



The New Zealand Ecolabelling Trust

Licence Criteria for

Portland Cement and Portland Cement Blends

EC-42-10

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1 INTRODUCTION

Environmental Choice New Zealand (ECNZ) is an environmental labelling programme which has been created to help businesses and consumers find products and services that ease the burden on the environment. The programme results from a New Zealand Government initiative and has been established to improve the quality of the environment by minimising the adverse and maximising the beneficial environmental impacts generated by the production, distribution, use and disposal of products, and the delivery of services. The programme is managed by the New Zealand Ecolabelling Trust (the Trust).

ECNZ operates to the ISO 14024 standard "Environmental labels and declarations - Guiding principles" and the Trust is a member of the Global Ecolabelling Network (GEN) an international network of national programmes also operating to the ISO 14024 standard.

ISO 14024 requires environmental labelling specifications to include criteria that are objective, attainable and verifiable. It requires that interested parties have an opportunity to participate and have their comments considered. It also requires that environmental criteria be set, based on an evaluation of the environmental impacts during the actual product or service life cycle, to differentiate product and services on the basis of preferable environmental performance.

The life cycle approach is used to identify and understand environmental issues (adverse or beneficial impacts) across the whole life of a product or service (within a defined product or service category). This information is evaluated to identify the most significant issues and from those to identify the issues on which it is possible to differentiate environmentally preferable products or services from others available in the New Zealand market. Criteria are then set on these significant and differentiating issues. These must be set in a form and at a level that does differentiate environmentally preferable products or services, is attainable by potential ECNZ licence applicants and is able to be measured and verified. As a result of this approach, criteria may not be included in an ECNZ specification on all aspects of the life cycle of a product or service. If stages of a product or service life cycle are found not to differentiate environmentally preferable products or services, or to have insufficient data available to allow objective benchmarking in New Zealand, those stages will not generally be included in criteria in the specification. For some issues, however, (such as energy and waste) criteria may be set to require monitoring and reporting. These criteria are designed to generate information for future reviews of specifications.

The New Zealand Ecolabelling Trust Board is pleased to publish this specification for Portland Cement and Portland Cement Blends. The specification has been published to take account of substances harmful to the environment, energy management, carbon dioxide emissions and consumption of resources.

This specification sets out the requirements that cement products will be required to meet in order to be licensed to use the Environmental Choice New Zealand Label. The requirements include environmental criteria and product characteristics. The

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specification also defines the testing and other means to be used to demonstrate and verify conformance with the environmental criteria and product characteristics.

This specification has been prepared based on an overview level life cycle assessment, relevant information from other Environmental Choice New Zealand specifications, information made available from international literature and environmental best practice guidelines.

This specification will be valid for a period of five years. Twelve months before the expiry date (or at an earlier date if required), the Trust will initiate a further review process for the specification.

2 BACKGROUND

Cement manufacture can potentially place a significant burden on the environment. The most significant potential impacts on the environment are related to quarrying raw materials, discharges to air from the kilns such as products of combustion including particulate, sulphur dioxide and nitrogen dioxide. The manufacture of cement also uses significant quantities of energy and is a significant industrial source of carbon dioxide emissions. In New Zealand there are currently only two manufacturers of cement.

The raw material primarily used in the manufacture of cement is limestone which is quarried. Limestone is a non-renewable resource. Potential impacts from quarrying include wastewater and surface water discharges which can increase the pH and suspended solids in receiving waters. The processing and extraction of the limestone can generate dust, noise and vibration which can adversely impact on the amenity of surrounding areas. The quarrying is undertaken using open cast quarries, which has the potential to reduce the biodiversity of the immediate area of the quarry with fauna and flora requiring removal.

The manufacture of cement discharges significant volumes of carbon dioxide from the combustion of fuels within the kiln as well as from the limestone during the calcination process within the kiln. To reduce the discharge of carbon dioxide cement plants are using alternatives to limestone which do not require calcining in the kiln, for example fly ash from coal fired power stations and slag from steel mills.

The two areas about which most discussions on potential environmental effects and measures to reduce effects presently focus are:

- reduction of material requiring being passed through the kiln (non-kiln material including supplementary cementitious materials); and
- the use of alternative fuels.

The use of non-kiln material reduces the amount of energy used and CO₂ emissions per tonne of cement produced. Alternative energy sources around the world include various waste materials including solvents, processed refuse, waste wood and waste oils. Both New Zealand plants use a proportion of alternative fuels within their kilns.

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The use of alternative fuels within cement kilns has the potential to provide unique and responsible waste management solutions, where waste contains appreciable energy that can be recovered. The United Nations Environment Programme (UNEP, 2007) recommends the use of alternative fuels in cement kilns.

While the contaminants from coal, gas and oil are generally well understood, the use of new alternative fuels requires careful management and monitoring before being introduced.

Based on a review of currently available information, the following product category requirements will produce environmental benefits by encouraging more sustainable sourcing of raw materials, reducing discharges of carbon dioxide to the atmosphere, and ensuring discharges to the environment are appropriately managed to ensure adverse impacts on the environment are minimised. As information and technology change, product category requirements will be reviewed, updated and possibly amended.

3 INTERPRETATION

“Alternative fuels” (AF) means fuel that is not derived from conventional fossil fuel sources such as coal, natural gas or unused fuel oil. AFs serve as a substitute for conventional fossil fuels and may be biomass AF or fossil AF.

“Clinker” means the calcinated material that has been passed through the kiln.

“Biomass AF” means alternative fuels containing biomass such as waste wood, sewage sludge and municipal waste.

“Energy Management Programme” means a program to achieve and sustain efficient and effective use of energy including policies, practices, planning activities, responsibilities and resources that affect the organisation’s performance for achieving the objectives and targets of the Energy Policy.

“Fossil AF” means alternative fuel derived from fossil fuels, such as waste tyres and used or waste oil.

“GEN” means the Global Ecolabelling Network.

“Kiln material” means any material that is part of the final cement product and passes through the kiln,

“Label” means the Environmental Choice New Zealand Label.

“Non-kiln material” means material that is added to the final cement product but does not pass through the kiln.

“NO_x” is a joint chemical abbreviation for nitrogen oxides (NO, N₂O and NO₂). In this document NO_x means total NO and NO₂ measured as NO₂ equivalents.

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“pH” is a scale of numbers indicating how acidic or alkaline a water is. A pH of 7 is neutral, higher pH values are progressively more alkaline and lower pH values are progressively more acidic.

“Product” means the final product including all blending and processing.

“Raw material” means a material used in the manufacture of cement.

Where references are made in this document to published lists, standards, or documents, the reference should be read as referring to the most recent edition of these lists, standards or documents.

4 CATEGORY DEFINITION

This category includes Portland cement and inter-ground or blended mixtures of Portland cement with other materials, which may include fly ash, slag or naturally occurring pozzolanic materials.

To be licensed to use the Label, the cement product must meet all of the environmental criteria set out in clause 5 and product characteristics set out in clause 6.

5 ENVIRONMENTAL CRITERIA

5.1 Legal Requirements

Criteria

The product must comply with the provisions of all relevant laws and regulations that are applicable during the product’s life cycle.

Verification Required

Conformance with this requirement shall be demonstrated by providing a written statement on regulatory compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by documentation identifying the applicable regulatory requirements and demonstrating how compliance is monitored and maintained.

Explanatory Notes

Relevant laws and regulations could, for example, include those that relate to:

- producing, sourcing, transporting, handling and storing raw materials and components for manufacture;
- manufacturing processes;

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- handling, transporting and disposing of waste products arising from manufacturing;
- transporting product within and between countries; and
- using and disposing of the product.

The documentation required may include, as appropriate:

- procedures for approving and monitoring suppliers and supplies; and
- information provided to customers and contractors regarding regulatory requirements.

It is not intended to require licence holders to accept increased legal responsibility or liability for actions that are outside their control.

5.2 Raw Materials

5.2.1 Quarried materials

Criteria

Quarries from which materials are obtained for an Environmental Choice licensed cement must have and implement:

- (a) management plans including any policies and management procedures to minimise adverse effects from the following potential impacts:
 - noise;
 - vibration;
 - dust; and
 - discharges to surface water, groundwater, oceans or land.
- (b) a quarry restoration plan.

Verification Required

Conformance with these requirements shall be stated in writing and signed by the Chief Executive or authorised representative of the applicant company. This statement shall be supported by documentation, including:

- copies of the relevant management plans;
- records demonstrating the management plans are being effectively implemented (including monitoring results).

Note: If the quarry is attached to the cement plant, combined management plans may be prepared and implemented to meet these requirements and the requirements in criteria 5.6 and 5.7.

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5.2.2 Non-kiln materials

Criteria

- (a) The cement shall consist of a minimum of 15% non-kiln material (excluding gypsum); and
- (b) Licence holders must have and implement a formal process to increase the use of non-kiln material in cement. The process must consider the environmental benefits relevant to each product/ batch or contract.
- (c) Licence holders must report annually to Environmental Choice New Zealand on the volume of non-kiln material used, including:
 - percentage and type of non-kiln material used in specific product/ batches or contracts;
 - results of any chemical analysis for contaminants undertaken on any non kiln material used, or determined to be inappropriate.

NOTE: the specification does not require the testing of non-kiln materials for contaminants. However, if any testing is undertaken either voluntarily or as a requirement of a resource consent or permit, then the results are to be reported to Environmental Choice New Zealand.

Verification Required

Conformance with these requirements shall be stated in writing and signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by documentation on the composition of the cement product and the type and quantity of non-kiln materials and records of any testing completed.

5.2.3 Kiln fuel supply

Criteria

- (a) Fuel used within the kiln shall consist of a minimum of 10% alternative fuels on an annual basis;
- (b) Licence holders must have and implement a formal process to increase the use of alternative fuels used within the cement kiln; and
- (c) Licence holders must report annually to Environmental Choice New Zealand on the volume of alternative fuels used, including:
 - percentage of alternative fuels used annually;
 - results of any chemical analysis for contaminants undertaken on any alternative fuels used, or determined to be inappropriate.

NOTE: the specification does not require the testing of alternative fuels used for contaminants. However, if any testing is undertaken either voluntarily or as a

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requirement of a resource consent or permit, then the results are to be reported to Environmental Choice New Zealand.

Verification Required

Conformance with these requirements shall be stated in writing and signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be supported by documentation detailing the annual composition of the fuel supply for the kilns and demonstrating the 10% limit is met and records of any testing completed.

5.3 Kiln emissions

Criteria

- (a) Air emissions from the kiln shall not exceed the following limits:

Pollutant	Maximum Allowable Concentration (kg/tonne of clinker)
Particulate Matter (total)	0.046
NO _x (as NO ₂)	2.4
SO ₂	1.38

Source: Table 1.24 of IPPC BREFT Cement and Lime Manufacturing Industries Draft September 2007

- b) Discharges to air from the kiln shall be demonstrated to result in an acceptable and environmentally sustainable level of impact on the quality of the receiving environment.

Verification Required

Conformance with these requirements shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company. The statement shall be supported by the following:

- continuous or discontinuous (no less than annually) stack emission monitoring for particulate, NO_x and SO₂ undertaken in accordance with the relevant ISO, USEPA or ASTM test methods and calculations of the pollutant concentrations to demonstrate compliance with (a).
- where discontinuous monitoring is undertaken, supporting information shall be presented to justify the frequency and intensity of monitoring. The justification should include consideration of:
 - The potential for adverse environmental effects
 - The variability in the emission rate (for example, a lesser frequency may be justified by a period of continuous monitoring showing that emissions are stable and predictable)

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- The amount of data available to characterise the emissions (for example, a lesser frequency may be justified by an extensive history of stack testing results)
- Any process changes or changes to raw materials or fuels that may affect the level of emissions and therefore warrant more frequent monitoring
- an independent assessment of discharges to air identified in (b) and the impact on the receiving environment completed by a person or agency competent to complete such an assessment. An assessment of environmental effects and other supporting information lodged in support of a resource consent application would be deemed to meet this criterion.

5.4 Point discharges to air (non-kiln)

Air emissions shall not exceed the following limits:

Pollutant	Units	Maximum Allowable Concentration
Particulate Matter	mg/Nm ³	50

Verification Required

Conformance with this requirement shall be stated in writing and signed by the Chief Executive Officer or other authorised representative of the applicant company. **This statement shall be accompanied by documentation that:**

- stack emissions testing results undertaken in accordance with the relevant ISO, USEPA or ASTM test methods to demonstrate compliance with the above limits;

Sites shall make available for inspection, if required:

- a copy of the sites preventative maintenance plan for all air emission control equipment.

5.5 Carbon dioxide

Criteria

The production of cement shall have a maximum emission rate of 800 kg CO_{2e} per tonne of product manufactured. This shall exclude indirect CO₂ emissions, such as from electricity generation, mobile equipment and transport and CO₂ emissions from carbon neutral biomass AF.

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Verification Required

Conformance with this requirement shall be stated in writing and signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be accompanied by documentation including either:

- stack emissions testing results undertaken in accordance with the relevant ISO, USEPA or ASTM test methods to demonstrate compliance; or
- Calculations of carbon dioxide emissions per tonne of product manufactured.

Where the applicant elects to demonstrate compliance with criterion 5.5 by presenting calculations, the calculations shall be in accordance with the methodology set out in Attachment One.

Note: Where applicable, the calculated CO_{2e} emissions from woodwaste or other biomass AF (excluding municipal waste) shall be reported, but are not included in the total CO_{2e} emissions per tonne of product manufactured.

5.6 Dust Management Plan

Criteria

The cement product manufacturer must have and implement a dust management plan covering all areas of the operation including haul roads, cement plant and associated activities including quarries.

Verification Required

Conformance with these requirements shall be stated in writing and signed by the Chief Executive or authorised representative of the applicant company.

The company shall make available for inspection, if required, documentation, including a copy of the sites dust management plan and records to show it is being effectively implemented.

5.7 Discharge of contaminants to natural water bodies and land

Criteria

- a) Discharges to the natural environment after reasonable mixing (natural water bodies, ocean) shall not exceed the following criteria:

Pollutant	Allowable Range
pH	6-9

And

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- b) Discharges of contaminants to the natural environment (natural water bodies, ocean or land) shall be demonstrated to result in acceptable and environmentally sustainable level of impact on the quality of the receiving environment.
- c) The cement product manufacture must have and implement a management plan for discharges to surface water, groundwater, oceans or land.

Verification Required

Conformance with these requirements in shall be demonstrated by providing a written statement on compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company.

The company shall make available for inspection, if required, documentation, including:

- test results demonstrating that the above criterion (a) is being met; and
- an independent assessment of the discharge quality and its impact on the receiving environment completed by a person or agency competent to complete such an assessment. The assessment may be based on the quality of discharge from the point at which the discharge from the site or any relevant combined or municipal waste collection and treatment system discharges to the natural environment; or from the plant in situations where the plant discharge is mixed with other organisations waste streams and the combined waste stream and its treatment before it is discharged to the natural environment is outside the control of the plant or licence applicant and suitable information is not available on the quality of the combined discharge.
- copies of the relevant management plans and records demonstrating the management plans are being effectively implemented (including monitoring results).

5.8 Energy Management

Criteria

- (a) The production of cement shall have a maximum thermal energy use for the kiln of 3500 MJ/tonne of clinker.
- (b) The cement manufacturer must have effective energy management policies and procedures and/or an energy management programme.
- (c) Licence holders must report annually to Environmental Choice New Zealand on energy management, including:
 - total energy use including fuel used for delivery vehicles;
 - breakdown of total energy use to types of energy used;
 - energy use related to production;
 - initiatives taken to reduce energy use and improve energy efficiency; and

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- initiatives taken to calculate and reduce CO2 emissions associated with energy use.

Verification Required

Conformance with this requirement shall be stated in writing and signed by the Chief Executive Officer or other authorised representative of the applicant company. This statement shall be accompanied by documentation that:

- describes the energy management policies, procedures and programmes; and
- includes annual reports on energy use and management.

5.9 Waste Management

- a) The cement product manufacturer must have effective waste management policies and procedures and/or a waste management programme covering manufacturing operations; and
- b) Licence holders must report annually to Environmental Choice New Zealand on waste management, including:
 - quantities and types of waste recovered for reuse internally and externally;
 - quantities and types of waste recycled internally and externally;
 - quantities and types of waste disposed of to landfill;
 - information on disposal locations for all wastes; and
 - initiatives taken to reduce waste generation and improve recovery/recycling of waste.

Verification Required

Conformance with this requirement shall be stated in writing and signed by the Chief Executive Officer or other authorised representative of the applicant company. **This statement shall be accompanied by documentation that:**

- describes the waste management policies, procedures and programmes; and
- includes annual reports to Environmental Choice New Zealand on waste generation and management.

5.10 Storage of Raw Materials

Criteria

The cement manufacturer must have effective management policies, procedures and systems covering the appropriate storage and handling of raw materials including fuels and limestone. These procedures shall:

- (a) ensure any storage of environmentally hazardous substances is located and managed to prevent contamination of surface water or land, (including ensuring potentially hazardous liquids are banded);
- (c) include a Spill Response Plan detailing procedures to identify, contain and clean-up any spill of potentially hazardous substances.

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Verification Required

Conformance with these requirements shall be stated in writing and signed by the Chief Executive or authorised representative of the applicant company.

The company shall make available for inspection, if required, documentation, including details of the location and type of storage facilities on site and the materials stored in each and a copy of the Spill Response Plan.

6 PRODUCT CHARACTERISTICS

Criteria

The product shall be fit for its intended use and conform, as appropriate, to relevant product performance standards.

Verification Required

Conformance with this requirement shall be demonstrated by providing a written statement of compliance, signed by the Chief Executive Officer or other authorised representative of the applicant company.

The company shall make available for inspection, if required, documentation, including:

- identifying the applicable standards, specifications and or consumer/customer requirements;
- demonstrating how compliance is monitored and maintained (including quality control and assurance procedures);
- records of customer feedback and complaints

7 REQUIREMENTS AND NOTES FOR ENVIRONMENTAL CHOICE LICENCE HOLDERS

Monitoring Compliance

Prior to granting a licence, Environmental Choice will prepare a supervision plan for monitoring ongoing compliance with these requirements. This plan will reflect the number and type of products covered by the licence and the level of sampling appropriate to provide confidence in ongoing compliance with criteria. This plan will be discussed with the licence applicant and when agreed will be a condition of the licence.

As part of the plan, Environmental Choice will require access to relevant quality control and production records and access to production facilities. Relevant records may include formal quality management or environmental management system documentation (for example, ISO 9001 or ISO 14001 or similar).

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Licence holders are required to advise Environmental Choice of any non-compliance with any requirements of this specification which may occur during the term of the licence. If a non-compliance occurs, the licence may be suspended or terminated as stipulated in the Licence Conditions. The licensee may appeal any such suspension.

Using the Environmental Choice Label

The Label may appear on the wholesale and retail packaging for the product, provided that the product meets the requirements in this specification and in the Licence Conditions.

Wherever it appears, the Label must be accompanied by the words “Cement” and by the Licence Number eg ‘licence No1234’.

The Label must be reproduced in accordance with the Environmental Choice programmes keyline art for reproduction of the Label and the Licence Conditions.

Any advertising must conform to the relevant requirements in this specification, in the Licence Conditions and in the keyline art.

Failure to meet these requirements for using the Environmental Choice Label and advertising could result in the Licence being withdrawn.

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Attachment One

Method of calculating CO₂ emissions per tonne of product manufactured.

Note: This methodology has been drawn from the New Zealand Climate Change Regulations and the CO₂ Accounting and Reporting Standard for the Cement Industry (June 2005).

In cement plants, direct CO₂ emissions result from the following sources (excluding CO₂ from mobile equipment and transport)¹:

- Calcination of carbonates contained in raw materials
- Combustion of organic carbon contained in raw materials;
- Combustion of conventional fossil kiln fuels;
- Combustion of alternative fossil kiln fuels (also called fossil AF or fossil wastes);
- Combustion of biomass kiln fuels (including biomass wastes);
- Combustion of the carbon contained in wastewater.

For the purposes of this specification, CO₂ produced from the combustion of wastewater is not included in the calculation as it represents a very small contribution to total CO₂ emissions. Therefore the total CO₂ emissions per tonne of product manufactured (TE) is calculated using the following equation:

$$TE = (TE_{\text{calcination}} + TE_{\text{organic carbon}} + TE_{\text{fuel combustion}}) / \text{tonnes of cement produced for the year}$$

where—

- TE_{calcination} is the total emissions from calcination of raw materials for the year in tonnes
- TE_{organic carbon} is the total emissions from combustion of organic carbon in raw materials for the year in tonnes.
- TE_{fuel combustion} is the total emissions from the combustion of fuel for the year in tonnes.

a) Method of calculating annual CO₂ emissions from calcination of raw materials

Calcination is the release of CO₂ from carbonates in the raw materials. Calcination CO₂ is directly linked with clinker production. In addition, calcination of cement kiln dust and bypass

¹ CO₂ Accounting and Reporting Standard for the Cement Industry, World Business Council for Sustainable Development, June 2005

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dust can be a relevant source of CO₂ where such dust leaves the kiln system for direct sale, addition to cement, or is disposed as a waste.

Emissions in relation to calcination of raw materials are calculated in accordance with the following formula:

$$TE_{\text{calcination}} = (A \times 0.7848 \text{ t CO}_{2e} / \text{t}) + (B \times 1.0919 \text{ t CO}_{2e} / \text{t}) + (C \times 0.7848 \text{ t CO}_{2e} / \text{t})$$

where—

- A is the total number of tonnes of calcium oxide in clinker produced in the year
- B is the total number of tonnes of magnesium oxide in clinker or burnt lime produced in the year (see Note 1).
- C is the total number of tonnes of calcium oxide and magnesium oxide in cement kiln dust or lime kiln dust (i.e. the calcined proportion of the dust) produced by the person in the year, excluding any dust that is recycled into cement or lime.

Note 1: Magnesium, in various mineral forms, is likely to be present as an impurity in the limestone used for clinker and lime production. If less than 5% MgO is present due to impurities then this can be calculated as CaO. If more than 5 per cent of MgO is present due to impurities, or if magnesium is added in the form of dolomite or other inputs, it must be included in the calculation as MgO.

b) Method of calculating annual CO₂ emissions from combustion of organic carbon

Organic carbon in the raw materials is a source of CO₂ emissions from the kiln. The CO₂ Reporting and Accounting Standard states that a typical value for Total Organic Carbon (TOC) in kiln raw materials is about 0.1 to 0.3 % (dry weight). This corresponds to CO₂ emissions of about 10 kg/t clinker, representing about 1% of the typical combined CO₂ emissions from raw material calcination and kiln fuel combustion. For this reason, CO₂ emissions from combustion of organic carbon will only be significant if a large quantity of raw material containing appreciable TOC, such as a large quantity of fly ash, is used in the kiln.

For the purposes of demonstrating compliance with criteria 5.5 of this specification, CO₂ emissions from combustion of organic carbon only needs to be calculated if the combined TOC content in the raw materials is greater than 0.5 % (dry weight). Therefore the applicant should either:

- a) Provide information to demonstrate that the combined TOC content in the raw materials is less than 0.5 % (dry weight); or
- b) Calculate the annual CO₂ emissions from combustion of organic carbon in the raw materials using the following equation:

$$TE_{\text{organic carbon}} = D \times 3.6641 \text{ t CO}_{2e} / \text{t C}$$

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where—

- D is the total number of tonnes of TOC in the raw material to the kiln for the year

c) Method of calculating CO₂ emissions from burning fuel

Fuels that may be used in cement kilns include:

- Conventional kiln fuels
- Alternative fossil fuels (fossil AF)
- Biomass fuels (biomass AF)

Emissions in relation to combustion of fuels in the kiln are calculated in accordance with the following formula:

$$TE_{\text{fuel combustion}} = (E_1 \times CV_1 \times EF_1) + (E_2 \times CV_2 \times EF_2) + \dots$$

where—

- E_{1-x} is the total number of tonnes (or cubic metres) of the class of fuel used in the year
- CV_{1-x} is the weighted average calorific value (expressed in units of TJ per tonne (or cubic metre)) of the class of fuel
- EF_{1-x} is the emission factor (expressed in units of t CO_{2e} / TJ) for the class of fuel (see Note 2).

Note 2: There are various sources of emission factors for fuels. The source (reference) for the emission factors selected should be stated. Where possible, these emission factors should be based on country-specific emission factors for the country of cement manufacture. In New Zealand, the most appropriate source of emission factors is Schedule 2 of the Climate Change (Stationary Energy and Industrial Processes) Regulations 2009. Where country-specific emission factors are not available, the IPCC 2006² default emission factors for stationary combustion in the energy industries may be used.

Note 3: CO_{2e} emissions from biomass AF, with the exception of municipal waste, are to be reported as a separate item CO_{2e} and are not included in TE_{fuel combustion}. The default emission factor for CO_{2e} emissions from solid biomass is 110 kg CO₂/ GJ.

² 2006 IPCC Guidelines for National Greenhouse Gas Inventories

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