

# Coversheet: Amending the National Environmental Standards for Air Quality

Advising agencies	<i>Ministry for the Environment</i>
Decision sought	<i>Agreement to a package of proposed amendments to the National Environmental Standards for Air Quality</i>
Proposing Ministers	<i>Hon Nanaia Mahuta, Associate Minister for the Environment Hon David Parker, Minister for the Environment</i>

## Summary: Problem and Proposed Approach

<p><b>Problem Definition</b></p> <p><b>What problem or opportunity does this proposal seek to address? Why is Government intervention required?</b></p>
<p>Human activities and natural sources emit gases and particles into the air. Some of these emissions can have a negative impact on air quality and can harm our health, our environment and our economy. In New Zealand, particulate matter is the air pollutant of most concern to human health, especially fine particles (PM<sub>2.5</sub>) which have a direct causal link to premature mortality. We have clear evidence that the main source of PM<sub>2.5</sub> in New Zealand is burning wood and coal for domestic heating.</p> <p>Over the last 15 years, regional council implementation of the existing regulations has successfully achieved reductions in air pollution in many urban airsheds in New Zealand. This has improved public health, with the majority of New Zealanders now enjoying air quality in compliance with the regulations.</p> <p>However, it is timely to update these regulations to reflect the large body of science about the health impacts of fine particulate matter that has developed since they were introduced in 2004. This also affords an opportunity to undertake technical amendments to address exceedances caused by natural sources and New Zealand's commitments under the Minamata Convention on Mercury.</p>

<p><b>Proposed Approach</b></p> <p><b>How will Government intervention work to bring about the desired change? How is this the best option?</b></p>
<p>Amendments to the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (the NESAQ) will set new standards for emissions of fine particles and regulate the use of wood, coal and other solid fuels for domestic heating. This will ensure appropriate and targeted regulation of New Zealand's main source of particulate pollution.</p>

## Section B: Summary Impacts: Benefits and costs

### Who are the main expected beneficiaries and what is the nature of the expected benefit?

The expected beneficiaries are the public. With better air quality, people will enjoy better health. Through avoided health costs, the government also benefits.

Avoided health costs were estimated in the Cost Benefit Analysis report (CBA). These were calculated by translating the annual PM<sub>2.5</sub> and annual PM<sub>10</sub> concentrations into health effects (ie, response ratio) and then applying a cost to each 'new' health incident:

#### Estimated cost per case from PM<sub>2.5</sub> exposure

Health effect	Avoided health cost (\$NZD)	Estimated number of cases
Premature mortality	\$4.06m per life <sup>1</sup>	646
Cardiac admissions	\$5,381 per admission	215.3
Respiratory admissions	\$7,432 per admission	422.4
Restricted Activity Days	\$70 per day	1,600,647

An overall reduction in particulate matter emissions will have an associated avoided health cost. It may also have other benefits in terms of climate change mitigation, cultural values, amenity impacts, and economic benefits for manufacturers, importers and retailers of compliant domestic burners and heat pumps, and for tourist operators that rely on New Zealand's 'clean green' image.

### Where do the costs fall?

All 16 regional councils and unitary authorities are expected to incur costs for activities such as purchasing new monitoring equipment, updating resource management plans, community education regarding the new rules, and monitoring and evaluation of updated plans and rules. Actual costs will vary depending on the council.<sup>2</sup>

Apart from the cost of the regulatory process, the Government is expected to incur minimal costs for written guidance and policy implementation workshops delivered by officials at the MfE. This will be carried out within baseline departmental budgets.

Costs to private households vary depending on existing regional rules. We anticipate costs would be higher in areas that are not currently subject to any regional rules for solid fuel domestic burners.

<sup>1</sup> Value of Statistical Life Years (VOSL) is a method to determine premature mortality costs. The method is detailed in the Cost Benefit Analysis (CBA), Market Economics, 2019. The report also details that a health cost of \$189,104 per annum could be used for comparative purposes of a different method - the Value of Life Years Lost (VLYL).

<sup>2</sup> The implementation costs incurred by regional councils are subject to generic figures as outlined in the CBA report. Councils have a devolved responsibility under the RMA to comply with the NESAQ, however, councils may vary in their methods to achieve compliance with the regulations eg, through education or enforcement. Councils could use the CBA model during consultation in order to assign their own projected implementation costs.

The extent of the change from status quo is affected by factors which include, but are not limited to the:

- scale of reductions required in PM levels,
- population of usual residents in an airshed,
- preference of one fuel type relative to another (influencing factors include dwelling size, heat output in terms of kilowatts per hour (kWh), price of fuel (cents per unit of kWh) , elasticity of demand).

Suppliers and manufacturers of domestic burners may incur costs for changing their manufacturing processes, designing and developing new burners. However, there is already an established market for low emissions and ultra low emissions burners available in New Zealand. We note that some suppliers may be left with stocks of non-compliant burners that they cannot sell if there is not enough time to transition to the new standards. Costs for testing and certification of new burners against new emissions standards are the same as the status quo.

### **What are the likely risks and unintended impacts, how significant are they and how will they be minimised or mitigated?**

By introducing annual average and daily average PM<sub>2.5</sub> standards, fewer airsheds may be classified as polluted. Based on measured exceedances data, there are approximately 20 airsheds currently in breach of the daily average PM<sub>10</sub> standards. Based on modelled exceedances data, we estimate there would be 15 airsheds in breach of the PM<sub>2.5</sub> standards. An airshed is classified 'polluted' if it breaches the standard, as averaged over the previous five years. An airshed is no longer 'polluted' if it has not breached the standard in the previous five years. Where airsheds stop being classified as polluted, more industrial discharge consents may be issued, affecting air quality. Some lead in time to begin measuring PM<sub>2.5</sub> and for councils to consider their regional air plans may help to mitigate this.

The proposals allow councils the discretion to implement their regional rules that are stricter than the national regulations. Council rules that prevent the use of non-compliant domestic burners may leave some households unable to afford to heat their homes through alternate means. Non-regulatory measures to support behaviour change may help to minimise this risk

Changing to a PM<sub>2.5</sub> standard may affect councils' responsibility for/ability to regulate larger particles such as dust from unsealed roads and silica dust from quarries, which can also have health impacts in affected communities. While only a few communities are affected i.e. in Northland and in Christchurch, keeping a standard for PM<sub>10</sub> will help to mitigate this risk

### **Identify any significant incompatibility with the Government's 'Expectations for the design of regulatory systems'.**

We believe the preferred option is compatible with the Government's 'Expectations for the design of regulatory systems'.

# Section C: Evidence certainty and quality assurance

## Agency rating of evidence certainty?

Medium confidence. *Our air 2018* provides recent, robust evidence of the state of air quality in New Zealand. Other sources of evidence including WHO reports, the Health and Air Pollution in New Zealand (HAPINZ) study, and emissions inventories are older but provide reliable indications of the health impacts of particulate matter and dominance of PM<sub>2.5</sub> within New Zealand's PM<sub>10</sub> emissions.

The most up-to-date information in this analysis comes from near-final versions of the research report on modelled health impacts of PM<sub>2.5</sub> in New Zealand and the CBA. These are currently awaiting further review.

Public and stakeholder consultation on the preferred option for proposed amendments will be a significant contribution to the evidence base.

## Quality Assurance Reviewing Agency:

Ministry for the Environment

## Quality Assurance Assessment:

The Ministry for the Environment's Quality Assurance panel has reviewed the Regulatory Impact Assessment and confirms the information provided meets the quality assessment criteria, for this stage of the process, and is likely to facilitate effective consultation on the proposals. The consultation will provide information where there is currently uncertainty and later support the delivery of a final Regulatory Impact Assessment to inform subsequent decisions.

# Impact Statement: Amending the National Environmental Standards for Air Quality

## Section 1: General information

Purpose
<p>The Ministry for the Environment is solely responsible for the analysis and advice set out in this Regulatory Impact Statement, except as otherwise explicitly indicated. This analysis and advice has been produced for the purpose of informing:</p> <ul style="list-style-type: none"><li>• decisions to be taken by Cabinet on the release of a government discussion document for public consultation, to refine a preferred option to amend the NESAQ</li><li>• stakeholders to be consulted on a government discussion document</li></ul> <p>Proposals to implement the obligations contained in the Minamata Convention on Mercury have been analysed through a separate process. Consultation on those proposals that relate to amending the NESAQ are part of this process.</p>

Key limitations or Constraints on Analysis
<p><i>Consultation and testing</i></p> <p>This is a pre-consultation RIS. We are seeking feedback on the content of the proposals in a discussion document and testing options with technical experts on an ongoing basis, as part of the consultation process. Post consultation, a cost-benefit analysis as required under section 32 of the Resource Management Act 1991 (RMA) will be undertaken on final recommendations for Ministerial consideration.</p> <p><i>Scope of proposed amendments</i></p> <p>The scope of proposed amendments to the NESAQ focuses on the health impacts of particulate matter (PM) in the air, based on international and national research that links the inhalation of smaller particles with severe health impacts.</p> <p>The Our air 2018<sup>3</sup> report is part of the Ministry for the Environment and Statistics New Zealand’s environmental reporting series. The report indicates that PM<sub>2.5</sub> is the air pollutant of most concern in New Zealand in terms of health impact. It also references emissions inventories which confirm that burning wood and coal for domestic heating is the most common source of PM<sub>10</sub> and PM<sub>2.5</sub> in New Zealand.<sup>4</sup> Therefore, the amendments focus on ambient (outdoor) air quality and the impacts of PM from domestic burners for home heating. The range of options considered reflects this scope and includes regulatory and non-regulatory measures. Where proposals include non-regulatory measures, these have not yet been scoped.</p>

<sup>3</sup> Ministry for the Environment (MfE) & Stats NZ (2018). *New Zealand’s Environmental Reporting Series: Our air 2018*. Retrieved from [www.mfe.govt.nz](http://www.mfe.govt.nz) and [www.stats.govt.nz](http://www.stats.govt.nz).

<sup>4</sup> Emission Impossible Ltd (2018). *National Air Emissions Inventory 2015*. Retrieved from [www.mfe.govt.nz](http://www.mfe.govt.nz)

The environmental reporting series has indicated improvements in air quality since the NESAQ came into force in 2004. We have not undertaken specific evaluation the effectiveness of the NESAQ.

The scope does not include consideration of the effects of PM emissions on indoor air quality, even though most people spend most of their time indoors. The scope also excludes consideration of standards in the NESAQ relating to gases including sulphur dioxide, nitrogen dioxide and ozone which also have health impacts. Future work to improve the regulations may include scope to consider noxious gases.

While proposed amendments to the NESAQ to implement the obligations contained in the Minamata Convention on Mercury will be consulted on as part of this process, analysis of those proposals was undertaken separately.

*Evidence for impact analysis*

This analysis relies on the assumptions used for modelling of the health impacts of PM<sub>2.5</sub> in New Zealand, and the CBA for the preferred option set out in this RIS.

Census data from 2018 is a constraint on modelling because data about home heating sources is not yet available, and population data is no longer reported by Census Area Unit (CAU). CAUs have been replaced by the 'statistical area 2' classification. This is an issue because New Zealand's air quality health impact models have been developed by linking airsheds with their relevant CAU. Therefore, modelling has relied on 2013 census data.

There is currently work underway to update the World Health Organisation Ambient Air Guidelines (WHO Guidelines) and the Health and Air Pollution in New Zealand (HAPINZ) report. Since these are not available yet, this analysis has relied on information from the 2005 WHO Guidelines and the 2012 HAPINZ report, among other sources.

**Responsible Manager (signature and date)**



26/11/19

Liz Moncrieff

Air Quality Policy

Natural and Built Systems

Ministry for the Environment

## Section 2: Problem definition and objectives

### 2.1 What is the context within which action is proposed?

#### **New Zealand's air quality is affected by contaminants from various sources**

Human activities and natural processes emit gases and particles into the air. Some of these emissions can have a negative impact on air quality. In New Zealand, this includes emissions from human activities (anthropogenic air pollution) such as burning fuels for home heating, vehicle exhaust from combustion engines, emissions from industrial processes, power generation, agriculture, pesticides, and dust from unpaved roads and unpaved areas such as quarries, farms, or construction sites. It also includes emissions from natural sources including wind-blown dust, pollen, smoke from wildfires, sea salt, and ash and gases from volcanic activity. Depending on the source, emissions will be characterised by particles of a certain size range and/or certain types of gases, with varying health impacts.<sup>5</sup>

#### **Particulate matter (PM) in our air can have health impacts**

The most significant human health impacts from poor air quality are associated with exposure to PM.<sup>6</sup> PM is a collective term for solid and liquid particles suspended in the air that are small enough to be inhaled. PM varies greatly in structure and chemical composition, depending on the size of the particle and source of the material; it correspondingly varies in the potential to cause harm.

Exposure to PM can have health impacts ranging from shortness of breath, coughing or chest pain, to disease and premature death from cardiovascular and respiratory causes. It can cause lung cancer and exacerbate asthma and emphysema. Studies point to possible links with diabetes and atherosclerosis due to an increase in inflammation.<sup>7</sup>

People with pre-existing heart or lung disease, young children, and the elderly, are the most likely to suffer adverse health effects from exposure to PM. The effects can be especially serious for the very young. PM exposure has been associated with premature birth, low birth weight, and infant bronchiolitis. It has also been associated with respiratory infections, asthma, and chronic reduced rate of lung growth in young children.<sup>8</sup>

The 2012 Health and Air Pollution Impacts in New Zealand (HAPINZ) study, based on PM<sub>10</sub> measurements, estimated the total social costs associated with anthropogenic air pollution in New Zealand to be \$4.28 billion per year or \$1,061 per person, with the following contributions attributed to each source:<sup>9</sup>

- 56 percent due to domestic fires

<sup>5</sup> MfE & Stats NZ (2018). *New Zealand's Environmental Reporting Series: Our air 2018*, p18.

<sup>6</sup> Health Effects Institute (2018). *State of global air 2018. Special Report*. Health Effects Institute, Boston, USA.

<sup>7</sup> World Health Organization (WHO) (2013). *Review of evidence on health aspects of air pollution – REVIHAAP Project*. Retrieved from <http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/2013/review-of-evidence-on-health-aspects-of-air-pollution-revihaap-project-final-technical-report>.

<sup>8</sup> WHO (2013); United States Environmental Protection Agency (US EPA) (2009). *Integrated Science Assessment for Particulate Matter*. <https://doi.org/EPA/600/R-08/139F>.

<sup>9</sup> Kuschel, G, Metcalfe, J, Wilton, E, Guria, J, Hales, S, Rolfe, K, & Woodward, A (2012). *Updated Health and Air Pollution in New Zealand Study Volume 1: Summary report (Vol. 1)*. Retrieved from [http://www.hapinz.org.nz/HAPINZ\\_Update\\_Vol2\\_Technical\\_Report.pdf](http://www.hapinz.org.nz/HAPINZ_Update_Vol2_Technical_Report.pdf).



- 22 percent due to motor vehicles
- 12 percent due to open burning
- 10 percent due to industry

PM is often classified according to its size. PM<sub>10</sub> has a diameter of 10 micrometres (µm) or less. PM<sub>2.5</sub> has a diameter of less than 2.5 µm and is, therefore, a subset of smaller particles within the PM<sub>10</sub> range. Ultrafine particles are an even smaller subset (less than 0.1 µm or 25 times smaller than PM<sub>2.5</sub>). In general, the smaller the particle, the greater the impact on human health, as smaller particles can penetrate more deeply into the human body. Fine particles (PM<sub>2.5</sub> or smaller) are now recognised as having the highest health risk and are mainly created by human activities.<sup>10</sup>

Health impacts modelling for the purposes of this analysis estimated the annual health outcomes attributable to PM<sub>2.5</sub>, based on 2018 data, as follows:

- 646 premature deaths (among adults aged 30 years and above)
- 215 cardiac hospital admissions (all ages)
- 422 respiratory hospital admissions (all ages)
- 1.6 million restricted activity days

### **Other impacts of PM**

Aside from the impact on human health, PM has other impacts, including those on natural ecosystems and biodiversity, agriculture, visibility, recreation, and cultural values. Data are lacking in New Zealand for these types of impacts, but they have been studied extensively overseas. There are also climate change implications related to PM. Changes to the climate system can be caused by air pollutants (that can heat or cool the climate); and in turn, a warming climate can affect pollutants that are already in the air.

PM<sub>2.5</sub> in the form of black carbon or soot is very good at absorbing sunlight.<sup>11</sup> In the atmosphere, its overall effect is to warm the climate. If black carbon deposits on ice or snow, it decreases Earth's ability to reflect the warming rays of the sun, while absorbing heat and hastening the melt of snow and glaciers, which in turn raises sea levels. Black carbon generally comes from vehicle emissions (especially from diesel engines), burning solid fuels (wood or coal) for home heating, or agricultural biomass burn-offs.

### **PM from home heating is an issue in New Zealand**

Monitoring of air pollutants across New Zealand's shows that our air quality profile is different to most of the rest of the world.

New Zealand comprises 16 regions. Each region constitutes an airshed, and across the country there are 73 further airsheds within regions which have been notified in the New Zealand Gazette. An airshed is a geographic boundary defined by existing regional boundaries, or by a regional council or unitary authority for air quality management where, in practice, part of the atmosphere is assumed to behave in a coherent way, particularly in how emissions disperse.

Monitoring of air pollutants in airsheds shows that our air quality is good in most places and

<sup>10</sup> MfE & Stats NZ (2018). *New Zealand's Environmental Reporting Series: Our air 2018*, p10-11.

<sup>11</sup> MfE & Stats NZ (2018). *New Zealand's Environmental Reporting Series: Our air 2018*, p55-56.



at most times of the year. However, in cooler months emissions from home heating in urban areas can raise pollutants to levels that exceed current standards and affect human health, especially when weather and landscape (topography) are favourable for the build-up of pollutants. Pollutants from vehicle emissions are a concern as well, mainly in large urban centres, throughout the year. Other pollutants can be significant locally.

PM<sub>2.5</sub> makes up a high percentage of estimated human-made PM concentrations in New Zealand. In 2015, PM<sub>2.5</sub> comprised 94 percent PM emissions from human activities (combustion), and 75 percent of PM emissions from all sources. Residential emissions were the biggest source of both PM<sub>10</sub> (25 percent), and PM<sub>2.5</sub> (33 percent) in New Zealand. Most PM from residential emissions came from burning wood and coal for home heating.

The number of homes burning wood or coal for heat has decreased over time, but they are still important home heating methods in New Zealand. Wood burners heated 33 percent of North Island homes and 47 percent of South Island homes in 2013. While wood burners are by far the most used solid fuel burning appliance in New Zealand, coal burners can emit about four times the particulate matter of a woodburner. A history of burning coal for heating has contributed to poor air quality in areas such as Southland, Canterbury and Otago. Council interventions in these areas have helped to reduce households' reliance on coal.

Those most at risk of exposure to PM from burning wood or coal for home heating commonly reside in neighbourhoods comprised of older homes (fitted with older burners), in areas where temperatures are low in winter, and local topography and climate can create inversion layers which limit the dispersal of air contaminants.

Measures to reduce exposure to PM from domestic burners in these areas can disproportionately impact low-socio economic households. Heating helps to minimise dampness and mould by maintaining a minimum indoor air temperature, controlling relative humidity, reducing dampness and inhibiting the growth of mould and fungi. Reducing the use of domestic burners may increase the risk of illness associated with dampness and mould, such as asthma and respiratory infections, in households that cannot afford to heat their homes with other sources of energy.

### **PM<sub>2.5</sub> is not explicitly regulated in New Zealand**

The quality of our air is affected by a wide range of human activities and natural sources. New Zealand currently only has a national standard for PM<sub>10</sub>, and is one of the few developed countries without a national standard for PM<sub>2.5</sub>. Without further action, regional councils and unitary authorities will continue to work towards improvements in air quality in their regions, taking varied approaches to address different sources of PM<sub>10</sub>, PM<sub>2.5</sub> and gases to comply with the NESAQ.

Population growth and urbanisation may exacerbate the health impacts of air pollution in areas where exposure to PM is already an issue. Additionally, as our population ages, more people will be at higher risk of the effects of PM<sub>2.5</sub>. Changes to our climate may change our demand for home heating over winter, with reduced demand where the climate is warmer.

The overall system for managing air quality in New Zealand has not been assessed as a whole. However, an air domain report is produced every three years as part of the Ministry for the Environment's and Statistics New Zealand's environmental reporting series. The most recent report is Our air 2018. It indicates that New Zealand's air quality is generally good and

has improved over time, though PM emissions from home heating in winter continue to affect human health. This implies that the overall system is working effectively, but further refinement is required to improve health outcomes.

The Parliamentary Commissioner for the Environment (PCE) provided commentary on the 2014 Air Domain report and Our air 2018. PCE recommended updating particulate matter standards to reflect current scientific understanding, and inclusion of both a daily and annual average national standard for PM<sub>2.5</sub>.

Implementing separate standards for PM<sub>10</sub> and PM<sub>2.5</sub> is an effective way of reducing disease and premature death from cardiovascular and respiratory causes, and restricted activity days. As per the WHO Guidelines, regulating PM<sub>10</sub> and PM<sub>2.5</sub> can protect against adverse health effects arising from short- and long-term exposure to both pollutants. Daily, short-term standards can help to protect against acute health effects, while annual long-term standards protect against cumulative and chronic health effects. Daily and annual standards are also useful to manage pollutants that demonstrate significant seasonal variations, as well as those that demonstrate high baseline concentrations year round.

## 2.2 What regulatory system, or systems, are already in place?

### Central Government

New Zealand's primary regulatory tools for managing ambient air quality are:

- the RMA
- the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NESAQ), made under the RMA
- the Ambient Air Quality Guidelines
- Land Transport Rule: Vehicle Exhaust Emissions 2007 (Vehicle Emissions Rule)

The Ministry for the Environment administers the RMA, NESAQ and Ambient Air Quality guidelines. The Ministry of Transport administers the Vehicle Emissions Rule.

These primary tools are supported by central government initiatives to address potential health impacts associated with home heating. Such initiatives include:

- the Warmer Kiwi Homes programme
- the Residential Tenancies (Healthy Homes Standards) Regulations 2019 (Healthy Homes Standards)
- Winter Energy Payment
- As a major provider of housing (via Kāinga ora), the government already installs low emission burners that are well below the proposed new emission standard (0.33g/kg)

Under the Health Act 1956, the Ministry of Health is responsible for improving, promoting and protecting public health. This includes responsibility for public health in relation to infectious diseases, health emergencies and environmental health (air pollution, waterborne and foodborne illness, radiation etc.).

### *Resource Management Act 1991*

The RMA is New Zealand's main piece of legislation that sets out how we should manage our environment, including managing discharges to air, land, water and coastal marine areas

and regulating land use and the provision of infrastructure. The RMA is based on the principle of sustainable management which involves considering effects of activities on the environment now and in the future when making resource management decisions.

#### *National Environmental Standards for Air Quality*

The NESAQ are regulations made under the Resource Management Act 1991, which aim to set a guaranteed minimum level of health protection for all New Zealanders.

The NESAQ was introduced 8 October 2004 and were last amended in 2011. It is made up of 14 separate but interlinked regulations. This includes:

- five ambient (outdoor) air quality standards for contaminants (including PM<sub>10</sub>, carbon monoxide, nitrogen dioxide, sulphur dioxide and ozone)
- seven standards prohibiting activities that discharge significant quantities of dioxins and other toxics into the air
- emissions and efficiency standards for new wood burners in properties less than two hectares
- a prohibition on the operation of new domestic open fires in polluted airsheds
- a requirement for large landfills to collect greenhouse gas emissions.

Under the NESAQ, regional councils and unitary authorities are required to identify and monitor areas where air quality is likely, or known, to exceed the ambient air quality standards. Each region of New Zealand is an airshed for the purposes of the NESAQ. Additionally, regional councils may gazette defined geographical boundaries as airsheds for the purpose of air quality management. These gazetted airsheds are generally assumed to behave in a coherent way, particularly in how emissions disperse. When an airshed is in breach of the ambient PM<sub>10</sub> standard, new open fires are prohibited indefinitely. When an airshed is in breach of the ambient PM<sub>10</sub> standard, averaged where possible over the previous five years, it is classified as a polluted airshed and new discharges of PM<sub>10</sub> from industry are prohibited unless they will be offset.

#### *Vehicle Emissions Rule*

The vehicle emissions rule sets emission limits for new motor vehicles in New Zealand. It aims to achieve improvements in air quality by reducing the levels of harmful emissions from motor vehicles.

#### *Warmer Kiwi Homes*

Warmer Kiwi Homes is a four-year Government programme offering subsidies for low-emissions home heating sources as well as ceiling and underfloor insulation. It is administered by the Energy Efficiency and Conservation Authority and aims to assist low-income homeowners to make their houses warmer, drier and healthier.

#### *Healthy Homes Standards*

The Healthy Homes Standards aim to make a significant change to the quality of New Zealand rental homes. The Standards are administered by the Ministry of Housing and Urban Development and cover improvements to heating, insulation, and ventilation, and addressing issues with moisture ingress and drainage and draught stopping.

#### *Winter Energy Payment*

The Winter Energy Payment from Work and Income New Zealand (WINZ) is an additional, automatic payment to superannuitants, veterans, jobseekers, sole parents and other eligible candidates who are already receiving weekly payments from WINZ. The Winter Energy Payment aims to assist beneficiaries to cover additional expenses associated with home heating over the winter months.

### **Local Government**

Regional councils and unitary authorities have responsibilities under the RMA for managing air quality in their regions and ensuring their regions meet the standards in the NESAQ.

To meet their responsibilities, regional councils and unitary authorities can establish policies and rules through regional plans to manage particular issues in their regions, issue resource consents for discharges from industrial and trade premises, investigate and respond to public concerns, carry out education campaigns and provide incentives for people to use cleaner forms of home heating.

Under section 44A of the RMA, territorial authorities must observe the NESAQ. This includes implementation of the relevant regional council's air quality rules and policies within their areas. They also have a role in implementing the NESAQ through issuing building consents for solid fuel appliances, establishing bylaws and supporting regional councils' regulatory and non-regulatory initiatives. As road controlling authorities, territorial authorities are also have responsibility for transport emissions.

### **International interests**

#### *World Health Organisation*

The World Health Organization (WHO) developed air quality guidelines in response to the threat that air pollution poses to public health globally. The WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide - Global update 2005 (WHO Guidelines) are not standards or legally binding criteria, but are designed to offer guidance in reducing the health impacts of air pollution, based on the ongoing expert evaluation of scientific evidence.

The WHO Guidelines are relevant to the diverse conditions of all six WHO regions – New Zealand is in the Western Pacific Region – and support a broad range of policy options for air quality management. The WHO Guidelines include daily and annual concentration limits levels for both PM<sub>2.5</sub> and PM<sub>10</sub> in order to protect against adverse health effects arising from short- and long-term exposure to both pollutants. The NESAQ contains a daily PM<sub>10</sub> standard (only), which is consistent with the daily PM<sub>10</sub> WHO Guidelines. The NESAQ does not contain any PM<sub>2.5</sub> standards.

The WHO Guidelines are currently under review, with an update proposed to be released at the end of 2020. WHO Guidelines are developed through rigorous processes and based on scientific evidence.

#### *Minamata Convention on Mercury*

In 2013 New Zealand signed the Minamata Convention on Mercury – an international environmental treaty aimed at addressing the global threat to human health and the environment posed by anthropogenic (human-made) mercury pollution.

The most significant anthropogenic releases of mercury globally are through emissions to air.

To ratify the Minamata Convention, parties must establish controls on emissions to air from mercury, including from certain industrial processes.

Anthropogenic mercury is not a significant pollutant in New Zealand as many of the activities and processes controlled by the Convention do not take place here and mercury use is minor. The relevant categories currently carried out in New Zealand chiefly relate to coal combustion through coal-fired boiler plants, and industrial coal-fired boilers.

New Zealand's ratification of the Minamata Convention requires three key steps. One step requires two amendments to the NESAQ that will:

- introduce new standards to prohibit the use of mercury in certain listed processes
- incorporate by reference international best practice guidance that decision-makers must consider when making decisions on controls for listed sources.

Proposals to ratify the Minamata Convention have been analysed through a separate process. Consultation on proposals that relate to amending the NESAQ will be part of the consultation on the broader package of proposed amendments.

### **2.3 What is the policy problem or opportunity?**

New Zealand's current regulatory framework for managing air quality, specifically the regulation of PM in the NESAQ, is out of step with scientific research on the links between PM and human health, improvements in home heating technology, and current international best practice for the regulation of PM.

Overall, the NESAQ has contributed to gradual improvements to air quality in New Zealand since it was introduced in 2004. However, it only deals with PM pollution by regulating PM<sub>10</sub>. This is a problem because:

- science shows that PM<sub>10</sub> is not the best indicator of the health impacts of particulate matter pollution. It is possible for an airshed to meet the daily average PM<sub>10</sub> standard while experiencing high concentrations of PM<sub>2.5</sub> that can contribute to significant health impacts.
- focusing on regulating PM<sub>10</sub> requires councils to measure and understand sources of larger, local and naturally occurring PM, over which they have limited control. This shifts effort away from controlling more harmful, smaller particles from human activities (such as home heating) which they do have some regulatory ability to manage

While PM<sub>2.5</sub> is a subset of PM<sub>10</sub>, neither is a proxy indicator for the other. PM<sub>2.5</sub> is not a consistent proportion of PM<sub>10</sub>, and natural background source contributions are not constant around the country or throughout the year. Some human activities generate PM<sub>10</sub> including silica dust from quarries and dust from unsealed roads which can have significant health impacts for people in certain areas of New Zealand. Such activities can be managed by councils and property owners eg, by sealing roads and watering down dust at quarry sites. Because of this, there is value in maintaining measurement and monitoring of PM<sub>10</sub>.

Regional councils and unitary authorities have wide discretion to manage air quality in their own regions in order to meet the requirements of NESAQ. Some councils have the community support, resource and capacity to implement rules that are more stringent than the NESAQ and/or initiatives to improve regional air quality. However, councils cannot be

expected to reduce the health impacts of PM<sub>2.5</sub> at the national scale under current circumstances. Several councils have begun to monitor PM<sub>2.5</sub>, but in the absence of a national standard, they lack direction about the 'acceptable' concentrations of PM<sub>2.5</sub> and parameters for measurement and monitoring. While there is no safe threshold for PM in ambient air, there does need to be a standard to trigger a regulatory response and facilitate progressive reductions in overall PM emissions.

The objective of the NESAQ is to reduce the health impacts of poor air quality in New Zealand. The current regulatory system will not directly address the health impacts of PM<sub>2.5</sub> and local authorities and individuals will take an ad hoc approach if not directed by Government.

#### **2.4 Are there any constraints on the scope for decision making?**

Ministerial decisions on the scope of amendments to the NESAQ include introducing ambient air quality standards for PM<sub>2.5</sub>, and relevant updates to reduce health impacts associated with exposure to emissions from home heating sources.

Ministerial decisions have ruled out prohibitions on behaviours that can increase emissions from woodburners such as burning wet wood, burning 'dirty' fuels such as treated timber and plastics, or modifying a woodburner in a way that alters its efficiency, and behaviours that increase PM<sub>2.5</sub> exposure generally such as outdoor burning. Ministerial decisions have also ruled out any requirement to replace woodburners before the end of their useful life eg, replacement when the property is sold. Instead, non-regulatory approaches to encourage changes to these types of behaviours are within scope. Changes to standards relating to ambient air quality standards for gaseous pollutants (carbon monoxide, nitrogen dioxide, sulphur dioxide and ozone) and changes to the mechanisms for managing PM emissions air quality are also out of the scope of these amendments.

Constraints on the scope of the amendments acknowledge that some of the most vulnerable households would experience compliance issues if there were prohibited behaviours for woodburner operation.

Current processes to update the WHO Guidelines and 2012 Health and Air Pollution in New Zealand (HAPINZ) study won't be completed until late 2020. Amendments to the NESAQ will proceed ahead of the updates. We anticipate there may need to be further amendments to the NESAQ following publication of the updated WHO Guidelines and HAPINZ report.



## 2.5 What do stakeholders think?

Policy development is still at an early stage and Government has not made any policy decisions in relation to the proposed amendments.

We carried out early, targeted engagement with regional councils and some iwi in 2018 to explore the broad scope of a proposed set of amendments. This engagement highlighted broad support for the transition to PM<sub>2.5</sub> as one of the regulatory tools for managing particulate matter. It identified some other issues that regional councils were interested in exploring, but these were subsequently agreed by the Minister to not be in scope of the package now proposed (set out in 2.4 above).

We sought the views of government agencies and a subset of the National Air Quality Working Group on the options set out in this analysis. We have not yet engaged with other key stakeholder including regional councils and unitary authorities, iwi authorities and domestic burner suppliers.

Officials from the Ministry of Health commented that the timing of these amendments should to align with WHO Guideline update (expected late 2020) to benefit from scientific expertise. They also consider that a wider review of the NESAQ be undertaken to achieve improvements in national public health. The review would include assessment of:

- other NESAQ pollutants e.g. nitrogen dioxide and sulphur dioxide
- other air pollutants such as benzene, benzo(a) pyrene (BaP) and arsenic which are known to increase cancer or be elevated above guideline levels in urban areas.

Officials from Kainga Ora questioned whether standards for indoor air quality would be within scope. They also expressed support for retaining the PM<sub>10</sub> standard, expanding emissions standards to all types of domestic solid fuel burners, and non-regulatory measures to encourage appropriate use of domestic burners. Kainga Ora also considered the impacts of Options 4 and 5 in this paper.

Officials from the Ministry of Transport expressed concern about the focus of the proposals on home heating emissions, the absence of proposals relating to PM<sub>2.5</sub> emissions from industry and transport, and the absence of proposals for other key pollutants, including nitrogen oxides.

Public consultation on a discussion document that sets out the preferred option for proposed amendments to the NESAQ is planned for early 2020 over 6-8 weeks, pending Ministerial and Cabinet decisions. Given the narrow scope and technical nature of the amendments, consultation will involve publication of the discussion document with opportunity to make submissions online and targeted engagement with regional councils and unitary authorities, iwi and relevant stakeholder groups such as the New Zealand Home Heating Association.



## Section 3: Options identification

### 3.1 What options are available to address the problem?

From the analysis of airshed progress data, including regional council PM<sub>10</sub> monitoring and compliance, a health-impact assessment and cost-benefit analysis, the Ministry has identified four policy options that combine regulatory and non-regulatory measures. Each option could to a greater or lesser extent achieve the objectives of the NESAQ and can be compared against the Status Quo.

These options range from a 'minimal' regulatory framework which allows for a greater degree of local discretion and minimal changes to the current NESAQ, to a comprehensively centralised and standardised approach which would see all New Zealanders treated equally, but may be unduly restrictive in areas where air quality is not currently a problem.

The options have been developed based on seven variables:

- ambient air quality standard(s) for PM<sub>10</sub>
- ambient air quality standard(s) for PM<sub>2.5</sub>
- compliance timeframes for meeting PM standards
- airshed status if PM standards breached
- emissions standards for domestic burners
- other incentives to reduce PM emissions
- ability of local rules to be more stringent than NESAQ provisions

The options are listed below in order of degree of change to the current NESAQ. Details of each option are set out in Appendix A.

#### ***Option 1 - Status Quo***

Continuation of the current regulatory framework with no amendments to the NESAQ. The status quo includes a daily standard for PM<sub>10</sub> of 50 µg/m<sup>3</sup>. There is no daily average or annual average standard for PM<sub>2.5</sub>. By 1 September 2020, all airsheds will only be allowed one or fewer exceedances of the PM<sub>10</sub> standard in a 12 month period.

If the PM<sub>10</sub> standard is breached, where possible averaged over the previous five years, the airshed will be classified as 'polluted' and the relevant council must not grant resource consents for discharges that would increase the concentration of PM<sub>10</sub> by more than 2.5 µg/m<sup>3</sup> in any part of the polluted airshed. An exception exists where the discharge can be offset by equivalent or greater reductions in PM<sub>10</sub> discharges elsewhere in that airshed. In theory, this helps to limit new sources of PM<sub>10</sub> and encourages councils to take steps to reduce overall emissions in the affected airshed. In practice, emissions offset provisions are not commonly used, and do not consider the cumulative effect of multiple small discharges. Instead councils have concentrated on measures to reduce residential emissions. To remove a 'polluted airshed' classification and enable resource consent to be issued, the airshed must comply with the PM<sub>10</sub> standard for five consecutive years.

Woodburners installed after 1 September 2005 on properties under two hectares must be designed to discharge less than 1.5 grams of particles for each kilogram of dry wood burnt, and the thermal efficiency must not be less than 65 percent.

Domestic solid fuel burning open fires cannot be installed in a breached airshed. Regional and local rules, resource consents or bylaws that are more stringent than regulations in the NESAQ prevail.

The Ministry does not consider this a feasible option because New Zealand would not be managing the PM fraction that is responsible for most health impacts from PM. The status quo is therefore only included as a baseline for measuring the effectiveness of other options.

### ***Option 2 – Minimal regulation***

Specific regulatory changes, supported by a significant non-regulatory package to support New Zealanders to reduce their home heating emissions.

Few amendments to the NESAQ, including:

- removal of the daily average standard for PM<sub>10</sub> of 50 µg/m<sup>3</sup>, while retaining the daily average PM<sub>10</sub> guideline in the Ambient Air Guidelines. The Ambient Air Guidelines are not legally binding.
- introducing an annual average standard for PM<sub>2.5</sub> of 10 µg/m<sup>3</sup>
- changing the compliance timeframes. By 2023, no exceedances of the PM<sub>2.5</sub> standard will be allowed

If the PM<sub>2.5</sub> standard is breached, the mitigation mechanisms in the status quo will apply. If the airshed is breached when averaged over the previous five years, the airshed will be classified as 'polluted' and the relevant council must not grant resource consents for discharges that would increase the concentration of PM<sub>2.5</sub> by more than 2.5 µg/m<sup>3</sup> in any part of the polluted airshed. An exception will apply where the discharge will be offset by equivalent or greater reductions in PM<sub>2.5</sub> discharges elsewhere in that airshed. To remove a 'polluted airshed' classification, the airshed will need to comply with the PM<sub>2.5</sub> standard for five consecutive years.

Development of centrally-led, non-regulatory mechanisms to drive behaviour change around:

- buying, replacing and operating domestic burners, including selection of fuels, maintenance and modifications to burners
- reducing other residential PM emissions from activities such as domestic solid-fuel burning in open fires and outdoor burning.

Regional and local rules, resource consents or bylaws that are more stringent than regulations in the NESAQ will continue to prevail.

### ***Option 3 – Increased regulation (preferred)***

Adopt the more critical health indicators for PM and retain the PM<sub>10</sub> standard for monitoring purposes only. Expand regulations to all types of new domestic solid-fuel burners installed in urban areas, and introduce stricter emissions standards to drive behaviour and industry innovation that will reduce PM<sub>2.5</sub> emissions

A narrow suite of amendments to the NESAQ including:

- retaining the daily standard for PM<sub>10</sub> of 50 µg/m<sup>3</sup> for the purposes of monitoring and reporting only. Exceedances would not count towards classification as a polluted airshed

- introducing standards for ambient PM<sub>2.5</sub>
  - annual average standard of 10 µg/m<sup>3</sup> – no exceedances will be allowed
  - daily average standard of 25 µg/m<sup>3</sup> – three or fewer exceedances will be allowed in a 12 month period
- expanding design standards and thermal efficiency standards for woodburners to all newly installed domestic solid-fuel burners (open fires, coal burners, pellet burners and multi-fuel burners, cookers, water boilers etc) installed on properties two hectares or smaller after amendments to the NESAQ come into force. The amendments will not apply to existing burners
- lowering the emissions standard to require that all domestic solid-fuel burners covered under the regulations be designed to discharge less than 1.0 grams per kilogram of fuel burnt. The thermal efficiency standard will stay the same.

If the PM<sub>2.5</sub> annual or daily standard is breached, the mechanisms in the status quo will apply. If the airshed is breached when averaged over the previous five years, the airshed will be classified as 'polluted' and the relevant council must not grant resource consents for discharges that would increase the concentration of PM<sub>2.5</sub> by more than 2.5 µg/m<sup>3</sup> in any part of the polluted airshed. An exception will apply where the applicant will offset the discharge by equivalent or greater reductions in PM<sub>2.5</sub> discharges elsewhere in that airshed. To remove a 'polluted airshed' classification, the airshed will need to comply with both of the PM<sub>2.5</sub> standards for five consecutive years. The airshed will not be classified as polluted if the daily average PM<sub>10</sub> standard is breached.

Investigation of support for councils to deliver non-regulatory mechanisms to drive behaviour change around:

- buying, replacing and operating domestic burners, including selection of fuels, maintenance and modifications to burners
- reducing other residential PM emissions from activities such as domestic solid-fuel burning in open fires and outdoor burning.

Regional and local rules, resource consents or bylaws that are more stringent than regulations in the NESAQ will continue to prevail. This will enable councils to continue their progress on reducing emissions

#### ***Option 4 – Strong regulation***

Adopt the more critical health indicators for PM and retain the PM<sub>10</sub> standard. Drive further emissions reductions from domestic burners. More stringent requirements for polluted airsheds.

A broader suite of amendments to the NESAQ including:

- retaining the daily average standard for PM<sub>10</sub> of 50 µg/m<sup>3</sup>
- introducing standards for PM<sub>2.5</sub>
  - annual average standard of 10 µg/m<sup>3</sup>
  - daily average standard of 25 µg/m<sup>3</sup>
- expanding design standards and thermal efficiency standards for woodburners to all domestic solid-fuel burners (open fires, coal burners, pellet burners and multi-fuel burners, cookers, water boilers etc) installed on properties under two hectares, after amendments to the NESAQ come into force

- lowering the emissions standard to require that all domestic solid-fuel burners covered under the regulations be designed to discharge less than 0.5 gram per kilogram of fuel burnt in all polluted airsheds, and less than 1 gram per kilogram of fuel burnt in all other airsheds. The thermal efficiency standard will stay the same
- introducing prohibition on unsuitable fuels for domestic solid-fuel burners, such as plastic and treated timber
- introducing a requirement for councils to adopt a 'point of sale rule' for the removal and replacement of non-compliant woodburners when a property is sold in a polluted airshed. An exception will apply for councils with existing 'phase-out' rules for woodburners.
- introducing a prohibition on outdoor burning on all residential properties.

If any of the PM standards are breached, the mechanism in the status quo (as described in Option 3) will apply.

Existing regional and local rules, resource consents or bylaws that are more stringent than regulations in the NESAQ will continue to prevail. No new rules may be established where a matter is already covered by the NESAQ.

#### ***Option 5 – Stringent regulation***

An ambitious and stringent nationally consistent standard. Adopt all WHO Guidelines for PM<sub>10</sub> and PM<sub>2.5</sub> as standards, and strengthen and introduce rules to reduce domestic heating emissions. Drive further emissions reductions through regulation and remove inconsistencies between regions.

A stricter suite of amendments to the NESAQ including:

- retaining the daily average standard for PM<sub>10</sub> of 50 µg/m<sup>3</sup>
- introducing an annual average standard for PM<sub>10</sub> of 20 µg/m<sup>3</sup>
- introducing standards for PM<sub>2.5</sub>
  - annual average standard of 10 µg/m<sup>3</sup>
  - daily average standard of 25 µg/m<sup>3</sup>
- expanding design standards and thermal efficiency standards for woodburners to all domestic solid-fuel burners (open fires, coal burners, pellet burners and multi-fuel burners, cookers, water boilers etc) installed after amendments to the NESAQ come into force
- lowering the emissions standard to require that all domestic solid-fuel burners covered under the regulations be designed to discharge less than 0.5 grams per kilogram of fuel burnt. The thermal efficiency standard will stay the same
- introducing prohibition on unsuitable fuels for domestic solid-fuel burners, such as plastic and treated timber
- introducing a requirement for councils to adopt a 'point of sale rule' for the removal and replacement of non-compliant woodburners when a property is sold in a polluted airshed. An exception will apply for councils with existing 'phase-out' rules for woodburners.
- introducing a prohibition on installing domestic solid-fuel open fires after amendments to the NESAQ come into force, on all residential properties.
- introducing a prohibition on outdoor burning on all residential properties.

If any of the PM standards are breached, the mechanism in the status quo (as described in Option 3) will apply.

Existing regional and local rules, resource consents or bylaws that are more stringent than regulations in the NESAQ will have to be removed. No new rules may be established where a matter is already covered by the NESAQ.

We would not recommend Options 4 and 5 because the provisions may be overly restrictive. Prohibiting outdoor burning on all residential properties may be seen as unreasonable if it prevented outdoor cooking ie, barbeque or hangi. Such regulations may also interfere with local and regional open fire rules. Point of sale rules can be difficult for councils to administer and enforce, and confusing and expensive for vendors and purchasers. Homes containing older burners often take decades to be listed for sale, with impacts on the effectiveness of such rules.

### 3.2 What criteria, in addition to monetary costs and benefits, have been used to assess the likely impacts of the options under consideration?

Based on the objective of improving air quality in New Zealand through reflecting updated scientific findings on the health impacts of PM, we have developed the following criteria and use these to assess the pros and cons of each option:

1. **Cost** – costs of implementation
2. **Effective** – achieves health benefits by improving air quality. Reflects up to date science on the health impacts of PM
3. **Implementable** – precise for councils to implement and enforce. Easy for households to understand. Easy for Government to monitor and assess for effectiveness in terms of air quality improvement, implementation and enforcement. Easy for industry to comply
4. **Flexible** – provides for appropriate level of local flexibility in management approaches where this will result in the best outcome for air quality
5. **Equitable** – affects all households equally. Affects all councils equally. Affects all businesses equally

### 3.3 What other options have been ruled out of scope, or not considered, and why?

Technical standards for industrial emissions have not been considered because the amendments aim to drive improvements in air quality by updating regulations to address PM<sub>2.5</sub>, residential home heating emissions as our most common source of PM<sub>2.5</sub>

A prohibition on the sale of domestic solid-fuel burners that would not meet the emissions and thermal efficiency standards has not been given further consideration at this stage due to time constraints. Prohibiting non-compliant burner sales is not directly related to primary objective of updating air quality regulations.

## Section 4: Impact Analysis

Marginal impact: How does each of the options identified at section 3.1 compare with the counterfactual, under each of the criteria set out in section 3.2?

	1) Status quo	2) Minimal regulation	3) Increased regulation	4) Strong regulation	5) Stringent regulation
<b>Cost</b>	0	- Compliance costs to councils. Costs to Government to establish non-regulatory mechanisms	- Compliance costs to councils and households Costs to councils to establish non-regulatory mechanisms	-- Compliance costs to councils and households	-- High compliance costs to councils and households
<b>Effective</b>	0	+ NESAQ based on PM <sub>2.5</sub> annual standard	+ NESAQ based on PM <sub>2.5</sub> annual and daily standards	++ NESAQ based on PM <sub>2.5</sub> annual and daily standards and PM <sub>10</sub> daily standard	++ NESAQ based on PM <sub>2.5</sub> annual and daily standards and PM <sub>10</sub> annual and daily standards
<b>Implementable</b>	0	0 Replacement PM standard with similar monitoring and enforcement requirements as status quo Supported by centrally-led non-regulatory measures	0 Additional PM standards with similar monitoring and enforcement requirements as status quo Supported by council-led non-regulatory measures	-- Additional PM standards with additional monitoring and enforcement requirements	-- Additional PM standards with additional monitoring and enforcement requirements
<b>Flexible</b>	0	0 Councils and households maintain discretion. Councils can make more stringent rules than the NES	0 Councils and households maintain discretion. Councils can make more stringent rules than the NES	- More directive to councils and households. Councils can keep rules that are more stringent rules than the NES	-- Directive to councils and households. Councils can't keep rules that are more stringent rules than the NES

<b>Equitable</b>	<b>0</b>	<b>0</b> Different requirements on households and businesses in polluted airsheds and those in non-polluted airsheds	<b>+</b> More similar requirements on households using different types of solid fuels for home heating	<b>+</b> Different requirements on households and businesses in polluted airsheds and those in non-polluted airsheds. All households required to use suitable fuels. All councils required to have phase out/point-of-sale rules.	<b>++</b> Councils, households and businesses all subject to same requirements
<b>Overall assessment</b>	<b>0</b>	<b>0</b> About the same as the status quo	<b>+</b> Better the status quo. More effective at reducing health impact of PM and more equitable	<b>-</b> Worse than the status quo. More compliance costs, harder to implement and less flexibility for councils	<b>--</b> Much worse than the status quo. More compliance costs, harder to implement and much less flexibility for councils

**Key:**

- ++** much better than the status quo      **+** better than the status quo      **0** about the same the status quo  
**-** worse than the status quo      **--** much worse than the status quo



## Section 5: Conclusions

### 5.1 What option, or combination of options, is likely best to address the problem, meet the policy objectives and deliver the highest net benefits?

Option 3 is preferred. It includes sets out a suite of regulatory measures, to be supported by non-regulatory mechanisms.

#### *Costs*

In 2017, we estimated total costs for monitoring PM<sub>2.5</sub> to be \$2.275 million across all councils, relative to the status quo cost of monitoring PM<sub>10</sub>. This is based on an assumption that 35 airsheds would likely require new PM<sub>2.5</sub> monitoring equipment, at a cost of \$65,000 per airshed. We also estimated that all councils would also have costs to update their plans (\$25,000 per council) and educate their communities on emissions standards for domestic solid fuel burners (\$50,000 per council). These estimates were used in the CBA, though we intend to seek feedback on these costs through consultation.

We consider the costs associated with shifting to a PM<sub>2.5</sub> monitoring regime may be lower than the CBA estimate, given that new, low-cost, US EPA-approved equipment that can measure both PM<sub>10</sub> and PM<sub>2.5</sub> simultaneously is now readily available (at approximately \$20,000 per monitor). We acknowledge that some councils may prefer to install PM<sub>2.5</sub> monitors alongside existing equipment instead of replacement, to ensure continuation of PM<sub>10</sub> records. The costs of doing so will generally be higher than replacing existing equipment with monitors designed for concurrent PM<sub>10</sub> and PM<sub>2.5</sub> monitoring. We do not anticipate that the costs of monitoring, enforcement and evaluation would be significantly different from the status quo. However, councils and Government may also have costs to investigate and implement non-regulatory measures to reduce the health impacts of PM.

Households will only experience costs when seeking to install a new domestic solid-fuel burner (as a new heating source or as a replacement for an existing burner) after the date that the NESAQ amendments take effect. This recognises that ongoing use of existing non-compliant burners will have health benefits for households by keeping homes warm and dry at relatively low cost (coal or wood for heating costs approximately \$450-970 per year), even though they contribute to poorer ambient air quality. For the purposes of the CBA, we estimate that the cost of a new domestic burner that meets the 1.0g/kg emissions threshold would be \$3,800 including any removal, installation and consenting costs. We also intend to seek feedback on these costs through consultation.

#### *Effectiveness*

Adopting the daily and annual PM<sub>2.5</sub> standard and retaining the daily PM<sub>10</sub> threshold for monitoring purposes will enable councils and government to manage air quality based on the best available science. The new standards would be based on PM<sub>2.5</sub>, to target the health impacts of human-made particulate matter rather than natural sources of particulate matter. It would be useful to continue to observe trends in PM<sub>10</sub> because neither air pollutant is a proxy for the other. Ongoing exposure to human generated sources of PM<sub>10</sub> including dust from unsealed roads or silica dust from quarries can have significant health impacts for individuals in selected areas. Continuing to monitor PM<sub>10</sub> will help to inform future policy after the WHO Guidelines and the 2012 HAPINZ study have been updated.

By setting a solid fuel emissions target rather than a wood burner emissions target, this framework introduces controls over coal burners for the first time. This will affect

household choice around heating sources, but we would expect improvements in air quality and avoided health costs because of the lower emissions standard. In addition, lowering the emission standard for wood burners and applying it to all new domestic solid-fuel burners installed in urban areas (1.0 grams of particles per kilogram of suitable fuel burnt rather than 1.5 grams of particles per kilogram of dry wood burnt) will drive reductions in PM<sub>2.5</sub> emissions and encourage further industry innovation.

Extending the emission target to all new domestic solid-fuel burners will ensure future sources of PM in an airshed are reduced, and facilitate more households to transition to cleaner forms of heating.

#### *Implementable*

The preferred option is designed using existing measures that councils use to address PM in their regions, therefore implementation is expected to be manageable. Some councils including Environment Canterbury, Bay of Plenty Regional Council and Otago Regional Council already have low emissions standards for woodburners in their areas (0.5-0.7 grams of particles per kilogram of dry wood burnt). Businesses have responded by supplying low emissions and ultra-low emissions burners to meet community demand. Domestic burner technology continues to improve and allows for compliance with lower emissions standards.

Several councils, including Otago Regional Council, Nelson District Council and Rotorua District Council, already regulate the use of all types of domestic solid-fuel burners. Amending the NESAQ to regulate the installation of new domestic burners in the same manner will be much easier to implement than a split approach for polluted and non-polluted airsheds – given that the status of an airshed can change.

Because the suite of regulatory changes are set nationally, they would come into force immediately upon amendment of the NESAQ, rather than an estimated two year wait for rules to be developed through an RMA Schedule 1 process. This would give the new air quality measures a kick start and reduce the planning costs on councils.

We would anticipate councils will take approximately two years to establish formal monitoring of PM<sub>2.5</sub> in their airsheds and one year of monitoring to collect meaningful data. As mentioned above, many councils have already purchased equipment capable of monitoring PM<sub>2.5</sub> and will be in a position to collect meaningful data from the date of the NESAQ amendments coming into force.

Compliance monitoring by councils, either risk-based or complaints-based, helps ensure that rules and regulations are adhered to so that adverse effects on the environment are limited. For permitted activities subject to conditions, such as emission limits for new installations of domestic solid-fuel burners, compliance monitoring helps ensure those conditions are met. Further information on implementation will be gathered through consultation.

#### *Flexible*

The preferred option is less flexible than the status quo to allow for greater national consistency. It is more directive to councils and households about the activities that need to be managed in order to reduce health impacts from exposure to PM. However, it retains a level of discretion for Councils to keep existing rules and create new rules that are more

stringent rules than the NESAQ, as well as discretion to develop non-regulatory mechanisms to improve air quality in their regions.

### *Equitable*

The new PM<sub>2.5</sub> standards will affect councils differently, depending on their existing monitoring equipment and processes, and their emissions profiles. Councils that are not currently monitoring PM<sub>2.5</sub> will face a cost of approximately \$65,000 per airshed to set up new equipment and processes to meet the standard. The new standards will serve to create certainty for councils (including Environment Canterbury, Greater Wellington Regional Council and Auckland Council) that are already monitoring PM<sub>2.5</sub> in their airsheds.

Where airsheds experience elevated PM<sub>2.5</sub> concentrations from home heating emissions in winter, councils will need to manage compliance with the daily average PM<sub>2.5</sub> standard. Councils responsible for airsheds where PM<sub>2.5</sub> levels are characterised by transport emissions year-round will need to focus efforts on compliance with the annual average PM<sub>2.5</sub> standard. This is more equitable than the status quo daily average PM<sub>10</sub> standard, which affects airsheds that are dominated by home heating emissions much more than airsheds dominated by transport emissions.

Businesses, particularly industrial businesses seeking new resource consents, may be affected differently depending on their emissions profiles, but this is already the case under status quo.

Emissions standards for domestic burners will affect households in rural and urban communities differently. Properties under two hectares are generally in urban areas. Such households will be more restricted in their choices when seeking to install a new domestic burner.

Allowing for investigation of non-regulatory mechanisms to support councils to drive changes in behaviour around operating and replacing domestic burners and around outdoor burning, rather than imposing strict rules, will help to ease the compliance burden on those lower socio-economic households that rely on low-cost fuel sources for heating.

## 5.2 Summary table of costs and benefits of the preferred approach

<b>Affected parties</b> <i>(identify)</i>	<b>Comment:</b> <i>nature of cost or benefit (eg ongoing, one-off), evidence and assumption (eg compliance rates), risks</i>	<b>Impact</b> <i>\$m present value, for monetised impacts; high, medium or low for non-monetised impacts</i>	<b>Evidence certainty</b> <i>(High, medium or low)</i>
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### Additional costs of proposed approach, compared to taking no action

#### **Regulated parties**

Households	Burner installation	900 per household	Medium
	New burner appliance	3,500 per household	
	Council consent	500 per household	
	New heat pump appliance	3,800 per household	

<b>Regulators</b>			
Ministry for the Environment	Policy development	200,000	Medium
	Policy implementation (support and written guidance)	100,000	
Regional Councils and Unitary Authorities	Updating plans (25,000)	400,000	Medium
	Community education on new rules (50,000)	800,000	
	Monitoring equipment (65,000)	2,275,000	
	Annual monitoring, enforcement, and evaluation (25,000)	400,000	
<b>Wider Government</b>			
Warmer Kiwi Homes programme (EECA)	Greater uptake of subsidy for heat pumps and low emissions wood burners (up to 2,500 per household)	Low	
<b>Total Monetised Cost</b>		97,700,000	Medium
<b>Non-monetised costs</b>		Low	

<b>Expected benefits of proposed approach, compared to taking no action</b>			
<b>Regulated parties</b>			
Households	Avoided health cost	Medium	
<b>Wider Government</b>			
Healthy Homes Standards (HUD)	Facilitate compliance with standards	Low	
<b>Other parties</b>			
Wider Society	Premature mortality - VOSL (4,060,000 per person)	820,200,000	Medium
	Respiratory hospital admissions (5,381 per patient)		
	Cardiac hospital admissions (7,432 per patient)		
	Restricted activity days as a result of long term exposure to PM <sub>2.5</sub> (70 per day)		
<b>Total Monetised Benefit</b>		820,200,000	Medium
<b>Non-monetised benefits</b>		Medium	

### **5.3 What other impacts is this approach likely to have?**

Proposals for investigating, developing and implementing non-regulatory mechanisms have not been fully scoped as part of this policy package which focuses on regulatory change. Costs will likely be assigned to Government and councils and benefits will accrue to communities, especially low-income households.

The CBA report uses the New Zealand Social Deprivation score as a proxy for the ability to pay the private costs associated with the policy options. A support package for a home heating scheme could alleviate some of the burden on socially deprived sections of the community, such as those already in place in a number of towns (as discussed under 5.1 below).

We do not yet have a complete picture of the impacts for Māori. It will be necessary through the consultation process to engage directly with Māori, particularly in areas where they are likely to be more impacted by the proposals, such as more polluted airsheds. Te Puni Kokiri provided estimates that fuel poverty affects 25 percent of households. It is a difficult trade-off between affordable energy and improved air quality. Further, targeted engagement with Māori is proposed on this matter.

### **5.4 Is the preferred option compatible with the Government's 'Expectations for the design of regulatory systems'?**

We believe the preferred option is compatible with the Government's 'Expectations for the design of regulatory systems'.

In particular it is flexible enough to allow regulators (regional councils and unitary authorities) to adapt their regulatory approach to the needs of their local communities. The preferred option is also consistent with relevant international standards, and supports compliance with New Zealand's international obligations. It has clear objectives, and aims to achieve those objectives in a least cost way.

## Section 6: Implementation and operation

### 6.1 How will the new arrangements work in practice?

Assistance, guidance and support will need to be made available to help councils, communities and industry to understand and comply with the new standards. We will seek information from stakeholders about the appropriate forms of support and guidance through the consultation process.

The preferred option requires regulatory changes to the NESAQ which local authorities are required to monitor, comply with, and enforce as part of their responsibilities under the RMA to implement national direction instruments. Most of the regulatory changes contained within the option are based on existing council rules.

#### *Council compliance*

In the absence of a compliance timeframe, we intend to develop implementation guidance for councils that will set out an expectation that councils take a maximum of two years to establish formal monitoring of PM<sub>2.5</sub> in their airsheds and one year of monitoring to begin collecting meaningful data. Several councils have already purchased and set up equipment capable of monitoring PM<sub>2.5</sub> and are already collecting/will be in a position to collect meaningful data from the date of the NESAQ amendments coming into force.

It is likely that monitoring and enforcement could be carried out within councils' existing functions and budget baselines. Some additional compliance monitoring capacity may be required to roll out the new national rules.

Compliance monitoring by councils, either risk-based or complaints-based, helps ensure that rules and regulations are adhered to so that adverse effects on the environment are limited. For permitted activities subject to conditions, such as emission limits for new installations of domestic solid-fuel burners, compliance monitoring and building consenting for installation of domestic burners will help to ensure those conditions are met.

Although 'softer', non-regulatory measures (such as education or on-site support) are normally effective in achieving compliance, enforcement action should be taken where these methods fail to deter and penalise non-compliance of the NESAQ. There is a range of enforcement options that regional councils can pursue under section 9 of the RMA. These include abatement notices, infringement notices, to enforcement orders, and prosecutions against those in breach of plan rules and consent conditions.

#### *Household compliance*

Government and councils will need to establish clear, targeted messaging and monitoring to ensure households are aware of regulations relating to new domestic burners on properties under two hectares. Some households, particularly low income households, may require assistance to meet the requirements.

It is the status quo for councils in areas of poorer air quality, including Rotorua, Tokoroa, Masterton and Wainuiomata, to offer subsidies and/or loans to assist and incentivise households that rely on wood or coal burners to transition to cleaner forms of heating. In addition, the Government operates the Warmer Kiwi Homes programme and Winter

Energy Payment for low-income households and individuals to access clean, energy efficient forms of home heating. We expect these types of initiatives to continue and potentially expand.

*National guidance*

Following any changes to the NESAQ, we would provide implementation guidance to regional councils and would continue to regularly monitor and evaluate the implementation of the NESAQ. We propose that the regulations would be reviewed every five years and updated as necessary.

## **6.2 What are the implementation risks?**

We are aware of risks relating to:

- the definition of gazetted airshed boundaries according to experience of PM<sub>10</sub> issues rather than PM<sub>2.5</sub> issues
- the capacity of councils to monitor both PM<sub>2.5</sub> and PM<sub>10</sub>
- slow retirement rates of domestic solid-fuel burners
- the lack of air quality data from areas that are not currently monitored

We will seek information from stakeholders about the risks of implementing the proposed amendments through the consultation process.



## Section 7: Monitoring, evaluation and review

### 7.1 How will the impact of the new arrangements be monitored?

The Ministry obtains regular air quality monitoring data from regional councils which provides an overview of national air quality and progress against current targets. This data is published to the Ministry website.

The environmental reporting series by the Ministry for the Environment and Statistics New Zealand's environmental reporting series also provides information on changes and trends in New Zealand's air quality since the NESAQ came into force in 2004.

In terms of measuring the effectiveness of the NESAQ, the Ministry could gather and analyse baseline data such as:

- PM<sub>2.5</sub> monitoring data
- Air quality discharge consents issued
- The number of infringement notices issued by regional councils for breaches of consents or breaches of the NESAQ
- The number of building consents for domestic solid fuel burners

### 7.2 When and how will the new arrangements be reviewed?

Under section 24(f) of the RMA, the Minister for the Environment must carry out monitoring of the effect and implementation of the RMA, including any regulations in force under it.

As part of the Ministry's regulatory stewardship responsibilities, regulation is generally reviewed for implementation and effectiveness at three to five yearly intervals depending on the subject matter and any other intervening factors.

There is inevitably a lead in time before new regulation can be fully implemented by regional councils and measures begin to take effect. This is called a benefit lag and we expect this will be at least five years for the NESAQ amendments. It is likely then that a first implementation review at three years would take the form of checking that councils have incorporated the NESAQ amendments into their air plans. This would also be an appropriate time to also consider updates to WHO Guidelines and upcoming New Zealand research into the health impacts of air pollution.

Appendix A – Options

	Option 1 - Status quo	Option 2 – Minimal regulation	Option 3 – Increased regulation (preferred option)	Option 4 – Strong regulation	Option 5 – Stringent regulation
		Minimise regulations for monitoring and implement a significant non-regulatory package to support New Zealanders to reduce their home heating emissions. Allow councils to continue with their progress reducing emissions through more stringent rules.	Adopt the more critical health indicators for PM, and retain the PM <sub>10</sub> standard for monitoring purposes only to inform future policy after the WHO guidelines have been reviewed. Set out minimum burner standards. Allow councils to continue with their progress reducing emissions through more stringent rules. Investigate further support for councils to deliver non-regulatory behaviour change mechanisms.	Adopt the more critical health indicators for PM and retain the current PM <sub>10</sub> standard. Drive further emissions reductions through regulation. More stringent requirements for polluted airsheds. Allow councils to keep existing local rules, but no new rules to be established.	An ambitious and stringent nationally consistent standard. Adopt all WHO guidelines for PM <sub>10</sub> and PM <sub>2.5</sub> as standards, and strengthen and introduce rules to reduce domestic heating emissions. Drive further emissions reductions through regulation, and remove inconsistencies between regions.
Ambient air quality standard(s) for PM <sub>10</sub>	Daily average PM <sub>10</sub> standard of 50 µg/m <sup>3</sup> Exceedances of the standard must be publicly notified	Remove the PM <sub>10</sub> standard – retain the existing PM <sub>10</sub> guidelines in the Ambient Air Quality Guidelines.  Remove requirement for exceedances to be publicly notified	Retain the existing daily average PM <sub>10</sub> standard of 50 µg/m <sup>3</sup> only for the purpose of monitoring and publicly notifying any exceedances.	Retain the existing daily average PM <sub>10</sub> standard of 50 µg/m <sup>3</sup>  Retain requirement for exceedances to be publicly notified	Retain the existing daily average PM <sub>10</sub> standard of 50 µg/m <sup>3</sup>  Introduce the WHO annual average standard for PM <sub>10</sub> of 20 µg/m <sup>3</sup>  Retain requirement for exceedances to be publicly notified
Ambient air quality standard(s) for PM <sub>2.5</sub>	n/a	Introduce the WHO ambient air quality annual average standard for PM <sub>2.5</sub> of 10 µg/m <sup>3</sup> Exceedances of the standard must be publicly notified			
		No daily average standard for PM <sub>2.5</sub>	Introduce the WHO ambient air quality daily average standard for PM <sub>2.5</sub> of 25 µg/m <sup>3</sup> Exceedances of the standard must be publicly notified		
Allowable exceedances and compliance timeframes for meeting PM standards	One or fewer exceedances of the daily average PM <sub>10</sub> standard in a 12-month period by 1 September 2020	Amend the compliance timeframe for all airsheds to allow no exceedances of the annual average PM <sub>2.5</sub> limit by 2023.	Amend the allowable exceedances. In a 12-month period: <ul style="list-style-type: none"> <li>Three or fewer exceedances of the daily average PM<sub>2.5</sub> standard</li> <li>No exceedances of the annual average PM<sub>2.5</sub> standard</li> </ul> No compliance timeframe	In a 12-month period: <ul style="list-style-type: none"> <li>One or fewer exceedances of the daily average PM<sub>10</sub> standard</li> <li>No exceedances of the annual average PM<sub>10</sub> standard</li> <li>Three or fewer exceedances of the daily average PM<sub>2.5</sub> standard</li> <li>No exceedances of the annual average PM<sub>2.5</sub> standard (Option 5 only)</li> </ul> No compliance timeframe	
Airshed status if PM standard(s) breached	Airshed is classified as 'polluted' if daily average PM <sub>10</sub> standard is breached, averaged over previous five years  Polluted status restricts granting of resource consents for activities that would increase the daily average concentration of PM <sub>10</sub> by more than 2.5µg/m <sup>3</sup> .  Polluted status removed if airshed is compliant with daily average PM <sub>10</sub> standard for five consecutive years	Airshed is classified as 'polluted' if annual average (or daily average) PM <sub>2.5</sub> standard is breached, averaged over the previous five years  Airshed is not classified as 'polluted' if daily average PM <sub>10</sub> standard is breached (Option 3 only)  Polluted status restricts granting of resource consents for activities that would contribute PM <sub>2.5</sub> to the airshed.  Polluted status removed if airshed is compliant with both PM <sub>2.5</sub> standards for five consecutive years		Airshed is classified as 'polluted' if a PM <sub>10</sub> or PM <sub>2.5</sub> standard is breached, averaged over the previous five years.  Polluted status restricts granting of resource consents for activities that would contribute PM <sub>10</sub> or PM <sub>2.5</sub> to the airshed.  Polluted status removed if airshed is compliant with all standards for five consecutive years	

Design standards for domestic burners	Discharges from new woodburners on properties smaller than two hectares are prohibited unless <ul style="list-style-type: none"> <li>the discharge is less than 1.5 grams of particles for each kilogram of dry wood burnt; and</li> <li>the thermal efficiency is not less than 65 percent.</li> </ul>	Develop non-regulatory mechanisms to drive behaviour change for buying, operating and replacing domestic heating burners (including maintenance, modifications and fuel type).	Expand the existing woodburner emissions and thermal efficiency standards to apply to all domestic burners (ie, open fires, coal, pellet and multi-fuel burners, cookers, water boilers) on properties under 2 hectares		Expand the existing woodburner emissions and thermal efficiency standards to apply to all domestic burners (ie, open fires, coal, pellet and multi-fuel burners, cookers, water boilers) on all residential properties
			Lower the emissions standard for all new domestic burners covered under these regulations to no more than 1.0g/kg Retain 65 percent thermal efficiency standard	Lower the emissions standard for all new domestic burners covered under these regulations to: <ul style="list-style-type: none"> <li>no more than 0.5g/kg in polluted airsheds</li> <li>no more than 1.0g/kg in non-polluted airsheds</li> </ul> Retain 65 percent thermal efficiency standard	Lower the emissions standard for all new domestic burners covered under these regulations to no more than 0.5g/kg Retain 65 percent thermal efficiency standard
			Investigate non-regulatory mechanisms to support councils to further drive behaviour change in operating and replacing domestic heating burners, (including maintenance, modifications and fuel type).	Prohibit unsuitable fuels for domestic heating burners.	
Other incentives to reduce PM emissions	No new domestic open fires on properties under two hectares in polluted airsheds.	Retain restriction on domestic open fires in polluted airsheds Develop non-regulatory mechanisms to drive behaviour change for other urban residential PM emissions, including open and outdoor burning.	Retain restriction on domestic open fires in polluted airsheds	Retain restriction on domestic open fires in polluted airsheds	Expand restriction on domestic open fires to include properties over two hectares and properties outside polluted airsheds Introduce prohibition on outdoor burning on any residential property
			Investigate non-regulatory mechanisms to support councils to further drive behaviour change in outdoor burning	Introduce prohibition on outdoor burning on any residential property	
Stringency of local rules	Councils have ability to establish more stringent rules than the NESAQ	Councils retain ability to establish more stringent rules.		Existing council rules may continue but no new regional rules may be established where a matter is already covered by the Air Quality NES.	No new regional rules may be established where a matter is already covered by the Air Quality NES, and existing rules must be removed.
Specification of methods	Methods for monitoring PM <sub>10</sub> incorporated by reference Methods for measuring emissions standards and thermal efficiency standards incorporated by reference	Update methods for monitoring PM <sub>10</sub> Incorporate appropriate methods for monitoring PM <sub>2.5</sub> Update methods for measuring emissions standards and thermal efficiency standards			