup>, measured over a 24-hour period
  - Remove the ban on resource consents for industry post 1 September 2013
  - Require mandatory offsets for discharge permits for significant new PM<sub>10</sub> discharges in over-allocated airsheds from 1 September 2012
  - Prohibit the installation of new open fires in homes in over allocated airsheds from 1 September 2012
  - Require highly polluted airsheds (those currently with 10 or more exceedances of the PM<sub>10</sub> standard) to have no more than three exceedances per year by 1 September 2016

- Require polluted airsheds (those currently with less than 10 exceedances of the PM<sub>10</sub> standard) to have no more than one exceedance per year by 1 September 2016
  - Require all airsheds to meet the PM<sub>10</sub> standard with no more than one permitted exceedance by 1 September 2020
  - Provide for exceptional event from the measurement of the exceedances (eg. bush fires) not currently provided for
18. Comparison of my final proposal to that previous approved on by Cabinet for consultation is contained in Table 1 below.

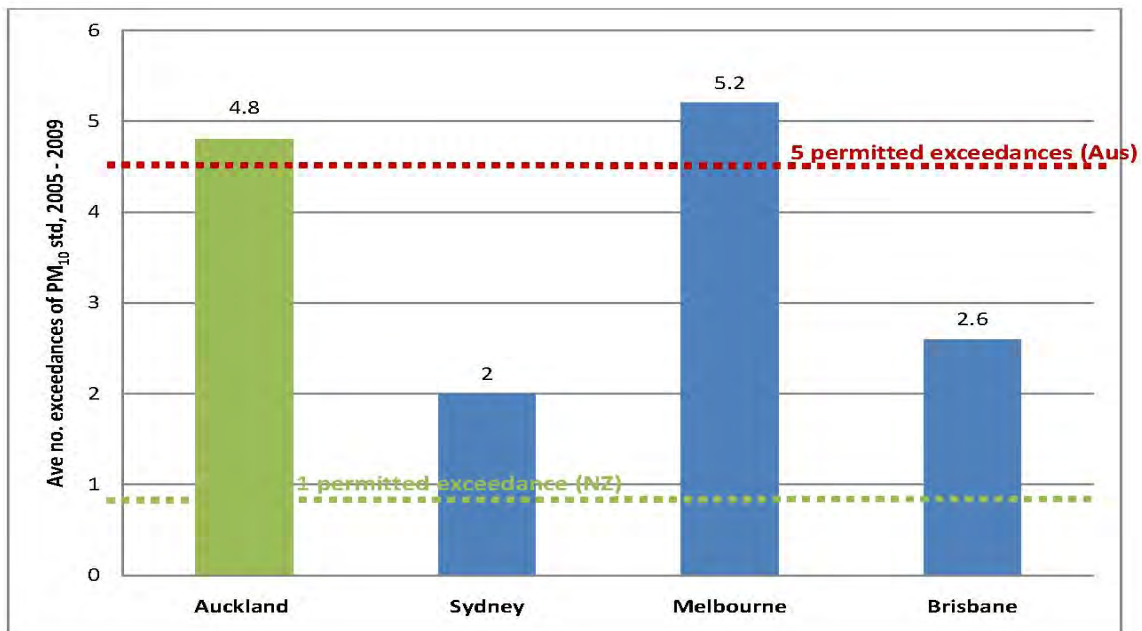
**Table 1 Previous Decisions and Preferred Option**

Action	Previously approved in principle by Cabinet	New Preferred Option: Split Targets
<b>Regulatory</b>		
Provide for exceptional events (e.g. volcanic eruptions)	Y	✓
Increase permitted exceedances from one to three	Y	Heavily polluted airsheds meet 3 by 2016; Polluted airsheds meet 1 by 2016; All airsheds meet 1 by 2020.
Repeal prohibition on industrial consents post 2013	Y	✓
Revise existing mandatory offsets provisions to apply to NEW significant industry in over-allocated airsheds	from 2018	from 2012
Revise existing domestic controls to prohibit new solid fuel burning open fires in over-allocated airsheds	-	from 2012
<b>Non-Regulatory</b>		
New target compliance date:	by 2018	by 2016
Require mandatory reporting by regional councils	Y	✓
National compliance strategy Includes best practice guidance for airshed management, education on health impacts of PM <sub>10</sub> , technical details for offsets, definition exceptional events, etc.	Y	✓
Ministerial oversight of non-compliance	Y	✓
Revise national ambient air quality guidelines for PM <sub>2.5</sub> and consider future standards for annual PM <sub>10</sub> and PM <sub>2.5</sub>	-	✓

## Comment

### Implications for industry

19. I agree with the TAG's conclusion that the industry consent restrictions are inequitable when the primary contributor to PM<sub>10</sub> pollution in most airsheds is domestic heating. However, I have concluded that without some incentive for industry to manage their emissions it is unlikely that the new target compliance date of 1 September 2016 will be achieved. I have therefore endorsed a proposal for mandatory offsets from *new/significant* industrial PM<sub>10</sub> discharges into over-allocated airsheds. This replaces the existing offset requirements for new and existing industry and blanket prohibition on *all* industry after 2013 in non-compliant airsheds.
20. This approach is fairer than the current situation with an allocation of costs between industry and the domestic sector that is much closer to the contribution that each sector makes to PM<sub>10</sub> emissions. Examples of industries with significant discharges of PM<sub>10</sub> may include new wood processing plants, new dairy processing plants and new thermal power stations. Emissions from sources such as school boilers are not likely to be significant and would not be required to be offset.
21. In formulating this proposal, Officials have also considered the impacts on the competitiveness of Auckland in comparison with other Australasian cities such as Sydney, Melbourne and Brisbane. Figure 3 presents annual exceedances of the PM<sub>10</sub> standard in selected cities for 2009.



**Figure 3 - Comparison of PM<sub>10</sub> exceedances in selected cities**

22. The regulatory requirements for PM<sub>10</sub> would therefore be very similar in Auckland to other Australasian cities,<sup>2</sup> and no different to the status quo in Auckland. The Auckland Council already has a zero net increase policy for industrial emissions.

<sup>2</sup> Australia's national environmental protection measure for PM<sub>10</sub> is 50 µg/m<sup>3</sup>, as a daily average, with five permitted exceedances for bushfire hazard reduction burning (i.e. zero exceedances otherwise permitted). In 2005 - 2009 Auckland, Sydney, Melbourne and Brisbane all averaged less than 10 exceedances of the PM<sub>10</sub> standard(s).

23. The Regulatory Impact Analysis concludes that the costs of mandatory offsets for the entire country are not overly large and would not be incurred at all if compliance were achieved.
24. In implementing this initiative, I am conscious of the submissions expressing concern over the technical details of mandatory offsets particularly with respect to the definition of *significant*. A definition of *significant* is proposed based on an existing in the *Good Practice Guide for Assessing Discharges to Air from Land Transport* (Ministry for the Environment, June 2008). That specifies a significant discharge as one that results in an increase in the concentration of ambient (i.e. outdoor, off-site) PM<sub>10</sub> at a particular location of more than 2.5 µg/m<sup>3</sup> over a 24-hour period, based on measurements and/or calculations.
25. Similarly, *new* industry (for the purposes of mandatory offsets) will be defined as an industry that applies for consent for new emissions to the airshed. This may be a new industry that is proposing to establish itself or an existing industry that is proposing to increase emissions.
26. While the target compliance date is extended, the requirement to take steps such as mandatory offsets will need to be put in place at an earlier stage to ensure that the new target compliance date is met. After taking submissions into account mandatory offsets will apply from 1 September 2012.
27. There will be no detailed regulation on how councils are to manage offsets because councils are in the best position to determine how to effectively and efficiently manage offsets in their own airsheds based on the sources of pollution within those airsheds. The regulations will continue to set out only what is to be achieved. The value of offsets will be determined by the market and may be undertaken by the party seeking consent or another party on its behalf (e.g. a council).
28. The requirement for offsets would be based on a five year average to smooth the inter-annual effects of meteorology. In the case of airsheds with less than five years monitoring data, what data there is available can be used to assess compliance. For example, an airshed that has exceeded the standards for five years would be deemed non-compliant and hence must implement mandatory offsets for new, significant industry discharges. Similarly, once compliance is assured (i.e. an airshed has attained compliance for five consecutive years) offsets would no longer be required. These technical details will be detailed in a national compliance strategy to be prepared by the Ministry for the Environment.

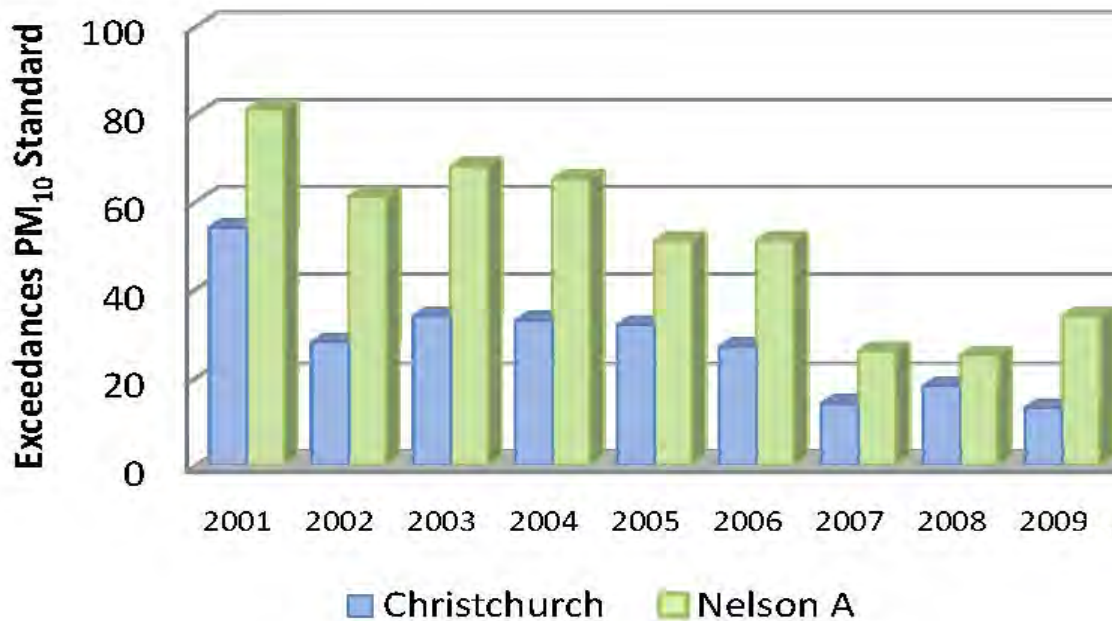
### ***Implications for home fires***

29. The regulations already impose some restrictions on domestic emissions (national emissions and efficiency standards for new woodburners in urban areas). There were a number of submissions from regional councils calling for increased domestic emission restrictions in the regulations. In this regard a national standard is more efficient and effective than changes to multiple regional plans. To ensure there is equity between sectors in managing PM<sub>10</sub> emissions, I propose to extend these domestic restrictions.
30. I propose, from 1 September 2012, to prohibit new open fires in over-allocated airsheds. This will apply in perpetuity (i.e. prohibition will not be lifted even when the airshed subsequently complies with the PM<sub>10</sub> standard). As noted above,

regional councils may (and some do) have stricter rules in their regional plans.<sup>3</sup> Because the prohibition only affects new open fires, the 2012 date is entirely achievable for households and councils, and will not impose additional costs.

**Target compliance date and permitted exceedances**

31. Over the last six years we have seen the progress that can be made in improving air quality if councils focus their attention. Figure 4 shows the reductions in maximum daily PM<sub>10</sub> concentrations in Christchurch and Nelson between 2001 and 2009. These reductions are a direct result of the hard work by Environment Canterbury and Nelson City Council to reduce emissions from domestic fires.



**Figure 4 PM<sub>10</sub> Trend in Christchurch and Nelson, 2001 - 2010**

32. A key objective of the regulations was the establishment of bottom-line standards that should not be breached. Maintaining these standards protects our investment in clean, green New Zealand. I therefore do not recommend any increase in the number of permitted exceedances. Instead it is proposed to moderate the target date for compliance and require an 'equivalence of effort' from all parties charged with implementation.
33. All airsheds will still be required to meet the PM<sub>10</sub> standard with one exceedance but that the date for national compliance be extended to 2020 with split targets applying from 2016. Under this approach, airsheds that are currently highly polluted (defined as at least 10 exceedances per year), will be required to meet a target of no more than three exceedances per year by 1 September 2016. By 1 September 2020 they should meet the PM<sub>10</sub> standard with one permitted exceedance. Lesser polluted airsheds should meet the standard of one permitted exceedance by 1 September 2016. The 2016 date was supported by Local Government New Zealand, in its submission on behalf of all councils.

<sup>3</sup> Currently Auckland, Hawke's Bay, Canterbury and Otago Regional Councils, and Nelson City and Tasman District Councils have more stringent rules in their air quality plans than the regulations. Rotorua District Council has recently implemented New Zealand's first air quality bylaw to control emissions from domestic burners.

34. This approach draws a careful balance between the level of health protection the standard affords against the need to reduce compliance costs and the very real issue of feasibility.
35. In setting this target, it is noted that some exceedances are beyond the control of councils because they are due to exceptional events. Such events could, however, push an airshed into non-compliance, imposing unnecessary costs on communities. Consequently, I confirm my proposal to make explicit provision in the regulations for the exclusion of exceptional events (e.g. volcanic eruptions, bush fires, etc).

***Additional proposed changes***

36. To support the implementation of the revised standards the Ministry for the Environment will develop and implement a national compliance strategy that sets out the practices that regional councils should adopt in order to meet the PM<sub>10</sub> standard. This national compliance strategy will include education on the health impacts of PM<sub>10</sub> and provide best practice guidelines for airshed action plans and for managing offsets. It will further outline the use of my residual powers under the RMA, such as intervening were regional councils with airsheds that are not on track to compliance. Regional councils will also be required to provide the Minister for the Environment updates on progress with airshed implementation plans under s27 of the RMA and be required to make PM<sub>10</sub> monitoring data publicly available. This will improve transparency and accountability.
37. Finally, a minor technical matter needs to be addressed. The national environmental standards for air quality have inadvertently created a trade barrier for wood-fired central heating appliances because they cannot be tested using the methods provided for in the regulations - Wood-fired central heating appliances are excluded from test methods AS/NZS 4013:1999 and AS/NZS 4012:1999. I propose a minor technical amendment to regulations 23 and 24 to permit test methods that are functionally equivalent to those provided for in the regulations, for such appliances.

***Costs and benefits of proposed changes***

38. A regulatory impact statement for the proposed amendments is attached. Table 3 summarises the costs and benefits of my preferred option and the status quo.

**Table 3 Cost Benefit Analysis Summary**

2008 – 2020 Inclusive	Status Quo	Preferred Option
	<b>\$M (2008 dollars)</b>	
Present Value Combined Benefits	1,911	1,746
Present Value Costs	867	195
Net Present Value	1,044	1,551
Benefit to Cost Ratio:	2.2	8.9

39. The cost benefit analysis supports my recommended approach with a positive present value of \$1.55 billion (\$2008) and a benefit to cost ratio of 8.9:1 to the New Zealand economy over the period 2008 and 2020. My proposed approach will

deliver the maximum net benefit to New Zealand taking into account the economic, social and environmental benefits and costs of air pollution.

40. Status quo assumes the current regulations remain in place but also reflects that compliance will not actually be achieved by 1 September 2013. Under status quo, on expiry of their current consent, industry in polluted airsheds would be declined a new consent and be forced to either relocate or close down. The status quo scenario assumes industry closures and relocations occur for three years until compliance is achieved with a present value cost to industry of \$679 million (\$2008). In fact, this is a somewhat hypothetical situation as I have signalled my intent to review the regulations since 2009 and made clear my views that this is an inequitable situation. A regulatory impact assessment demands, however, comparison with a base case and the status quo scenario serves this purpose.
41. The large majority of benefits estimated for both status quo and the preferred option arise from reductions in premature mortality associated with air pollution. This, in turn, reflects the value of a statistical life selected by the New Zealand Institute of Economic Research (NZIER). NZIER has commented at length on their choice of value of statistical life in their report to the Ministry.<sup>4</sup> In light of the binary nature of mortality and the broad spectrum of population exposure (i.e. all ages) I am satisfied that this approach is appropriate and note that this approach is consistent with that of comparable Australian and US jurisdictions. Note that the National Environment Protection Council of Australia recommends a value of \$AUD 6 million for the value of a statistical life specifically for the purpose of setting air quality standards.<sup>5</sup> As such, the choice of \$NZ3.35 million for the purposes of this analysis appears rather conservative in that it will not overestimate benefits.
42. The large cost reductions in my preferred option arise from lower costs faced by industry. They would not be forced to close down or relocate as a result of a prohibition on resource consents.
43. Proposed mandatory offsets will impose costs for new industry in polluted airsheds but these are relatively small in comparison with the benefits from reduced premature mortality. The benefits of proposed mandatory offsets will be:
  - increased regulatory certainty (i.e. air pollution will not continue to get worse); and
  - improved overall efficiency of the airshed (i.e. the new entrant buys out the most polluting and least efficient use of the air 'resource').
44. The prohibition of new open fires in over-allocated airsheds will have negligible costs; the direct costs to households arise from upgrades required through local rules (further details provided in the attached regulatory impact statement).
45. Costs to central and local government rise under the amendments, as set out below in financial implications section of this paper. These cost increases are negligible compared to the cost savings to industry.

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<sup>4</sup> NZIER, 2009 *The value of air quality standards, Review and update of cost benefit analysis of National Environmental Standards on Air Quality*, New Zealand Institute of Economic Research, October 2009 at Appendix C.

<sup>5</sup> NEPC, 2009 *An Australian Approach to Setting Air Quality Standards*, Consultation draft, National Environment Protection Council, Australia, September 2009.

### ***Giving effect to the policy***

46. The *Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations* were made in 2004 and since this time the national environmental standards provisions of the RMA have been amended several times. It proposed that the current regulations be revoked and new regulations be promulgated that contain the proposed amendments and retain the provisions unaffected by the amendments.

### **Consultation**

47. The following departments have been being consulted in the preparation of this paper: The Treasury, Ministry of Economic Development, Department of Internal Affairs, Ministry of Health, Ministry of Transport, Department of Building and Housing, Energy Efficiency and Conservation Authority, Housing New Zealand Corporation, Ministry of Agriculture and Forestry, Ministry of Justice, New Zealand Defence Force, New Zealand Transport Agency, Te Puni Kōkiri. The Department of the Prime Minister and Cabinet have been informed of this paper.

### **Financial implications**

48. Compared with the status quo, the net present costs faced by government rise from \$10 million to \$11 million over the same period. These costs will be shared almost equally between local and central government.
49. Increased costs to local government are additional reporting costs estimated to be \$5,000 per regional council per year, for all 16 councils, and a one-off cost of \$750,000, divided amongst 8 councils, to prepare air quality action plans for 15 non-complying airsheds (estimated to cost \$50,000 each).
50. Increased costs to be met by central government include (all of these costs will be met from within Vote: Environment baselines):
  - Preparation of the national compliance strategy is estimated to cost \$150,000, mostly in the current financial year;
  - Preparation and rollout of best practice guidance is estimated to cost \$75,000 in the 2011/12 financial year;
  - Revision of the national ambient air quality standards is estimated to cost \$75,000 in the 2012/13 financial year;
  - Ministerial oversight will incur costs estimated at \$100,000 per annum, from the 2014/15 financial year until compliance is achieved (assumed to be 2016).

### **Human rights**

51. The proposals contained in this cabinet paper are consistent with the New Zealand Bill of Rights Act 1990, and the Human Rights Act 1993.

### **Gender implications**

52. There are no gender implications arising from this paper.

### **Disability perspective**

53. The air quality standards provide public health protection through nationally consistent, bottom-line standards that should not be breached. Vulnerable people such as those with disabilities may be health-compromised and more susceptible to air pollution than their parts of the population.
54. The recommendations maximise the health protection afforded by the standards. To the extent that health benefits are realised by these proposals, these positive impacts will be disproportionately accorded to persons with disabilities.

### **Legislative implications**

55. Amendments are proposed to the *Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004* to be approved by the end of February 2011.

### **Regulatory impact analysis**

56. The Regulatory Impact Analysis requirements apply to the proposals in this paper and a Regulatory Impact Statement (RIS) has been prepared and is attached.
57. The Regulatory Impact Analysis Team (RIAT) has reviewed the RIS prepared by the Ministry for the Environment and associated supporting material, and considers that the information and analysis summarised in the RIS meets the quality assurance criteria.

### **Consistency with government statement on regulation**

58. I have considered the analysis and advice of my officials, as summarised in the attached Regulatory Impact Statement and I am satisfied that, aside from the risks, uncertainties and caveats already noted in the attached regulatory impact statement, the regulatory proposals recommended in this paper:
  - are required in the public interest
  - will deliver the highest net benefits of the practical options available, and
  - are consistent with our commitments in the Government statement "Better Regulation, Less Regulation."

### **Publicity**

59. I intend to make a public announcement of the proposed amendments to the standards at the Bluegreens Forum, 29 and 30 January 2010.
60. There may be controversy over some proposals. In particular, industry submissions expressed concern over the requirement for mandatory offsets. These concerns were largely over the practicalities of the mechanism and did not reflect the proposal to only require offsets for new, significant industry. I consider that these concerns will be addressed in the national compliance strategy that will be developed.

### **Recommendations**

The Minister for the Environment recommends that the Committee:

1. note that at its meeting in June 2009, the Cabinet Economic Growth and Infrastructure Committee [EGI Min (09) 11/5] approved a review of three aspects of the regulations:
  - 1.1. whether disallowing industry consents (as required by the regulations after 2013) is equitable when industry contributes a small proportion of pollutants;
  - 1.2. whether the current number of permitted exceedances of the ambient PM<sub>10</sub> standard is appropriate for New Zealand;
  - 1.3. whether the 2013 timetable is achievable, and whether it has the suitable cost/benefit balance;
2. note that:
  - 2.1 in June 2009, Cabinet noted that the Minister for the Environment intended to appoint a Technical Advisory Group to oversee a review of the air quality standards [CAB Min (09)20/20];
  - 2.2 the technical advisory group provided its report to the Minister for the Environment in November 2009;
- 3 note that Cabinet [CAB Min (10) 19/10] agreed in principle, subject to the outcome of consultation, to amend the air quality standards by:
  - 3.1 increasing the number of permitted exceedances of the ambient PM<sub>10</sub> standard from one to three;
  - 3.2 making provision for the exclusion of exceptional events (e.g. volcanic eruptions, bushfires and Australian dust storms);
  - 3.3 requiring information on airshed implementation plans from councils (section 27 of the Resource Management Act 1991);
  - 3.4 requiring the mandatory reporting of PM<sub>10</sub> monitoring data by regional councils post-2013 to improve transparency and accountability;
  - 3.5 developing a compliance strategy to demonstrate the Minister for the Environment's intent to monitor and follow up non-compliance by councils;
  - 3.6 investigating the feasibility of funding links (e.g. making government funding conditional on councils using regulatory powers to improve air quality);
- 4 note that Cabinet [CAB Min (10) 19/10] agreed to include in the discussion document the options of:
  - 4.1 repealing the prohibition on industry resource consents post-2013, but retaining a revised offset provision which requires mandatory offsets for new industry with significant discharges of PM<sub>10</sub> in over-allocated airsheds after 2018;
  - 4.2 relying on existing regulatory measures for compliance;
- 5 agree to the following amendments to the Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004:
  - 5.1 retain the PM<sub>10</sub> air quality standard of 50 µg/m<sup>3</sup>, measured over a 24-hour period;
  - 5.2 remove existing restrictions on industry consents for significant discharges of PM<sub>10</sub>;

- 5.3 require mandatory offsets for resource consents for significant new PM<sub>10</sub> discharges in over-allocated airsheds from 1 September 2012 with compliance to be determined, where applicable, on a five year rolling average and applying until the airshed is compliant for five consecutive years;
  - 5.4 prohibit, from 1 September 2012, discharges from new, solid-fuel burning open fires in homes in over-allocated airsheds, the prohibition applying in perpetuity;
  - 5.5 require highly polluted airsheds (those currently with 10 or more exceedances of the PM<sub>10</sub> standard) to have no more than three exceedances per year by 1 September 2016;
  - 5.6 require polluted airsheds (those currently with less than 10 exceedances of the PM<sub>10</sub> standard) to have no more than one exceedance per year by 1 September 2016;
  - 5.7 require all airsheds to meet the PM<sub>10</sub> standard with no more than one permitted exceedance by 1 September 2020;
  - 5.8 provide for the exclusion of exceptional events from the measurement of exceedances;
  - 5.9 permit test methods that are functionally equivalent to those stated in AS/NZS 4013 and 4012, for appliances excluded from these test methods;
- 6 agree that for the purpose of recommendation 5:
- 6.1 *new industry* (for the purposes of mandatory offsets) is an industry that applies for consent for new emissions to the airshed;
  - 6.2 a *significant* discharge is one that results in an increase in the concentration of ambient (i.e. outdoor, off-site) PM<sub>10</sub> at a particular location of more than 2.5 µg/m<sup>3</sup> over a 24-hour period, based on measurements and/or calculations;
- 7 note that the Minister for the Environment will implement the following non-regulatory actions to support compliance of the new air quality standards:
- 7.1 require information on progress from councils with implementation of regional plans to meet air quality standards pursuant to section 27 of the Resource Management Act 1991;
  - 7.2 require annual reporting of PM<sub>10</sub> monitoring data by regional councils pursuant to section 27 of the Resource Management Act 1991;
  - 7.3 a national compliance strategy;
- 8 invite the Minister for the Environment to issue drafting instructions to Parliamentary Counsel Office to draft regulations to replace the Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004;
- 9 invite the Minister for the Environment to approve the final details and any other technical changes required to give effect to the policy in this paper, any changes to be reported to the Cabinet Legislation Committee when seeking approval for the regulations to be signed by the Governor General by Order in Council;

10 note that the Minister for the Environment intends to publicly release this paper, including Cabinet decisions and Annexes including the Regulatory Impact Statement, to meet statutory requirements.

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Hon Dr Nick Smith  
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## Annex 1: Health Impacts of Particulate Matter

There is a substantial body of evidence that breathing particulate matter (PM) is harmful to human health, particularly smaller fractions such as PM<sub>10</sub> (particulate matter that is smaller than 10 microns in diameter), PM<sub>2.5</sub> (particulate matter that is smaller than 2.5 microns in diameter) and PM<sub>1</sub>, or ultrafine particulate matter, (particulate matter that is smaller than 1 micron in diameter). Generally larger particulate matter (between 2.5 and 10 µm) deposits in the upper airways whereas smaller particulate matter (<2.5 µm) deposits in the very small airways deep in the lung. Inhaled ultrafine particulate matter may enter the bloodstream and be carried around the body.<sup>6</sup>

The evidence of adverse health impacts from PM arises from several major lines of scientific investigation:<sup>7,8</sup>

- Characterisation of inhaled particles;
- Consideration of the deposition and clearance of particles in the respiratory tract and the doses delivered to the upper and lower airway and the alveoli;
- Animal and cellular studies of toxicity;
- Studies involving inhalation of particles by human volunteers; and
- Epidemiological studies carried out in community settings.

Epidemiological studies focus on the statistical relationships between PM levels and health impacts, including premature death. Toxicological studies investigate the biological mechanisms through which health impacts can occur.

The health effects that occur following inhalation of PM are predominantly respiratory and cardiovascular but more recent evidence include pregnancy-related outcomes such as low birth weight and increased infant mortality. Adverse health impacts, including premature death, are not confined to one part of the population, however, the proportion of the population affected by less severe outcomes (e.g. symptoms, reduced lung function) is much larger than that affected by more severe outcomes such as hospital admissions and death as shown below in Figure A1.

It is usually the more susceptible groups who experience the more severe outcomes. The US EPA notes that several groups have increased susceptibility to PM pollution, including:

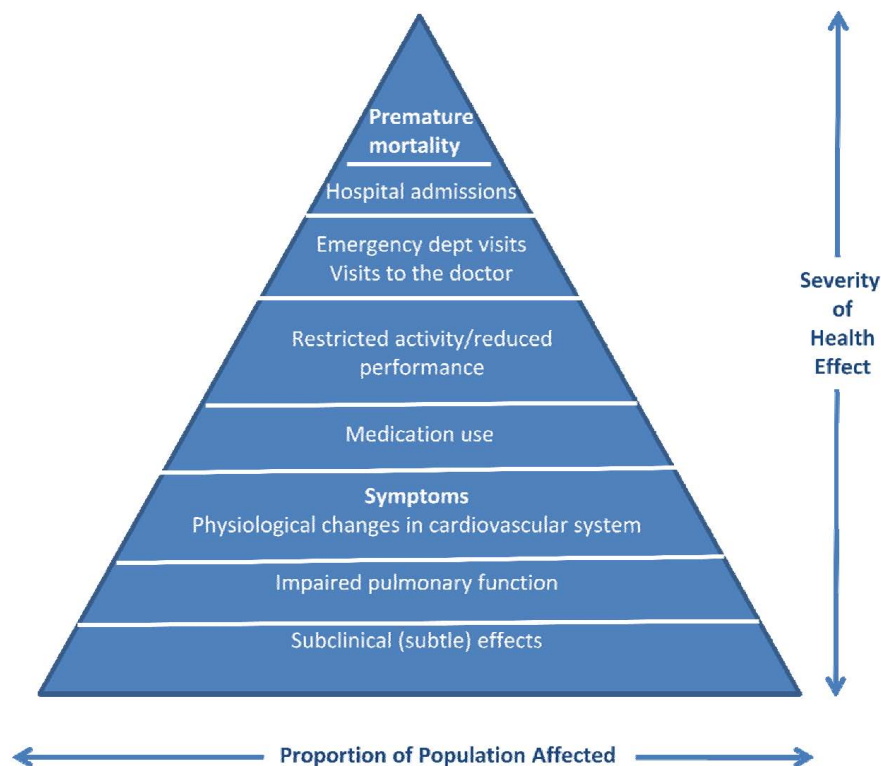
- The elderly;
- Individuals with pre-existing heart or lung disease;
- Children, especially the very young and unborn babies (because of the effects on lung function development);
- Asthmatics and people with respiratory conditions or with diabetes.

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<sup>6</sup> Research now focuses on ultrafine particles (i.e. particulate matter smaller than 1 micron in diameter) to investigate translocation via the olfactory nerve following deposition on the olfactory mucosa of the nasopharynx. This mechanism bypasses the blood-brain barrier to provide a direct route to the central nervous system. *Air Quality Guidelines Global Update 2005, Particulate matter, ozone, nitrogen dioxide and sulphur dioxide*, World Health Organisation, Germany 2006 at 237.

<sup>7</sup> Research varies in its focus on different fractions – this discussion amalgamates findings into a general discussion of particulate matter (PM) as opposed to the individual fractions.

<sup>8</sup> WHO (ibid) at p 247.



**Figure A1 Pyramid of Health Effects Associated with Air Pollution<sup>9</sup>**

The studies have shown that in addition to the acute effects of rises in PM (i.e. effects in the hours and days following an increase in PM), which have been recognised since the middle of last century, there is now a large body of evidence on the chronic effects of PM. Outcomes reported to be associated with PM exposure include:<sup>10</sup>

- Physiological changes e.g. reduced lung function, increased heart rate, reduced heart rate variability, blood coagulation factors, inflammatory mediators, blood vessel reactivity, blood pressure, blood vessel structure
- Low birth weight
- Infant (especially post-neonatal) mortality
- Respiratory symptoms e.g. cough
- Exacerbation of asthma, chronic bronchitis
- School/work absenteeism
- Respiratory mortality
- Cardiovascular mortality
- Myocardial infarction (heart attack)
- Stroke
- Cardiac arrhythmia (abnormal heart rhythm)
- Lung cancer
- Reduced lung growth
- Reduced life expectancy
- Respiratory and cardiovascular disease medication use, hospital admissions, emergency department visits, primary care visits.

Importantly, the studies do not support the hypothesis that PM pollution causes premature death by “harvesting” the very frail who would have died in a few days anyway. Rather than finding excess deaths during and immediately after days of high PM pollution, followed by a

<sup>9</sup> WHO (Ibid) at 91.

<sup>10</sup> Report of the Air Quality Technical Advisory Group, at 111.

short-term compensatory reduction in deaths, they found that PM - mortality associations were stronger at longer time levels.

### **Comparison with health effects from other causes (e.g. smoking)**

Although ambient exposure to PM poses smaller relative risks for cardiovascular disease than risk factors such as obesity or tobacco smoking, the absolute number of people affected is very high because the entire population is exposed, and represents a large health burden.<sup>11</sup>

### **Evidence of health improvement from air quality regulation**

On a positive note, the benefits of reduced air pollution have been demonstrated in studies that examine the improvements in health that arise from rapid changes in ambient pollution, including PM, as a result of changes in regulation or sources. For example;

- Banning of coal burning in Dublin saw a sharp drop in mortality from cardiovascular disease;<sup>12</sup>
- Reduced air pollution in the US between 1980 and 2000 has resulted in an increased life expectancy;<sup>13</sup>
- Subtle reductions in PM<sub>10</sub> in Switzerland since 1991 have resulted in reduced age-related decline in lung function and lower rates of reporting respiratory symptoms;<sup>14</sup>
- Improvements in air quality in Germany following reunification saw a decline in chronic respiratory disease;<sup>15</sup>
- Increased growth in lung function in children who moved to areas of lower PM<sub>10</sub> in California.<sup>16</sup>

Such 'quasi-experimental' approaches underline the causality of the association between air pollution and adverse health impacts.

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<sup>11</sup> Report of the Air Quality Technical Advisory Group, at 111.

<sup>12</sup> WHO (ibid) at 250.

<sup>13</sup> Report of the Air Quality Technical Advisory Group, at 114.

<sup>14</sup> Report of the Air Quality Technical Advisory Group, at 114.

<sup>15</sup> WHO (ibid) at 250.

<sup>16</sup> Report of the Air Quality Technical Advisory Group, at 114.