

GUIDANCE NOTE
ASSESSMENT OF NON-STANDARD FUELS



Department of
**Environment and
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Introduction

This document explains how the Department of Environment and Conservation (DEC) assesses applications for the use of non-standard fuels at facilities it regulates.

The key aim is to encourage the beneficial use of non-standard fuels while ensuring that there are no unacceptable impacts to human health or the environment.

'Standard fuels' are:

- coal or coal-derived fuel other than any tar or tar residues
- liquid or gaseous petroleum-derived fuels, such as natural gas and LPG (propane and butane)
- untreated timber residues, such as from forest operations or sawmilling, but excluding any form of treated or painted timber
- bagasse from sugar cane.

'Non-standard fuels' are all other substances that are used or proposed to be used as fuel.

Where the non-standard fuel is a waste, or may be derived from a waste, the material can only be combusted where this represents a *genuine energy recovery opportunity* rather than a means of waste disposal.

Part 1 of this document outlines the criteria that DEC uses to make this determination.

Part 2 sets out the more general fuel assessment criteria that are used to evaluate the environmental impact of a proposed use of a non-standard fuel, with a particular focus on air emissions.

DEC recognises that the use of non-standard fuels can benefit the environment and the community. For example, by reducing greenhouse gas emissions that would otherwise be generated from standard fuels such as coal, reducing reliance on non-renewable and virgin fuels and offering a value-adding opportunity for materials that may otherwise be sent to landfill.

However, burning some materials may have adverse environmental impacts. For example, by forgoing higher end uses for the material, creating demand for materials that would otherwise be reduced or eliminated and potentially generating toxic air emissions such as heavy metals and dioxins.

Only where DEC assesses the use of non-standard fuels as appropriate should non-standard fuels be used.

Any licensed premises wishing to use a non-standard fuel will need to contact DEC to have the proposed fuel and its use assessed. The type of information that DEC would require to make this assessment is outlined in **Part 3**. The proposal cannot be evaluated if the information provided to DEC is incomplete.

Where existing facilities have been using non-standard fuels, DEC will consider whether equivalent assessment, in-line with this document's objectives, has been undertaken through the development consent or licensing processes. Where such assessments have not occurred, the use of non-standard fuels at such facilities will be assessed on a prioritised basis over time, to ensure continued protection of the environment and human health. Where necessary, Pollution Reduction Programs may be negotiated to require equivalent assessment and necessary controls to deliver the appropriate environmental protection outcomes.

For further information, please contact your local DEC office.

PART 1

Criteria guiding the consideration of waste materials as non standard fuels

DEC encourages the beneficial use of waste materials for energy recovery where such use does not create a different environmental problem or an unacceptable impact on the environment or human health. DEC does not facilitate waste disposal by incineration under the guise of beneficial use.

Where a waste or waste-derived material is proposed to be used as a non-standard fuel, the following criteria are used by DEC to assess whether it comprises genuine energy recovery:

1. Is a practical higher order resource recovery opportunity currently available?

DEC discourages the use of any waste as a fuel where a higher order reuse or recycling opportunity is available and practicable for that material. For example, it would not be acceptable to collect PET for burning as a fuel because there are higher order reuse opportunities to recycle the PET into new containers or process the material into garment fibre.

2. Does the waste meet calorific value and thermal efficiency thresholds?

To meet the fuel value criterion, the 'as received' fuel (calorific) value should be at least 10 mega joules of energy per kilogram (mj/kg), and used to directly replace energy that would otherwise have been derived from a standard fuel or the electrical power grid.

Subject to a case-by-case assessment and approval, as received calorific values down to 5 mj/kg would be considered, where the lower value is attributable to the high water content of material. For example, wet green waste and other woody materials may have an as received calorific value of as low as 6 mj/kg; when dried their fuel value can increase to be over 20 mj/kg. It is preferred that such material be appropriately treated prior to use to maximise the calorific value and the treatment itself does not generate a new energy demand.

To meet the thermal efficiency criterion, at least 25% of the energy generated from the combustion of that material should be captured as electricity. Subject to specific approval, as low as 15% could be considered for small steam cycle electricity generating plants. When generating heat alone, the capture of at least 70% of the energy generated is preferred.

The above preferred calorific and thermal efficiency thresholds have been developed to ensure that the use of a material for energy recovery purposes is an efficient and sustainable resource recovery option. These thresholds should assist in the choice of materials that are genuine alternative fuels while minimising the combustion of substances that are not suitable for genuine energy recovery purposes or do not efficiently recover the energy generated.

3. Is the waste stream chemically and physically homogeneous, of a consistent quality and does it deliver a regular stream of the material over the medium term?

Waste streams should be homogeneous with regard to their chemical and physical composition, with contaminant levels approximately consistent and within agreed parameters over time. DEC discourages the combustion of blended, irregular or one-off batches of wastes as a fuel. The consistency of waste streams needs to be considered over the medium-term to ensure impacts will not vary over time. In practice, wastes are only likely to satisfy this criterion if they are produced in substantial quantities from a very well defined and consistent feedstock.

Mixed wastes such as mixed municipal solid waste (MSW) or mixed construction and demolition (C&D) waste potentially include a very large number of contaminants in varying

amounts over time and are not considered acceptable feedstock for energy recovery purposes.

4. Has a specification, standard or agreement between the producer and user of the waste been developed (and presented to DEC) to ensure the material is ‘fit for purpose’?

DEC strongly encourages the development of specifications to which the material will be used, and quality assurance/quality control (QA/QC) programs to ensure the ongoing consistency and quality of the material over time. Specifications should help ensure that the materials to be used are well-characterised and of a consistent quality. Where this information is not provided, it will not be clearly established that the substance is a ‘non-waste product’ for regulatory purposes.

Additional general conditions for wastes being assessed as non-standard fuels

In addition to the above energy recovery assessment criteria, it must also be demonstrated that the following general conditions will be met:

1. The waste material is not diluted or blended to meet the above assessment criteria.
2. The combustion of the waste for energy recovery purposes does not result in greater negative environmental impacts than the use of the fuels for which they are being substituted (or other fuels used in the same or similar applications).
3. A facility combusting a waste as a fuel must assess the classification of the residual waste generated through the combustion of that material in accordance with the *Protection of the Environment Operations Act 1997* and the *Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes* (EPA 1999), as amended and in force from time to time. This is necessary to assess the potential contaminants introduced into the facility’s wastes due to the change in combustion feedstock. Re-evaluation of current use and/or disposal practices associated with the fuel residues is required.
4. The specified assessment criteria must be reapplied at least every 5 years to ensure that the continued use of this material for energy recovery purposes is appropriate (e.g. no higher order re-use has been developed).

In approving the use of waste as a non-standard fuel, DEC would ensure that the approved use does not conflict with any Extended Producer Responsibility scheme for that waste that is recognised by DEC – including consideration of those schemes that are under development. Similarly, assessments and reassessments of waste for use as fuel should also avoid conflict with those higher value alternative recovery options for such wastes that are part of any individual or regional council waste contracts.

To qualify as genuine energy recovery, each and every criterion and general condition must be met. In these circumstances, the material is a non-waste substance for regulatory purposes once it is received at the facility. The facility combusting the material does not need to be regulated as a waste facility and the waste levy is not applicable (other than for any residual material that goes to landfill).

Where any criterion or general condition is not met, the substance is a waste for regulatory purposes. DEC does not support the combustion or incineration of waste for waste disposal purposes.

PART 2

Criteria guiding the consideration of potential air impacts

1. Is the operation, equipment and performance of the facility sustainable over the medium to long term?

Before considering any non-standard fuels proposal, it must be determined that the operation of the facility is sustainable over the medium to long term.

A sustainable level of performance would meet all of the following requirements:

- emissions comply with all regulatory requirements
- impacts from emissions comply with all DEC impact assessment criteria (*Approved Methods and Guidance For the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2001) found at: www.environment.nsw.gov.au/air/amgmaap/index.htm)
- emissions are consistent with reasonable and feasible levels of performance
- where air toxics are emitted, emissions are consistent with the requirements for 'applying all practicable means to reduce emissions'.

A detailed air quality impact assessment may be required.

2. Is the operation, equipment and performance of the facility appropriate for the burning of non-standard fuels?

The proponent must demonstrate that the facility is fit-for-purpose for the use of the proposed non-standard fuels.

Any proposed modifications to fuel burning equipment and the operation/management of the plant (to facilitate the combustion or co-firing of a non-standard fuel) need to be detailed.

3. Have the potential contaminants in the material been identified and an assessment made of potential air pollutants?

The proponent needs to provide an assessment of the potential physical and chemical contaminants that may be in the fuel and to identify the air pollutants that may be produced when this fuel is burnt.

For example, if the proposed fuel is mixed wood waste from construction and demolition sites, the fuel could be contaminated with, for example, metal plates, pipes, wiring, nails, CCA treated timber, timber painted with lead based paints, and PVC pipes. This could mean that when the mixed wood waste is burnt, there is increased potential for air contaminants such as toxic metals, particulates, dioxins and volatile organic compounds (VOCs) to be emitted.

Assessment of the chemical composition of the proposed fuel requires representative sampling and characterisation of the levels of pollutants in the proposed fuel, and quantitative measurement of the concentrations of those contaminants.

4. Is there a QA/QC program in place to ensure the continued acceptability of the material as a fuel?

The extent of QA/QC needed will vary from proposal to proposal depending on the source of the fuel, likely contaminants in the fuel and the likely emissions produced upon combustion. Proposed fuels obtained from a variety of suppliers, with the potential to contain contaminants, or with the potential to be non-homogeneous, will need a high degree of QA/QC to ensure that contaminants are not present at unacceptable levels.

An appropriate **fuel specification** is a very important tool to prevent emission limits being exceeded. This would include identification of the upper limits of impurities contained in the

non-standard fuel, and a maximum co-firing rate with any other standard and non-standard fuel to be used. Testing the fuel and comparing the results against the fuel specification is usually easier, quicker and cheaper than undertaking comprehensive air emissions monitoring. The proponent may need to conduct trials prior to developing a detailed and accurate fuel specification.

A **fuel monitoring program** that ensures that a fuel meets the specification is an important aspect of any QA/QC program. The amount of testing necessary will be highly dependent upon the variability of the non-standard fuel and risk posed by potential contaminant levels in the fuel.

5. Is there a risk that air pollution will increase?

The proponent needs to compare the levels of pollutants in the proposed fuel to those in the existing fuel. Similarly the proponent needs to compare the predicted levels of pollutants emitted to air produced from the proposed fuel to those emitted from the existing fuel.

Where air emissions may increase through the use of a non-standard fuel, additional requirements to minimise and/or eliminate those impacts would be required. Under such circumstances, further information is likely to be required by DEC and supplementary assessment criteria may be applied. Where this is the case, please contact the Manager, Air Technical Unit on (02) 9995 5000 for further advice.

6. Is the proposed air monitoring acceptable?

Monitoring of emissions is an important operational check to ensure that adverse environmental impacts are not occurring as a result of the non-standard fuel usage. This monitoring should include checking for both:

- pollutants of concern, and
- process parameters or air pollutant surrogates that may not necessarily be pollutants of concern themselves, but may be an important indicator of minimising emissions (e.g. combustion efficiency).

The proponent should detail the emissions' characterisation and subsequent monitoring regime that they propose to undertake while non-standard fuels are being used on the premises.

7. Are there any other likely impacts on the local environment, such as impacts on water or the generation of noise, odour and dust due to the processing, storage or use of the material as a fuel. If so, how are these to be managed?

Some non-standard fuels may be odorous (e.g. green waste), produce other air pollutants (e.g. dust) or generate water and noise impacts when being stored, handled or processed on-site. Where this is the case, these need to be assessed and information provided as to how they will be managed.

PART 3

Information required to support an application

The following advice is provided to guide industry proponents in their preparation of submissions for the burning of non-standard fuels. DEC will not be able to consider an application unless complete and accurate information is provided.

Background information

The following background information must be supplied in support of any application to combust non-standard fuels:

- proponent's details
- outline of the proposal
- has the proposal gone through the land use planning process, including details of whether Development Consent or an amendment to current Development Approval has been sought
- information on the local receiving environment
- details of the predicted volume and consistency of supply of the material
- details on the generation, transfer, storage and quality control of the material
- details of any existing industry guidelines or standards and how these are to be applied
- any other information supporting consideration of the material as 'fit for purpose'
- details of source(s) and origin(s) of the material
- details of the physical and chemical composition of the material (including moisture content and concentration of chemical and physical contaminants, where applicable).

If the proposed material has already been assessed by DEC, less information may be required. A list of materials that have already been assessed for use as a non-standard fuel can be found at Appendix 1. The listing of assessed materials is updated as appropriate from time to time and can be found on DEC's website at www.environment.nsw.gov.au. Where an assessment of a material has already been undertaken, details of the proposal's compliance with the requirements of that assessment should be provided.

Specific information relevant to the criteria for assessing whether the use of non-standard fuels that are wastes can be considered genuine energy recovery

Is a practical higher order resource recovery opportunity currently available?

- existing alternative resource recovery operation(s) in which the waste could be utilised
- justification of why the waste should not go to existing operation(s)
- current disposal practices for the waste
- justification of how energy recovery will deliver improved environmental outcomes.

Does the waste meet calorific value and thermal efficiency thresholds?

- the calorific value of the material, as per the guidance on testing for energy content in Australian Standard 1038.5 Bomb Calorimetry (Standards Australia 1998)

- information regarding the combustion process to which the material will be applied (including its efficiency).

Is the waste stream chemically and physically homogeneous, of a consistent quality and does it deliver a regular stream of the material over the medium term?

- a material specification sheet stating what the waste is, and its current classification using the *Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes* (EPA 1999), as amended and in force from time to time
- the contaminants in the waste (including a comparison with the standard fuel it is proposed to replace) including the potential variation in those contaminants and the average predicted contaminant levels
- estimated amount of the waste to be consumed over a given period.

Has a specification, standard or agreement between the producer and user of the waste been developed (and presented to DEC) to ensure the material is 'fit for purpose'?

- any existing industry standard to which the waste will be processed to meet requirements for use as combustion feedstock
- QA/QC systems in place (at the production end of the waste) to ensure consistency of calorific value, contaminant levels, quality and quantity of supply over time
- other parameters as relevant to demonstrating that the material is 'fit for purpose' (*these will be fuel specific but could include requirements specified by the user e.g. demonstrating that the material would not adversely affect the operation of its equipment, exceed the thresholds of its licence etc*).

Information relevant to the criteria for assessing air and other impacts from the use of non-standard fuels

Is the operation, equipment and performance of the facility appropriate for the burning of non-standard fuels?

- details of current emissions (where only standard fuels are combusted)
- evidence that current emissions meet Clean Air (Plant and Equipment) Regulation limits
- details of the current emissions monitoring (where appropriate).

See also *Approved Methods and Guidance For the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2001) found at:
www.environment.nsw.gov.au/air/amgmaap/index.htm

Have the potential contaminants in the material been identified and an assessment made of potential air pollutants?

- details of any pre-treatment the material will undergo to remove contaminants and reduce moisture content (if relevant)
- representative characterisation and quantification of the concentration of chemical and physical contaminants contained in the material
- indicative concentrations of air pollutants that will be produced when the material is burnt
- estimated emission concentrations of all air pollutants when using the material, including all supporting calculations

- a detailed description of the proposed measures to control air emissions (this may include both process and pollution controls).

Further guidance on sampling to obtain representative results can be obtained from DEC's Air Technical Unit, the Resource Recovery Section of DEC's Sustainability Programs Division (wood waste), the Waste Management Section of DEC's Environment Protection and Regulation Division (general waste sampling; see Technical Appendix of *Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes* (EPA 1999), as amended and in force from time to time or the Australian Standards that address bulk material sampling.

If the fuel is to be obtained from a number of different sources or if there is potential for variability in the makeup of the proposed fuel, a greater number of samples will need to be obtained. When assessing the results of the analysis, averaging the results is unlikely to achieve the degree of confidence necessary that on a particular day pollutant levels will not exceed concentration limits. A more appropriate statistical assessment of the results would be to use the 95-percentile figures for each pollutant parameter.

Where the proposed fuel may contain contaminants, the proponent should conduct a mass balance detailing the fate of the pollutants in the fuel when burnt in the application proposed. The benefit of conducting a mass balance is that it assists understanding of the processes in the formation of the various pollutants and can also be used as the basis for developing a fuel specification. In addition to the mass balance, the proponent may provide actual results of pollutant concentrations in emissions that have been obtained from other plants or from trials of the non-standard fuel at the premises. A sufficient number of results will need to be provided to conduct a statistical analysis of results so that an emissions profile can be detailed.

Is there a QA/QC program in place to ensure the continued acceptability of the material as a fuel?

- details identifying the upper limits for the concentrations of the contaminants contained in the material
- the maximum co-firing rate with any standard and non-standard fuel to be used
- details of the QA/QC measures that will ensure a consistent feedstock that will comply with the proposed combustion arrangements
- a detailed fuel testing regime based on the variability of the contaminants in the feedstock, its physical form and the risk posed by possible contaminant levels in the feedstock. This must include a detailed description of sampling and sample preparation procedures.

Is there a risk that air pollution will increase?

The proponent needs to compare the levels of pollutants in the proposed fuel to those in the existing fuel, and predicted levels of pollutants emitted to air produced from the proposed fuel to those emitted from the existing fuel. Particular consideration should be given to factors such as:

- the type, sources and origins of the proposed fuel
- the potential for contamination
- the chemical composition of the fuel
- the QA/QC procedures
- the capacity of the process and control technology to deal with contamination
- monitoring results from similar applications

- indicative air pollutant levels from the proposed fuel post-combustion
- potential for principal air toxic emissions
- pollutant levels produced from the existing fuel.

Where it is likely that air emissions will increase through the use of a non-standard fuel, additional requirements to minimise and/or eliminate those impacts would be required. Under such circumstances, further information is likely to be required by DEC and supplementary assessment criteria may be applied. Where this is the case, please contact the Manager, Air Technical Unit on (02) 9995 5000, for further advice.

Is the proposed air monitoring acceptable?

Monitoring of emissions should include checking for both:

- pollutants of concern, and
- process parameters or air pollutant surrogates that may not necessarily be pollutants of concern themselves, but may be an important indicator of minimising emissions, such as combustion efficiency.

The proponent should detail an emissions monitoring regime that they propose to undertake while non-standard fuels are being used on the premises.

Are there any other likely impacts on the local environment, such as impacts on water or the generation of noise, odour and dust due to the processing, storage or use of the material as a fuel. If so, how are these to be managed?

Information required to support consideration of this criterion includes:

- a detailed description of the on-site handling and storage of the material to ensure water and air pollutants (including leachate draining from the non-standard fuel and dust or odours emitted from the material prior to combustion) are appropriately managed
- evidence that noise impacts from the handling, storage and use of the non-standard fuel are in compliance with DEC's *Industrial Noise Policy* (EPA 2000) or, for existing premises proposing to use non-standard fuels, that the noise environment will not be changed (where the noise environment is currently acceptable).

References

EPA 1999, *Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes*, Environment Protection Authority, Sydney, (Reprinted June 2004)

EPA 2000, *NSW Industrial Noise Policy*, Environment Protection Authority, Sydney

EPA 2001, *Approved Methods and Guidance For the Modelling and Assessment of Air Pollutants in New South Wales*, Environment Protection Authority, Sydney

Standards Australia 1998, *AS 1038.5-1998: Coal and coke – Analysis and testing – Gross calorific value*, Sydney

APPENDIX 1

Non-standard fuels already assessed for use

Some potential fuels, although not 'standard fuels', have already received a degree of assessment and DEC considers that they can be used in most fuel burning applications provided they meet agreed (generally standard) requirements.

Approved substitute fuel	Details	Conditions
Coal seam methane gas, Coal mine vent gas (methane)	May be diluted with ambient air, but otherwise must be free from any contaminants.	To be used in appropriate gas burning or consuming equipment.
Biogas (methane produced from the digestion of sewage biosolids)	As above. Special attention should be given to sulphur content.	To be used in appropriate gas burning or consuming equipment.
Unused and uncontaminated timber off cuts or scrap wood	Must be demonstrated to be unused, uncontaminated wood only, without any risk of contamination. For example, no presence or production of any treated, preserved, painted, lacquered, glued, laminated or coated timber or wood on or near the site from which the product is sourced. Does not include timber recovered from landfill or similar sources.	To be used only in appropriately designed equipment (e.g. a boiler designed for burning powdered coal would not be appropriate).