



Summary of stakeholder engagement on technical aspects of options to manage emissions from non-road diesel engines

March 2021

Key points

- No decision has been made to introduce or implement regulation or an industry led approach to manage emissions from non-road diesel engines in Australia.
- The current evaluation of management options will provide evidence of the benefits and costs of different approaches to manage emissions from these engines to inform whether a national approach is appropriate.
- Stakeholder engagement from October to December 2020 focused on the technical aspects of proposed management scenarios and the accuracy of our business as usual model. Key engagement materials included an online meeting (held 14 October 2020) and a [discussion paper](#) circulated prior to the meeting.
- We appreciate the effort and time our stakeholders have taken to contribute to this work. We received submissions from 32 organisations. A list of those who provided feedback is at [Appendix A](#).
- This document summarises the feedback on the management scenarios and the business-as-usual model, and how we are using this information.
- Feedback on the management scenarios was varied and helpful. We also received contradictory views from stakeholders and feedback that covered matters outside the scope of our engagement. The management scenarios have been modified based on relevant feedback.
- Feedback on the business-as-usual fleet model identified material inconsistencies, mainly in relation to the mining and construction fleet composition. The model will be modified to address this feedback.
- The timeline for completing the cost-benefit analysis has changed since the stakeholder engagement. It is now expected to be completed in late 2021.

Background on the evaluation is provided in [Appendix B](#).

Management scenarios

The management scenarios that will be modelled in the cost-benefit analysis are:

- scenario 1 – Industry agreement
- scenario 2 – Phased introduction of standards

- scenario 3 – Best practice standards as soon as practicable.

These scenarios were introduced in the discussion paper and online meeting. Based on stakeholder feedback, the management scenarios to be tested in the cost-benefit analysis will be changed to accommodate the following:

- for the industry agreement (management scenario 1)
 - we will model option A, where 50% of the number of new units sold in each industry group and each powerband sold in each industry group align with international best practice in relation to emission standards (currently Tier 4 final). For example, in mining 50% of new units above 560Kw will be Tier 4 final and 50% in each of the other powerbands. Industry groups are mining; agriculture; forestry; construction and commercial; manufacturing and; marine (<130kW only)
 - extend the time between the introduction of the industry agreement and when compliance with them would be required, to allow users and suppliers sufficient time to establish the necessary arrangements
- for the phased introduction of standards (management scenario 2), extend the time between the phases to enable
 - suppliers to recover the costs of complying with each new standard over a reasonable time period
 - local manufacturers to develop Tier 4 final products.

[Appendix C](#) provides further details of the management scenarios to be modelled in the cost benefit analysis.

Business as usual model

Feedback has resulted in the following changes to the business-as-usual model:

- mining equipment utilisation rates and engine life will be increased
- the proportion of engines allocated to mining will be increased as some equipment were inaccurately allocated to other industry sectors (particularly construction)
- the model will also be modified to reflect that mining engines are replaced 3-5 times during the equipment life
- large engines sold in construction and mining as Tier 0, or uncertified, are often mechanically equivalent to a Tier 1-3 certified engine but unable to be labelled/marketed as such due to having a fuel consumption optimised engine calibration. The emissions profile in the model will be modified to so that Tier 0 more closely align to the higher Tier emissions profile.

Some stakeholders predict that the Tier 4 final uptake will be higher than in the business-as-usual model, particularly for construction and agriculture:

- these predictions were variable and have not resulted in a change to the business-as-usual model
- however, the cost-benefit analysis will include a sensitivity analysis which will allow the implications of this potential outcome to be understood.

Cost-benefit analysis modelling scope

The stakeholder feedback has also highlighted a need for further clarity on the scope of the cost-benefit analysis modelling:

- The model includes equipment types covered under the [US Code of Federal Regulations, Title 40, Part 1039](#), noting
 - underground mining will be excluded as Tier 4 final engines with aftertreatment have elevated surface and exhaust temperatures that render them technically incompatible for underground mining, and are explicitly excluded from US and other international non-road diesel regulations
 - this equipment is readily identified in the business as usual model and will be removed from further analysis
 - mobile firefighting pumps with higher Tier (lower emissions) technology and fitted with electronic control systems may be more vulnerable to failure when under flame attack than those with lower Tiers (higher emissions)
 - all firefighting pumps will be included in the analysis as they are unable to be identified in the business-as-usual model
 - when compared with other type of non-road diesel engine equipment, firefighting pumps represent a very small proportion of the market and usage. Including them in the analysis would not materially change the analysis findings
 - Application of emissions standards to firefighting pumps would be considered further should a national approach be considered appropriate
 - exempt marine equipment types are those $\geq 130\text{KW}$ (or those covered under the [USEPA Marine Compression-Ignition Engines Exhaust Emission Standards](#), as noted in Title 40, Part 1039)
 - the business as usual model includes marine equipment $<130\text{kW}$. This provides an opportunity to model emissions from this equipment type even though it is outside the scope of the proposed management scenarios. These results will not be considered as part of the management scenarios
 - stationary engines are not covered under the US Code of Federal Regulations, Title 40, Part 1039, but are currently included in the business as usual model
 - stationary equipment is commonly used at power and manufacturing plants to generate electricity and to power pumps and compressors
 - under USEPA regulations stationary engines are not self-propelled (tractors, bulldozers), propelled while performing their function (lawnmowers) or portable or transportable (do not have wheels, skids, carrying handles, dolly, trailer or platform) or located in one place for less than 12 months
 - different regions manage the regulation of stationary equipment differently. They are commonly covered by [different standards than those that apply to non-road diesel engines](#)
 - stationary non-road diesel engines will be identified in the data where possible
- some health advocacy groups questioned why locomotives are excluded from the evaluation

- managing emissions from locomotives is more complex than applying standards to other non-road diesel engines. For example, locomotive engines tend to have a long service life and there is evidence that retrofitting equipment to reduce emissions may be a more successful approach for this sector. This is not an option for other smaller engines being considered under the current evaluation where standards may be applied to the import of new equipment
- this evaluation is drawing on international experiences of introducing emissions standards for diesel engines. In the USA, locomotive emissions are managed through different standards (see [40 CFR part 1033](#)) to those introduced for other diesel engines. In both the USA and EU locomotive emissions were introduced sequentially after non-road diesel engines
- all industry groups will continue to be included in the modelling
- no management scenarios involve retrofitting of existing equipment and all apply only to non-road diesel engine equipment introduced into Australia for the first time. This means all new non-road diesel engine equipment, whether manufactured in Australia or overseas, and imported second-hand non-road diesel engine equipment. This scope is unchanged from what was presented in the discussion paper
- the cost-benefit analysis will expand the definition of ‘loose engines’ to ensure clarity that refurbished engines are required to match or exceed the emission standard that applied to the equipment when it was built. This scope is unchanged from what was intended in the discussion paper where only replacement of engines in existing equipment and upgrade of existing engines was mentioned.

Additional feedback

The following additional matters raised by stakeholders will be examined in the cost-benefit analysis:

- users want information on the cost implications for each management scenario, particularly understanding what trade-offs may exist between higher capital costs and potential lower running costs
- some users and suppliers questioned why we would not let the market drive the change towards lower-emitting engines
- some users and suppliers have suggested that costs of higher emissions standards outweigh the benefits for equipment used in sparsely populated areas.

The 2020 engagement process did not seek stakeholder views on preferences for implementing a particular approach to manage emissions from non-road diesel engines. However, the feedback to date shows:

- if emissions were to be regulated, the supply sector tends to favour the one-step approach, while the users tend to favour a phased introduction
- those supportive of implementing best practice emissions standards as soon as practicable are environmental and health advocacy groups. Many larger international original equipment manufacturers are also supportive as this would allow them to harmonise production and operations

- a non-regulatory approach, where industry achieves targets for emissions reductions
 - tends to be favoured by users and smaller suppliers over regulation. However, most suppliers are concerned that a non-regulatory approach will encourage free riding (a proportion of the industry bearing the burden of the improvement while other industry participants benefit without contributing). This may result in Australia becoming a dumping ground for dirty engines
 - is likely to be the most challenging to implement but may offer flexibility desired by some stakeholders
 - is unlikely to effectively reduce emissions, according to some stakeholders
- labelling of emissions information would be generally welcomed, but this would be unlikely to materially influence the future profile of emissions technology
- for some management scenarios there may be availability issues for some low volume specialised equipment. Availability of diesel exhaust fluid (such as AdBlue®) is critical to support Tier 4 final engines
 - these issues are not picked up in the current evaluation. Issues relating to availability of diesel exhaust fluid would be considered further should a national approach be considered appropriate.

Appendix A – Feedback providers

- All Energy Pty Ltd
- Association of Mining and Exploration Companies
- Australian Fire Authorities Council
- Australian Forest Contractors Association
- Australian Forest Products Association
- Clark Equipment
- CNH industrial
- Construction, Mining Equipment Industry Group
- Cummins South Pacific Pty. Ltd
- Deutz Australia
- Doctors for the Environment
- Eco-road hero
- EPG Engines
- EUROMOT
- Gas Energy Australia
- Glencore Coal Assets Australia
- HATZ diesel Australia
- Idemitsu
- Isuzu
- Kobelco
- Kubota Tractor Australia
- Liebherr
- Minerals Council of Australia
- National Farmers Federation
- Power Equipment Australia
- Ricegrowers Association Australia
- Scania Australia
- Thiess Pty. Ltd.
- Tractor and Machinery Association of Australia
- Truck & Engine Manufacturers Association
- Truck Industry Council
- Welling and Crossley Pty Ltd

Appendix B – Evaluation background

In 2015, Environment ministers from every state, territory and Commonwealth governments in Australia established the [National Clean Air Agreement](#). This is a joint agreement between all levels of government to prioritise actions at a national level, to improve and enhance air quality.

Under the Agreement work plan, the NSW and Commonwealth Governments are examining the potential for a national approach to manage non-road diesel engine emissions. In 2019, a market analysis of these engines was undertaken which established the business as usual model. A cost-benefit analysis is now underway.

Through the cost-benefit analysis, we are assessing air quality and costs outcomes under business as usual and will compare this with 3 different management scenarios, including a non-regulatory and 2 regulatory options. The cost-benefit analysis findings will identify if an opportunity exists to more actively manage non-road diesel engine emissions in Australia.

The cost-benefit analysis is expected to be finalised in late 2021 and will inform next steps.

If you would like to know more, please visit our [website](#) or [email](#) the Air Quality Policy Section in the Atmosphere and Reporting Branch, Environmental Protection Division.

Appendix C – Management scenarios to be modelled in the cost-benefit analysis

The options for action

The cost-benefit analysis will examine 4 management scenarios. One scenario is business as usual and 3 scenarios involve a change in management. All these scenarios:

- draw on international NRDE emission standards (references to standards are for US EPA Tiers. However, other international standards that are equivalent to a US Tier apply)
- apply to all within-scope NRDE equipment introduced into Australia for the first time. This means all new NRDE, whether manufactured in Australia or overseas, and imported second hand NRDE
- engine refurbishments or loose replacement engines in NRDE equipment must match or exceed the emission standard that applied to the equipment when it was built
 - engine refurbishments were not specifically noted in the discussion paper
 - internationally, NRDE emission regulations typically apply to new equipment only. Some jurisdictions do require replacement engines are of a higher emission standard than applied to the equipment when it was built. Such requirements are not common and highly varied. For example, this requirement often only applies to a certain power band, Tier/stage, and end use).

Scenario 1 - Industry agreement

The scenario to be modelled for an industry agreement is derived from option A in the discussion paper. Box 1 provides details of this scenario.

Box 1 Scenario 1 (Industry agreement) features

Industry agrees to move its fleet to meet international standards or alternative technology and report on compliance. This would be achieved by an Industry Agreement involving members of peak industry bodies who represent the majority of the Australian NRDE supply and consumer industries. Industry agrees to report compliance with the agreement.

Within 3 years after any hypothetical decision to introduce this management option, 50% (by number) of NRDE type equipment introduced into Australia for the first time by each industry group and powerband:

- align with international best practice for NRDE emissions (at least Tier 4 final or equivalent), or
- are an alternative technology that can be substituted for a NRDE product (hybrid, plug-in hybrid, battery electric or hydrogen fuel cell technology).

Industry groups are:

- mining
- agriculture
- forestry
- construction and commercial
- manufacturing
- marine (<130kW only).

Note the following changes have been made to this scenario since the discussion paper:

- scenario 1 had a time period of 2 years in the discussion paper, which has since changed to 3 years
- in the discussion paper it was not stipulated if the percentage of NRDE type equipment applied to the number of units of equipment or the total kW of NRDE type equipment introduced into Australia for the first time. Stakeholders made representations for both options, with numbers seemingly less complicated to implement than total kW
- stakeholders made representations that percentage targets should also apply by powerbands to ensure emissions reductions would be achieved. US EPA powerbands are < 8 kW, 8 ≤ kW < 19, 19 ≤ kW < 37, 37 ≤ kW < 56, 56 ≤ kW < 75, 75 ≤ kW < 130, 130 ≤ kW < 225, 225 ≤ kW < 450, 450 ≤ kW < 560 and kW ≥ 560.

Scenario 2 - Phased introduction of standards

The scenario for a phased introduction of standards will extend the time between the steps in the phased from that presented in the discussion paper (see Table 1). Footnotes show where this option has been changed from that presented in the discussion paper.

Table 1 Scenario 2 (Phased introduction of standards) features

Restriction type	Phase 1	Phase 2
Import and manufacture restrictions	Decision + 2 years – Tier 3 a standards (or equivalent) apply to the import or manufacture of NRDE introduced into Australia for the first time	Decision + 6 years b – current international standards (Tier 4 final) apply to the import or manufacture of NRDE introduced into Australia for the first time
Supply restrictions	Decision + 3 years – Tier 3 a standards apply to the sale of NRDE introduced into Australia for the first time	Decision + 7 years c – current international standards (Tier 4 final) apply to the sale of NRDE introduced into Australia for the first time

a Where a power band has no Tier 3 standard the next best available standard applies. For example, US Tier 2 applies to < 37 kw (< 50) and ≥ 560 kw (hp ≥ 750). **b** In the discussion paper this time period was 5 years **c** In the discussion paper this time period was 6 years.

Scenario 3 - Best practice standards as soon as practicable

This scenario has not changed from that presented in the discussion paper (see Table 2).

Table 2 Scenario 3 (Best practice standards as soon as practicable)

Restrictions type	Restrictions
Import restrictions	Decision + 2 years – current international standards (Tier 4 final) apply to the import or manufacture of NRDE introduced into Australia for the first time
Supply restrictions	Decision + 3 years – current international standards (Tier 4 final) apply to the sale of NRDE introduced into Australia for the first time