Public consultation comments and responses

Cement Criteria

Documents Supporting this document

Information to support issuers and verifiers is available at www.climatebonds.net/standard/cement as follows:

- Cement Background Paper: complete details on why the criteria were chosen
- Cement Criteria document: the complete Criteria requirements.
- Cement Frequently Asked Questions (FAQ's)[1]
- The Climate Bonds Standard: contains the requirements of the overarching CBS
- The Climate Bonds Standard & Certification Scheme Brochure: provides an overview of the Climate Bonds Standard & Certification Scheme, of which these Criteria are a part

For more information on Climate Bonds and the Climate Bonds Standard and Certification Scheme, see www.climatebonds.net.

[1] Published post-public consultation.

Category / Question	No.	Feedback Received	Response
Scope of Activity	1	Whilst we understand that the scope does not include concrete, as clinker substitutes are addressed, we believe it would be better to also address cementitious materials in concrete (as the additions can either be made at the cement or at the concrete stage)	Because the Cement Criteria are focused on cement production, the scope does not include blending in the concrete mixer. This practice leads to poorer performance, and therefore the TWG view is that this should not be changed.
	2	Criteria document: 1. Section 2.3 on page 8 should clearly indicate that the threshold calculation includes the amount of reduction using a CCUS technology but the technology is outside of the scope unless setting robust criteria. The reason is as follows; According to the IEA reports, a volume of CO2 reduction by CCUS in the cement industry is extremely large compared to other sectors, and the specific "net" emissions from cement production shown in the TPI's table also seems to be taken into consideration of the reduction using CCUS. On the other hand, since "assets out of scope" shown in this section on page 8 does not include CCUS activities, the reader may misunderstand to exclude the CCUS technology in the the threshold calculation. 2. SCMs such as Slag and Fly ash are currently considered to be very effective to reduce CO2 emissions from cement production since there is no alternative reduction measure. Therefore, until an implementation of innovative technologies, it should be applied for the use of Slag and Fly ash as a tentative reduction measure for a limited period of 10 or 20 years while those are available. Background document: It is fully acceptable to specify in the activities of the cement industry shown in Section 4.2. However, regarding the "organizational boundary" of the industry, please refer to the following details defined in ISO 19694-1 and ISO/DIS 19694-3;	Criteria document: 1. While it is acknowledged Carbon Capture and Utilisation (CCU) holds considerable promise, cement production facilities utilising such technology cannot yet be certified. This is not due to opposition to the principle of CCU in cement. Rather, there was insufficient time for the TWG to determine robust criteria around what uses or 'utilisation applications' are considered appropriate. Future versions of the criteria will attempt to widen the scope to allow for eligible CCU applications. This does not apply to CCS, which is within scope. This will be clarified in the documents. 2. Cement producers using fly ash and slag to reduce their cement emissions are not outside of scope. Rather, for the avoidance of doubt, 'production of' these SCMs (i.e., coal energy and steel production) cannot be part of bond proceeds under these criteria. Climate Bonds does not see a need for a cut-off date, although it is well noted that beyond 10-20 years we expect such materials to be lower in availability. Rather, the Cement Criteria will be regularly reviewed. As part of these reviews, the availability of more suitable SCMs and fly ash and slag will be considered and thus whether preference should be given to other SCMs. SCMs are already implicitly favoured by the correction factor method. The factor is calculated on the basis of pure dilution, but SCMs are not inert, therefore, a reduction of 20% of the clinker content would lead to a strength lowered by less than 20% (in practice, frequently increased by some amount). Background document: 3. The commentary on the ownership is well taken. However, the issuer must nonetheless include the scope of emissions laid out in section 4.2.4 of the Criteria document. Issuers may use relevant ISO Standards or GNR reporting mechanisms so long as the scope of

		The organization shall consolidate its facility-level GHG emissions by using one of the following approaches: a) control: the organization accounts for all quantified GHG emissions from facilities over which it has financial or operational control; or b) equity share: the organization accounts for its portion of GHG emissions from respective facilities.	emissions stipulated are addressed.
	3	1. About fly ash and blast furnace slag In Japan, it is expected that the blast furnace will be continued to use at least before 2040, when the alternative carbon neutral furnace or high quality electric arc implemented. Considering there are huge fly ash and blast furnace slag produced, it is reasonable to utilize them as far as such technologies are transitionally operated. 2. About the practicability of limestone, calcined clay. From Japanese academia and experts' opinions, there are still doubt in its feasibility. It has risks to rely heavily on these alternatives in mid-term. 3. About utilization of waste In Japan's value chain, the cement industries take an important role to utilize wastes. This definitely reduce the waste amount sent to final landfill site. Could you add the technology development or facilities which utilizes more waste mixing in the process of cement production?	1. Climate Bonds and the TWG agree with this viewpoint and as such cement producers using fly ash and slag to reduce their cement emissions are not outside of scope. Rather, for the avoidance of doubt, 'production of' these SCMs (i.e., coal energy and steel production) cannot be part of bond proceeds. Note, this does not apply to legacy fly ash deposits. 2. The TWG view is that industrial deployment of calcined clay has started, and they expect it to grow considerably. As such, the TWG sees no need to restrict use of calcined clays. As with any other SCM, these criteria address the climate credentials of various solutions, not their economic or market feasibility. Calcined clays are seen as a promising SCM from an emissions standpoint and thus are not excluded. 3. Burners and kilns which can burn alternative fuels such as waste-derived fuel are eligible. However, these burners can also burn fossil fuels. As such, it is hard to guarantee that a burner will burn only waste fuels. The Criteria therefore allow waste burning (with key caveats) in cement production, but the facility must meet the relevant thresholds. Sorting of waste or pre-processing facilities alongside would have to meet the Waste Management Criteria.
		We concur with the proposed scope. Proposed Scope The proposed scope in Draft Criteria and Background Paper, should cover all stages of production of blended cement. At this time, key exclusions include; - Concrete and associated activities - Emissions from quarrying and transport - Clinker by fly ash should be excluded. Their supply is expected to reduce in the future and they cannot be part of a long-term decarbonisation plan Rationale	No change needed. Note as above, however, that fly ash and slag are not excluded from the Criteria. Rather, companies cannot include increased use of such materials in transition plans for meeting future decarbonisation pathways. This has been clarified in the Criteria.

		We based our assessment of the proposed scope on the quantity of emissions produced at each stage of the production process. A recent IFC study on cement production (IFC, 2021) indicate ~90% of the carbon emissions (~50% process emissions and ~40% thermal emissions) from cement production can be attributed to clinker while a report by Sustainalytics indicate that clinker only accounts 60-70% of the emissions (Sustainalytics, 2020). While the proportion of clinker can differ between studies, it is not in doubt that clinker is the biggest contributor to CO2 emissions. For this same reason, excluding the other stages such as quarrying and transport is compatible with the approach on focusing on emissions. The downstream process of manufacturing concrete involves mixing water, gravel and clinker (Draft Background Paper). The process is largely physical, not chemical. Consequently, it does not have a significant carbon footprint and should be excluded from the scope.	
	4	We cannot formally comment on the criteria until we have a Cement working group launched and the group has made decisions on these specific issues. However, to support the process, we hope to share our informal opinion on this and the following questions. Capturing the emissions from quarrying to blending may be appropriate given the use case of CBI's cement criteria. However, including quarrying in the system boundary is a departure from other initiatives such as PACTA, ACT, and TPI, who exclude quarrying in the system boundary, and SBTi who considers including quarrying only in their near-term targets.	No change needed. Quarrying and transportation comprise roughly 1% of cement production emissions. The TWG determined they would not make a material difference to whether a plant or company would meet the relevant pathway. As such, they are not within the scope of emissions to be counted by the issuer. However, many cement companies do report these emissions and therefore future versions of criteria may aim to consider them in scope if necessary.
	5	Yes, with the exception of production of fly ash and blast furnace slag - not clear why these are excluded when e.g. silica fume, which is also a byproduct of another industrial process, is included.	Note as above that fly ash and slag are not excluded from the Criteria. Rather, companies cannot include increased use of such materials in transition plans for meeting future decarbonisation pathways. Equally, the *production* (as separate from the procurement) of such materials is outside of scope. This has been clarified in the Criteria.
	6	In the section 2 of criteria document, section 2.1 list out eligible projects. Here, there is one category which should be included in increase of Alternative Fuel Rate (AFR). Also, the onsite renewable energy projects should be considered in this list. Also, this standard should consider the boundary extension to include Concrete. Concrete is the end product and not cement.	If onsite renewable energy or AFR are part of a cement production process that meets the overarching pathway, then they are eligible Use-of-Proceeds. However, renewable energy assets in and of themselves must meet the relevant Climate Bonds sector criteria (e.g., wind, solar, etc.). AFR such as biomass must meet additional criteria adopted from the Climate Bonds Bioenergy Criteria. Waste-derived fuels must also meet the Waste Management Criteria. In short, they are indeed potentially within the scope of criteria.

			Concrete was not included because it is impossible for the cement producer to know what concrete will be made with their cement. This aligns with other initiatives such as SBTi and TPI. It is hoped in the near future that Climate Bonds can address concrete production as well as embodied carbon in construction. Criteria for concrete will be welcomed in the market, but this will require much more development due to the large range of possible outputs from concrete mixing.
	7	The assets in scope section only considers cement. The sector key output is concrete and cement is just an intermediary. So the team should look at developing the standard at concrete level.	See comment 6. Concrete was not included because it is impossible for the cement producer to know what concrete will be made with their cement. This aligns with other initiatives such as SBTi and TPI. It is hoped in future that Climate Bonds can address concrete production as well as embodied carbon in construction. Note: this will also allow a wider range of companies to be certified, as many cement producers also produce concrete.
	8	Yes, but you've not included fuel switching and CCS in the Assets in Scope in section 2.1, even though they are. I would also include switching of cement production chemistry to be more sustainable,for example adding the equipment necessary for LC3 cement production.	Fuel switching and CCS are within scope, subject to meeting additional, cross-cutting criteria. The documents should now reflect this. The TWG was unable to determine specific technology or equipment *unique to* SCMs such as calcined clay or LC3. Nonetheless, light-touch criteria are added under the conditionally eligible assets where it can be demonstrated that the equipment is dedicated to calcined clay use in cement. It is assumed eligible plants can also use lower carbon chemistries to be certified, but they should still meet the overarching pathway.
Scope of Emissions	9	The focus is scope 1 emissions (direct emissions) including clinker transfers (part of scope 3), this is acceptable.	The Criteria now require emissions from Alternative Fuels and Raw Materials (AFR) to be included in emissions accounting (gross emissions), along with additional criteria alongside the various types of fuels (i.e., Bioenergy and Waste-derived fuels). Full rationale is in Section 4.7.3 of the Background Paper.
	10	The draft in Section 3.3.1 is reasonable and appropriate as it reflects our business activities in Japan.	The Criteria now require emissions from Alternative Fuels and Raw Materials (AFR) to be included in emissions accounting (gross emissions), along with additional criteria alongside the various types of fuels (i.e., Bioenergy and Waste-derived fuels). Full rationale is in Section 4.7.3 of the Background Paper.
	11	We have no objection on this section.	The Criteria now require emissions from Alternative Fuels and Raw Materials (AFR) to be included in emissions accounting (gross emissions), along with additional criteria alongside the various types of fuels (i.e., Bioenergy and Waste-derived fuels). Full rationale is in Section 4.7.3 of the Background Paper.

	12	We feel that the proposed scope is too narrow. Rationale The proposed scope states that Scope 1 emissions such as the direct emissions from cement production should be considered and we agree with this. However, we do not agree that emissions from on-site power generation, alternative fuels and raw materials should be excluded from the scope of emissions. 40% of the CO2 emissions are thermal emissions (IFC, 2021). Thermal emissions are largely determined by the choice of kiln (traditional or electrified), choice of fuel (biomass/biofuels or fossil fuel) and power generation. As the proposed scope already includes burning fossil fuels to heat kilns, it is intuitive that on-site power generation and emissions from alternative fuels be included for completeness. While looking at whether to include into the scope of emissions, one factor we consider is the level of control the company has. In this case, the choice of power generation and alternative fuels falls under the company's circle of control and should be integrated as it has the potential to be a significant decarbonisation lever. We also agree that a clinker production facility must incorporate downstream Scope 3 emissions from grinding and the addition of SCMs to account for the downstream emissions associated with transporting or using the cement product. A grinding or blending operation must incorporate upstream scope emissions from clinker production.	Onsite power generation emissions must now be accounted for. The Criteria now require emissions from Alternative Fuels and Raw Materials (AFR) to be included in emissions accounting (gross emissions), along with additional criteria alongside the various types of fuels (i.e., Bioenergy and Waste-derived fuels). Full rationale is in Section 4.7.3 of the Background Paper.
	13	Addressing gross emissions and including Scope 2 emissions would be appropriate. Addressing only net, Scope 1 emissions can be a departure from related initiatives and approaches in this and other sectors such as PACTA, SBTi, ACT, and Climate-Aligned Finance methodologies. Additionally, more clarification on what is included in alternative fuels and raw materials, and what is the rationale behind excluding them from emissions would be very helpful.	Quarrying and transportation comprise roughly 1% of cement production emissions. The TWG determined they were not material and would not make a huge difference to whether a plant or company would meet the relevant pathway. As such, they are not within the scope of emissions to be counted by the issuer. However, they are technically scope 1 & 2 emissions in many cases and many cement companies do report these emissions and therefore future versions of criteria may wish to consider them in scope if necessary. The Criteria now require emissions from Alternative Fuels and Raw Materials (AFR) to be included in emissions accounting (gross emissions), along with additional criteria alongside the various types of fuels (i.e., Bioenergy and Waste-derived fuels). Full rationale is in Section 4.7.3 of the Background Paper.
		Scope 1 emissions should be in "gross" terms rather than "net" i.e. including emissions from combustion of waste-derived fuels.	Climate Bonds and the TWG agreed with this which is now reflected in the Criteria.

		Scope 2 emissions should also be included as these are reported on by cement companies so do not create an additional reporting burden.	
	14	This is acceptable.	The Criteria now require emissions from Alternative Fuels and Raw Materials (AFR) to be included in emissions accounting (gross emissions), along with additional criteria alongside the various types of fuels (i.e., Bioenergy and Waste-derived fuels). Full rationale is in Section 4.7.3 of the Background Paper.
	15	Net zero is not 0.15 tonnes of CO2 per tonne of cementitious product. Net zero is net zero. It all depends on what is being included in the calculations. Provided that CO2 reuptake is not, I might be able to get behind this as a target. It seems that the biogenic fraction of fuel IS being counted as climate neutral – so I would expect more ambition. It is entirely possible to go to net negative with cement by 2050 if CCS is included.	The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. It indeed does not end at 0g CO2eq / t cement, but it does end close to this. This is because it assumes recarbonation in cement will be responsible for the remaining emissions reductions, but this takes place in the use and recycling of concrete rather than at the cement production stage. If recarbonation were included, the end value would be below zero. Moreover, the Criteria now require emissions from Alternative Fuels and Raw Materials (AFR) to be included in emissions accounting (gross emissions), along with additional criteria alongside the various types of fuels (i.e., Bioenergy and Waste-derived fuels). This means the pathways should reflect carbon budgets that also include these emissions. Full rationale is in Section 4.7.3 of the Background Paper. Climate Bonds will review the criteria in light of technological developments. If CCS continues to accelerate as a key decarbonisation technology, the TWG will suitably review thresholds. The emissions pathway for plants now ends at 0g CO2eq / t cement in 2050. This is because the TWG considered that a certified plant should represent the best available technology for the time. It is expected that, in 2050, zero emissions cement production could be feasible. However, this will be continuously reviewed in light of technological development. I.e., if by 2040, CCS is extremely feasible for retrofitting a majority of cement plants, the year for reaching zero emissions cement plants may even be brought forward. Or vice versa.
	16	The current draft criteria (Section 3.3.1. "The scope of emissions used in meeting the pathway") includes CO2 emissions from burning fossil fuels to heat kilns, but excludes CO2 emissions from alternative fuels and raw materials. This provision has been presumably extracted from the Methodology proposed by the Transition Pathway Initiative (PTI)[2] with the methodology accessible,[3] which states that: *"The argument for excluding alternative fuels and raw materials is that their use leads to equivalent emissions reductions in the waste*	Climate Bonds and the TWG fully agree that emissions from burning AFR, particularly waste-derived fuels, should be accounted for. As such the Cement Criteria now require emissions from Alternative Fuels and Raw Materials (AFR) to be included in emissions accounting (gross emissions), along with additional criteria alongside the various types of fuels (i.e., Bioenergy and Waste-derived fuels). Moreover, CBI acknowledges that more suitable fuel alternatives will be needed in the long-term, yet no other alternatives to fossil fuels exist today.

[2] https://www.no-burn.org/wp-content/uploads/2021/11/Plastic-is-Carbon-Oct2021.pdf
[3] https://www.transitionpathwayinitiative.org/publications/76.pdf?type=Publication

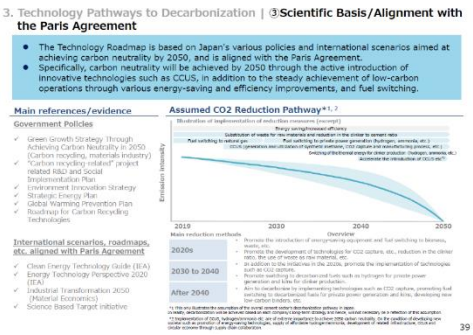
		management industry." (Page 7 of PTI Methodology). This assumption —the fact that burning waste in cement kilns can be deemed carbon-neutral because it is saving emissions in the waste sector— is completely false. The real facts are: - What is referred to as the "non-organic fraction of municipal waste streams" or "waste streams stripped of the recyclable content" to be used as alternative fuels (e.g. in the form of Refuse-Derived Fuels) is normally an heterogeneous compilation of materials, namely, plastic, recyclable materials (paper, cardboard), textiles, industrial waste, even garden or other types of biomass waste. Normally, the main component of RDF is plastic waste. - The assumption that this waste would have emitted emissions in the waste sector is false, since these materials could have been either recycled, reused, composted, transformed in an anaerobic digestion plant, or in the case of plastic waste, it could have been addressed with upstream policies which aim at the minimising its generation. In this way, the waste that is being burnt in cement kilns has been taken away from activities that offer a much bigger climate mitigation potential. - Furthermore, the assumption that burning waste is carbon neutral ignores the fact that burning waste, in any facility, produces GHG and toxic emissions. We cannot emphasise strongly enough how this fact needs to be taken into account in order to provide an accurate account of GHG emissions involved in burning waste in cement kilns. - It is very important to note that RDF or waste typically burnt in cement kilns contains a large amount of fossil-plastic. In this sense, cement kilns replace coal with plastic — that is replacing one form of fossil fuel with another. Using plastic waste as fuel and making it look like a climate friendly activity with a climate bond credential becomes a greenwashing exercise to an increased source of GHG and toxic emissions. - When a fossil-based alternative fuel such as plastics sourced from municipal solid waste is used, this practice will perpetuate greenhouse gas emissions associated with plastics life-cycle. Plastic begins as a fossil fuel, and greenhouse gases are emitted at every stage of its lifecycle: oil and gas extraction and transport, plastic production and manufacture, plastic waste management or incineration, and plastics pollution in our environment. - Indeed, "plastic refining is among the most greenhouse-gas-intensive industries in the manufacturing sector—and the fastest growing. The manufacture of plastic is both energy-	As such, a cut-off date of 2035 is set after which point Municipal Solid Waste (MSW) will no longer be accepted as a fuel source. However, Climate Bonds will continuously review this criterion in light of available technology, bringing this cut-off date forward or pushing it backward accordingly. Lastly, all recyclable waste (including certain plastics) must be removed prior to burning in line with the waste hierarchy. Issuers must demonstrate that either: a) The waste has come from an eligible sorting facility that has removed recyclable material prior, or: b) Recyclable waste has been removed through pre-processing in line with additional criteria Full rationale is in Section 4.7.3 of the Background Paper.

		intense and emissions-intensive in its own right, producing significant emissions through the cracking of alkanes into olefins, the polymerization and plasticization of olefins into plastic resins, and other chemical refining processes. Emissions from plastic production are rising rapidly: a new Shell ethane cracker being constructed in Pennsylvania could emit up to 2.25 million tons of CO2e each year; a new ethylene plant at ExxonMobil's Baytown, Texas, refinery could release up to 1.4 million tons. Annual emissions from just these two new facilities would be equal to adding almost 800,000 new cars to the road. Yet they are only two among more than 300 new and expanded petrochemical projects being built in the US alone—primarily for the production of plastic and plastic feedstocks (CIEL, 2021). In this context, the CBI's inclusion of plastic waste burning in cement kilns will effectively provide a financial incentive to maintain the expansion of plastic production and disposal. - Turning cement kilns into plastic waste incinerators in disguise —which is what the CBI's criteria on cement will do if not addressed— will increase the already staggering projection of GHG emissions related to producing and burning plastic waste in conventional incinerators. Production and incineration of plastics are on track to emit 2.8 gigatons of CO2e per year by 2050 —as much as 615 coal plants— and burn through up to 13% of the ever-shrinking global 1.5C carbon budget.[4] Burning plastics —in whatever facility— will emit 2.9 kg of CO2e for every kg of plastic burned.[5] Ultimately, using plastic waste as an energy source is no better for the climate than using other fossil fuels. Additionally, the scope of emissions should also include all GHG emissions and not only CO2 emissions. When the full-life cycle of plastic is addressed, methane emissions can be observed from the extraction of fracked gas and various extraction-production stages of plastics. (https://disc.gsfc.nasa.gov/datasets/GFEI_CH4_1/summary) As portrayed in Section 3.2.3. "mitigation criteria for cement production facilities" of the draft criteria document, carbon intensity targets are the only instrument used in determining whether an investment is eligible or not. When burnt, plastics as alternative fuels will increase the carbon intensity of cement. When emissions from alternative fuels are not calculated, the resulting carbon intensity (expressed in t CO2/t cementitious product) might be underestimated.	

[4] https://www.ciel.org/project-update/plastic-climate-the-hidden-costs-of-a-plastic-planet/
[5] https://www.no-burn.org/wp-content/uploads/2021/11/Plastic-is-Carbon-Oct2021.pdf

		In conclusion, the section presents a failure to acknowledge the importance of including all GHG emissions from alternative fuels and raw materials that are derived from fossil fuels (such as plastics). Moreover, we urge you to review and rectify as a matter of utmost importance the CBI's statement from the background paper, Section 4.4.6. "Alternative fuels" as these are false claims, as argued above. Specifically, the wrong assumptions are: 1. (the usage of waste-derived fuels) displaces the consumption of fossil fuels with little to no downside; and 2. reduction in emissions can be achieved by improving plant burners which allows for a wider range of fuels to be used, notably municipal waste.	
Is the TPI Pathway the best to have chosen? What else should be considered?	17	We agree using the Transition Pathway Initiative pathway but the updated version including the adjustments necessary to make the total cement output and total Scope 1 emissions data from the IEA model comparable to the emissions intensity as defined by the GCCA. Also recarbonation should be included here. 104.pdf (transitionpathwayinitiative.org)	Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. See sections 4.3.1 and 4.3.2 of the Background Paper. Recarbonation is not included because it is typically small during the lifetime of structures (2-5%) and can be large only if the concrete is crushed at the end of life. Neither the real-life expectancy of buildings nor the End-of-Life is guaranteed, and therefore, we chose to exclude carbonation.
	18	For the emissions intensity the pathway starts with 0,455 tons CO2/ton cementitious which is below any other pathway and even below the threshold of the EU taxonomy (0,469-ton CO2/ton cement). This makes the proposed approach really challenging and unpractical.	This starting point for 2020 was increased in line with the pathway updates. Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. The EU Taxonomy is based on real data from high performing cement plants in the region, demonstrating that these emissions are technically feasible. See sections 4.3.1 and 4.3.2 of the Background Paper. It is acknowledged the thresholds for cement production facilities is ambitious. However, there is far more leeway for companies to become certified through the criteria for companies, as distinct from

			facilities. See section 1.3 in the Criteria document for illustration of the differing criteria.
	19	Criteria document: It is NOT definitely considered that TPI is an applicable reference for Criteria document due to the following reasons. 1. The global thresholds shown in Figures 1 and Table 3 in Section 3.2.3 are indicated based on the 2 ° C scenario of TPI. However, even referring to several scenarios of the latest IEA reports, the calculation process is vague and the validity of values is unclear. 2. The forecast of cement demand and CO2 emissions from cement production are discussed in all IEA reports. However, TPI uses values on cementitious production somehow converting from cement production based on IEA data. Unfortunately, the definition of "Cementitious" is not described in the document what kinds of material are included and furthermore there is no forecast data on the materials. 3. TPI has analyzed for transition scenarios based on limited information excluding update on the cement industry in Japan. For instance, Taiheiyo cement participated in TCFD published their reduction scenarios. (View at https://www.taiheiyo-cement.co.jp/csr/pdf/2020/m_64_65.pdf) And Sumitomo Osaka Cement also set a reduction target. (View at https://www.soc.co.jp/csr/carbon_newtral_bision/) Therefore, it is strongly recommended to adopt existing transition scenarios of migration developed in each country/region instead of TPI shown in Figure 1 and Table 3 of Section 3.2.3. Since the Government of Japan is currently developing a transition roadmap by 2050 in collaboration with each industry sector, the threshold should be set using such reduction scenario in each region/country at the highest priority. (View at https://www.meti.go.jp/english/press/2022/0324_003.html) If there is no "national/reginal transition roadmap" yet, it can be acceptable that the 2 ° C scenario value of TPI is applied as a provisional default while improving the accuracy in the future.	Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. See sections 4.3.1 and 4.3.2 of the Background Paper. While true that cement production is highly subject to regional contexts, reliance on regional pathways is problematic. Firstly, it does not guarantee that they meet the necessary ambition needed to meet 1.5°C in the sector. Secondly, some regions do not have their own pathways which makes a global pathway a necessity. Ultimately, the entity level criteria in the Cement Criteria reflect regional contexts to an extent: companies that are not yet on the pathway can meet Tier 2 requirements through meeting the pathway by 2030 and having a transition plan that demonstrates how they will get there. This would give ample time to overcome various regional barriers currently faced.

		Background document: "Be globally applicable, not based on regional data or standards" of Section 4.3.1 on page 19 should be amended to follow; • Be globally applicable, consistent with national roadmap based on regional data or standards Reason is that the transition pathway to net zero emissions depends on each regional circumstance since raw material procurement and market conditions differ from those on the region/country.	
	20	It is internationally well known that the most acceptable climate rule is to publish the reduction target and manage responsibly the reduction progress by each country like NDC implemented in the Paris Agreement. Therefore, in order to disseminate the initiative globally as well, it is necessary to incorporate high quality published national/reginal data instead of TPI. For instance, since there is a "transition roadmap to net zero CO2 emissions" incorporating all reduction measures including energy conservation in the cement industry developed by the public and private partnership in Japan, the following roadmap should be incorporated into the Criteria document as an assessment tool.  https://www.meti.go.jp/policy/energy_environment/global_warming/transition/transition_finance_technology_roadmap_cement_eng.pdf	Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. See sections 4.3.1 and 4.3.2 of the Background Paper. While true that cement production is highly subject to regional contexts, reliance on regional pathways is problematic. Firstly, it does not guarantee that they meet the necessary ambition needed to meet 1.5°C in the sector. Secondly, some regions do not have their own pathways which makes a global pathway a necessity. Ultimately, the entity level criteria in the Cement Criteria reflect regional contexts to an extent: companies that are not yet on the pathway can meet Tier 2 requirements through meeting the pathway by 2030 and having a transition plan that demonstrates how they will get there. This would give ample time to overcome various regional barriers currently faced.
	21	Transition Pathway Initiative Pathway should be one of the refereed source. We cannot know the calculation method, so we cannot judge the TPI's pathway is appropriate or not 100% basis. In addition, the pathway seems to be quite high target for the Japanese cement sector considering their current emission level. The way to reduce carbon varies by country, and by company.	Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. See sections 4.3.1 and 4.3.2 of the Background Paper.

		We need to consider the cement company's location, nationality, natural disaster risks and energy source limitation, which are different by country. For example, in Japan, it is difficult to switch its energy source from coal/oil to LNG, as most of the cement factories locates in mountain side. Japan is an island and LNG pipelines do not reach to the mountain side. In addition, Japan has to import LNG from middle east, the U.S. or Russia mainly. Japan is far from those site, which means it is necessary to consider the CO2 emission during the maritime shipping as well as land transport from the port to the factories. In addition, there is an political and geographical risks to largely depends on LNG only. As a matter of fact, switching coal energy plant to biomass and in the future to ammonia. This is Japanese risks and limitations in terms of energy transition. Secondly, Japan has frequent serious earthquake, which means it is difficult to reduce clinker ratio easily. As such, there are unique risks and limitations to reduce carbon emission. If you try to cover global companies, we sincerely request you to consider each national limitations and risks. If you do consider such national differences, We recommend you to refer each national transition roadmap like Japan's METI setting, if any, in addition to the global pathway. We need to consider plural options to refer the transition pathway. It is not the only one option we need to refer, don't you think?	While true that cement production is highly subject to regional contexts, reliance on regional pathways is problematic. Firstly, it does not guarantee that they meet the necessary ambition needed to meet 1.5°C in the sector. Secondly, some regions do not have their own pathways which makes a global pathway a necessity. Ultimately, the entity level criteria in the Cement Criteria reflect regional contexts to an extent: companies that are not yet on the pathway can meet Tier 2 requirements through meeting the pathway by 2030 and having a transition plan that demonstrates how they will get there. This would give ample time to overcome various regional barriers currently faced. It is also important to note that the criteria set an emissions pathway rather than prescribing specific milestones such as lower clinker factor or fuel substitution. This allows producers to reach the necessary emissions levels that best suits their context.
	22	The Transition Pathway Initiative (TPI) is a good starting point and feel that it is a favourable approach. TPI is based on the Sectoral Decarbonisation Approach (SDA) which has been effective at translating international emissions targets to sector specific benchmarks. This approach has been key to avoiding unrealistic and costly solutions in reducing emissions across sectors, making it preferable to other pathways. The TPI has a further advantage of providing year by year thresholds to form a pathway to net zero by 2050, specific to the cement sector. This makes it very easy to understand. Reliability is also not in question as it has been developed through a high degree of scrutiny from academia and industry experts. Elements of the SBTi	Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. See sections 4.3.1 and 4.3.2 of the Background Paper.

		Notwithstanding the benefits of the TPI, we should also consider incorporating elements of other approaches. An alternative that was alluded to in the paper and which MUFG has been advising our clients to use is the Science Based Targets Initiative (SBTi), which is also generated via a similar methodology. There are two aspects; - First, the SBTi is aligned with a 1.5°C reduction which has a broader recognition with other stakeholders includes Second Party Opinion providers and regulatory bodies. In addition, alignment to the 1.5°C reduction is consistent with the starting point in the white paper and the position that CBI took in transition finance (CBI, 2020). Anecdotally - Holcim, the largest cement producer in the world, has announced their alignment in October 2021 with the SBTi pathway in their 2050 net zero targets and expressly indicated the 1.5°C reduction (Holcim, 2021). The industry (and our clients) took Holcim's lead and it would certainly be amiss to disregard it. - Second, while SBTi does not have a cement specific pathway for now, they are developing one (SBTi, 2022). This will also be consistent with the SDA and should be incorporated once it has been released in June 2022.	
	23	The selection of a 1.5-aligned pathway would be the most appropriate approach; and IEA Net Zero Report as the source of 1.5ºC pathway for cement sector would be appropriate. Emissions should be in "gross" terms, i.e. including emissions from combustion of waste derived fuels. Cement industry definition of "net emissions" gives credit for avoided emissions, which is not compatible with meeting a carbon budget. Instead, reference could be made to SBTi pathways which exist for cement (on a gross basis): here for well-below 2ºC and here for 1..5ºC (in draft form until finalization in June 2022 but unlikely to change)	Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. See sections 4.3.1 and 4.3.2 of the Background Paper. Note, TPI does now have a 1.5-degree pathway which warrants consideration and is highly valuable for the market. It is also partially aligned with the SBTi methodology.
	24	There has been sector pathway developed by GCCA. The standard should refer to the GCCA roadmap.	Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. See

			sections 4.3.1 and 4.3.2 of the Background Paper. The GCCA roadmap is a laudable initiative by the industry to drive emissions reductions across the sector. However, because it sets a pathway in absolute emissions (i.e., not emissions intensity of production) and is for the whole cement and concrete sector, it is unsuitable for use in these Criteria.
	25	The starting carbon intensity value of 2020 considered is too ambitious. These are almost the range of values prescribed by SBTi for 2030. Also, the intensity values should consider the development stage of the geography. There should be different range for developed and other geographies.	This starting point for 2020 was increased in line with the pathway updates. Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. The EU Taxonomy is based on real data from high performing cement plants in the region, demonstrating that these emissions are technically feasible. See sections 4.3.1 and 4.3.2 of the Background Paper. It is acknowledged the thresholds for cement production facilities is ambitious. However, there is far more leeway for companies to become certified through the criteria for companies, as distinct from facilities. While true that cement production is highly subject to regional contexts, reliance on regional pathways is problematic. Firstly, it does not guarantee that they meet the necessary ambition needed to meet 1.5°C in the sector. Secondly, some regions do not have their own pathways which makes a global pathway a necessity. Ultimately, the entity level criteria in the Cement Criteria reflect regional contexts to an extent: companies that are not yet on the pathway can meet Tier 2 requirements through meeting the pathway by 2030 and having a transition plan that demonstrates how they will get there. This would give ample time to overcome various regional barriers currently faced. It is also important to note that the criteria set an emissions pathway rather than prescribing specific milestones such as lower clinker factor or fuel substitution. This allows producers to reach the necessary emissions levels that best suits their context.
	26	From the chart, no, it's too weak.	Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU

			Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. See sections 4.3.1 and 4.3.2 of the Background Paper.
	27	The Transition Pathway Initiative pathway methodology excludes emissions from burning alternative fuel (e.g. municipal solid waste, RDF, etc) in cement kilns on the assumption that the emissions produced by the combustion of waste are equivalent to emissions that would be produced in the waste management sector. As explained in question 2, this assumption is false. Therefore, the PTI is not the best reference for the CBI criteria on cement. A more scientifically robust and internationally recognised reference is the latest IPCC Report on Mitigation, released on April 4th 2022. Chapter 11 presents an overview of options to mitigate the Industrial sector, including the cement sector there (Ref) . Key recommendations from the IPCC report for the cement sector are: 1. Reduce the amount of clinker in cement production. " The IPCC April 2022 report indicates that a much more aggressive pathway of reductions in the industrial sector is needed. In regards to the cement sector, the IPCC does not recommend fuel substitution with waste. The IPCC states that, "Because so much of the emissions from concrete come from the limestone calcination to make clinker, anything that reduces use of clinker for a given amount of concrete reduces its GHG intensity. While 95% Portland cement is common in some markets, it is typically not necessary for all end-use applications, and many markets will add blast furnace slag, coal fly ash, or natural pozzolanic materials to replace cement as supplementary cementious materials; 71% was the global average clinker content of cement in 2019 (IEA 2020a). All these materials are limited in volume, but a combination of roughly 2–3 parts ground limestone and one part specially selected, calcined clays can also be used to replace clinker." Improve the composition of cement "One of the simplest and most effective ways to reduce cement and concrete emissions is to make stronger concrete through better mixing and aggregate sizing and dispersal; poorly and well-made concrete can vary in strength by a factor of 4 for a given volume (Fechner and Kray 2012; Habert et al. 23 2020)." This argues for a refocus of the market away from "one size fits all", often bagged, cements to professionally mixed clinker, cementious material and filler mixtures appropriate to the needs of the end use. (IPCC AR6, chapter 11, page 46)	The Cement Criteria now have updated pathways that are both 1.5-degree aligned and include emissions from the burning of AFR. The Cement Criteria also seek to encourage reduction of clinker in cement production through the correction factors which encourage this practice. On limiting the amount of cement and concrete used in construction, these activities are outside of the scope of criteria. Climate Bonds and the TWG fully agree that emissions from burning AFR, particularly waste-derived fuels, should be accounted for. As such the Cement Criteria now require emissions from Alternative Fuels and Raw Materials (AFR) to be included in emissions accounting (gross emissions), along with additional criteria alongside the various types of fuels (i.e., Bioenergy and Waste-derived fuels). Moreover, CBI acknowledges that more suitable fuel alternatives will be needed in the long-term, yet no other alternatives to fossil fuels exist today. As such, a cut-off date of 2035 is set after which point Municipal Solid Waste (MSW) will no longer be accepted as a fuel source. However, Climate Bonds will continuously review this criterion in light of available technology, bringing this cut-off date forward or pushing it backward accordingly. Lastly, all recyclable waste (including certain plastics) must be removed prior to burning in line with the waste hierarchy. Issuers must demonstrate that either: a) The waste has come from an eligible sorting facility that has removed recyclable material prior, or: b) Recyclable waste has been removed through pre-processing in line with additional criteria Full rationale is in Section 4.7.3 of the Background Paper.

		2. Limit and reduce the amount of cement used in construction "Architects, engineers and contractors also tend to overbuild with cement because it is cheap as well as corrosion and water resistant. Buildings and infrastructure can be purposefully designed to minimize cement use to its essential uses (e.g. compression strength and corrosion resistance), and replace its use with other materials (e.g. wood, stone, other fibres) for non-essential uses. This could reduce cement use by 20–30% (D'Alessandro et al. 2016; Imbabi et al. 2012; Brinkerhoff and GLDNV 2015; Lehne 31 and Preston 2018; Shanks et al. 2019; IEA 2019b; Habert et al. 2020). "(IPCC AR6, Chapter 11, page 46)	
Verifying an issuer's compliance with a pathway: Mid-point threshold of the bond vs. demonstration of continued compliance with the pathway every three years.	28	Our view is that one should simply refer to alignment with the pathway.	This is now the underlying requirement of the Cement Criteria for this particular aspect.
	29	Criteria document Regarding Section 3.2.3., SCMs such as Slag and Fly ash are currently considered to be very effective to reduce CO2 emissions from cement production since there is no alternative reduction measure. Therefore, it should be recommended to allow the use of Slag and Fly ash as a tentative reduction measure for a limited period of 10 or 20 years while those are available. If possible, please replace the ▲ with ■ in row of "Production of Fly Ash and Blast Furnace Slag" and both columns of "Mitigation" and "Adaptation and Resilience" in Table 1. On the other hand, the cement company should indicate each available utilizing period for fly ash and blast furnace slag in its project document.	The table has been removed as it creates more confusion than clarity. Cement producers using fly ash and slag to reduce their cement emissions are not outside of scope. Rather, for the avoidance of doubt, 'production of' these SCMs (i.e., coal energy and steel production) cannot be part of bond proceeds. Climate Bonds does not see a need for a cut-off date, although it is well noted that beyond 10-20 years we expect such materials to be lower in availability. Rather, the Cement Criteria are regularly reviewed every 3 years. As part of these reviews, the availability of more suitable SCMs and fly ash and slag will be considered and thus whether preference should be given to other SCMs.
	30	I am not so sure whether the issuer could plan the detailed pathway threshold for 10 or 20 years. On the other hands, most of Japanese high efficient companies have mid-term investment plan for decarbonization which is about two to five year cycles. So, it is preferable to take option b) with the condition that the issuer could review and revise its transition pathway to comply with every three years as well. The reason why such review and revision is necessary is that they are trying to realize the next generation innovative technology to realize carbon neutral by 2050. The success of these innovation is very much uncertain at this moment, so, it is better to revise its transition pathway in two to three years at least.	Climate Bonds and the TWG agree with this viewpoint. Moreover, it is not clear whether an issuer could feasibly meet the pathway values in the future. As such, these Criteria are set as suggested here with the view that regular review will take place of the pathway in light of technological developments.
	31	Between the 2 options, we are more inclined towards option b).	Climate Bonds and the TWG agree with this viewpoint which will be implemented.

		A continued compliance approach culminating in a final target is more consistent with the strategy of TPI (Question 3) of establishing year by year thresholds that leads up to a net zero target in 2050. Having continued compliance ensures that at the end of the facility, the company should be in adherence and closer to its net zero target. A side benefit of this approach is also providing the issuer with multiple milestones to achieve the certification.	
	32	Option (b) is preferable since the reporting and compliance intervals are shorter and more appropriate to track the issuers' progress on emissions reductions. For example, PCAF's New Methods guidance on green bonds also recommends issuers to publish an impact report annually, which aligns with our approach on annual reporting.	Climate Bonds and the TWG agree with this viewpoint which will be implemented.
	33	Option b seems preferable as it encourages continuous monitoring and reporting	Climate Bonds and the TWG agree with this viewpoint which will be implemented.
	34	Option a could be considered.	Option b is being used due to the limitations cement production experiences today of meeting the future targets (as these represent future technological and production capabilities).
	35	Annual reporting. It's too easy to ignore the requirement for 10 years, play along and then refinance with a different bond. IF there's penalty clauses to prevent this, then maybe mid point, but ten years is a long time. Furthermore, the requirement to do annual reporting will de-facto force companies to carefully consider their emissions reporting – it's a win-win.	Climate Bonds and the TWG agree with this viewpoint which will be implemented.
	36	Demonstrating continued compliance is imperative. Several factories within the cement industry have a track record of violation of Human Rights across the world. In this case, it's especially important to build a robust system for transparency, accountability and verification of their activities, particularly taking into account the direct testimony of local communities nearby cement plants. A comprehensive account of the reality of waste incineration in cement kilns and how local communities have been obliged to defend themselves can be found here in this reference. *'We have a right to breathe clean air': the emerging environmental justice movement against waste incineration in cement kilns in Spain* Herrero, A. & Vilella, M. Sustainability Science (2017).	Climate Bonds and the TWG agree with this viewpoint which will be implemented.

		https://doi.org/10.1007/s11625-017-0473-x Access here: https://link.springer.com/article/10.1007/s11625-017-0473-x	
Cement grade correction factors	37	Accounting for cement class as a proxy for cement quality is not reasonable and will be counter net zero objective. The methodology also presents a major flaw as the clinker factor appears to be used twice. For the cement classes below 42,5 a correction downward of the threshold is applied, while for above a correction upward is applied. (Meaning that a cement in the 62,5 class will have 15% higher threshold). As most installations produce several cement types and classes, this would be far too complex but also allow higher emissions for higher cement class.	See section 4.3.3 in the Background Paper for full rationale for the correction factors by cement grade. The TWG strongly held the view that more reactive cements are crucial for bringing emissions down. In other words, more reactive cements have greater scope for substitution with SCMs and thus lower emissions. Cement strength grades are considered the most suitable proxy for cement reactivity. As such, an effective discount on carbon intensity of higher-grade cements is applied to reflect this increased opportunity for substitution. Because the correction factors are calculated based on dilution with *inert, unreactive* filler, cements that are subsequently diluted with *reactive* SCMs are thus favoured. Nonetheless, it is agreed there should be a specification for plants producing a range of products. As such, facilities and companies producing several different types and classes can take the mass-weighted average strength of produced cement. Furthermore, to avoid confusion, the 22.5 and 62.5 categories have been removed post-public consultation. These are not commonly produced and the TWG did not want to indicate that such cement grades should be produced when they lead to other issues.
	38	In Figure 1 and Table 3 of Section 3.2.3, it is not possible to use a global threshold because the amount of SCM added in cement depends on Regulation, Standard, and Building Code in each country. Therefore, it should be clearly indicated that "the threshold value described in this section is one of example for the Europe region". The reason is as follows; 1. 52.5 class cement is mostly consumed in Japan. This is a reason why cement with less SCM is required in areas where many earthquakes frequently occur. 2. As mentioned above, a transition roadmap for each sector has been developed in Japan through public-private partnerships, and the roadmap comprehensively describes low carbon manufacturing processes, low carbon raw materials, fuel shifting and CCUS to reach a net zero CO2 emissions. If such roadmap is existed, the	See section 4.3.3 in the Background Paper for full rationale for the correction factors by cement grade. The Criteria (in Chapter 4 of the Criteria document) are now as follows: 'The company/facility shall test their product following EN 197-1[6] or, if EN 197-1 is not used, corresponding nominal strength according to a locally used standard) and report the value'. This ensures that local standards can be used but ultimately corresponds to the compressive strength of the cement produced. The TWG strongly held the view that more reactive cements are crucial for bringing emissions down. In other words, more reactive cements have greater scope for substitution with SCMs and thus lower emissions. Cement strength grades are considered the most suitable proxy for cement reactivity. As such, an effective discount on carbon intensity of higher-grade cements is applied to reflect this increased opportunity for substitution. Because the

[6] https://datis-inc.com/blog/what-is-en-197-1-standard/

		Criteria document should incorporate it by priority. An introduction of "collection factor" in Table 4 on page 17 of Section 3.2.3 may help to asses several types of cement composition on the same line, but the following issues remain. 1. It is unclear how to determine collection factors related to cement class in the draft. Use of 42.5 as a global standard strength based on EN 197-1 is just a European case, and it is not possible to apply the correction factor of year threshold to other regions and countries. As shown above, since cement class 52.5 is a baseline in Japan, Table 4 should be indicated as an example of European case. Background paper: Section 4.3.2 on page 21 and 22 includes a slightly overestimated description that even if part of the clinker is simply replaced by SCM such as calcined clay, limestone and silica fume, it still meets the strength of 42.5 by EU standards. However, in Japan, initial properties including the workability of concrete are concerned as well as its strength. Also, comments on a validity of the correction factor cannot be addressed because it is much unclear how to deliver. Though the cement class 42.5 is the baseline in this draft, most of the cement used for building construction is 52.5 class in countries where earthquakes frequently occur.	correction factors are calculated based on dilution with *inert, unreactive* filler, cements that are subsequently diluted with *reactive* SCMs are thus favoured. Nonetheless, it is agreed there should be a specification for plants producing a range of products. As such, facilities and companies producing several different types and classes can take the mass-weighted average strength of cement.
	39	We could not clearly understand the calculations method from the current criteria draft and the background paper. We request you to disclose more precise conditions and calculations formula. Please disclose the definition of cementitious product. IN addition, please explain why the Table 3 carbon intensity starts from 0.455 in 2020. The current global emission intensity of cement sector seems to be much higher. We are afraid that you use the old version of TPI, isn't it revised now to 0.55? Please clarify the calculation formula of the correction factor and cement class. What is EN 197-1? If this refers from EU Taxonomy, or any EU regulations, it is not a global standard but regional standard.	Further explanation is now provided on calculation of the correction factors in section 4.3.3 of the Background Paper. On the carbon intensity thresholds, these are now updated in line with the latest pathways and 1.5-degree scenarios from SBTi. The starting point for 2020 was increased in line with the pathway updates. Because the TPI Pathway was originally based on a 1.75-degree pathway (B2DS) rather than 1.5-degrees, this has now been updated. The emissions pathway for companies is based on the SBTi 1.5-degree pathway for cement. This was developed through a robust process of stakeholder engagement and modelling. The emissions pathway for plants is based on a starting point of the EU Taxonomy on Sustainable Finance, and an endpoint in 2050 of zero emissions. The pathway follows the same trajectory as the SBTi sectoral pathway. The EU Taxonomy is based on real data from high performing cement plants in the region, demonstrating that these emissions are technically feasible. See sections 4.3.1 and 4.3.2 of the

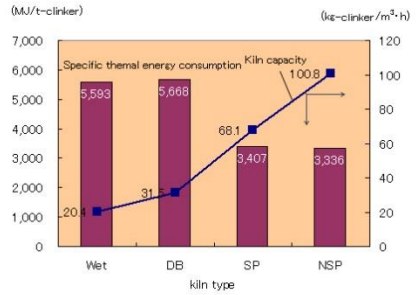
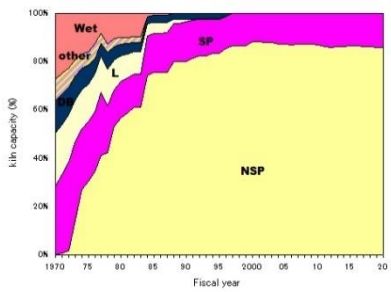
			Background Paper. It is acknowledged the thresholds for cement production facilities is ambitious. However, there is far more leeway for companies to become certified through the criteria for companies, as distinct from facilities.
	40	There are two key elements with the proposed methodology. Firstly, it differentiates cement classes using the European Standard EN-197. Secondly, it applies a correction factor on the cement class, penalizing classes with a lower clinker quality. The methodology implicitly assumes that the European Standard will be used consistently. We need to recognize that different countries have different local standards, for instance Singapore uses the Singapore Standards developed by SPRING Singapore (SSC, 2014) and other Asian countries use ASTM standards. We suggest adapting to using the local equivalents if EN-197 is not widely applied. In our opinion, applying a discount on the carbon intensity enhances the soundness of the methodology as it reflects the higher chemical reactivity and higher potential for SCM addition. In addition, we note that the mitigation requirements are based on a strategy to be part of an economy that is net zero by 2050. It is not currently possible to achieve zero carbon cement due to the limitations of today's technologies.	Climate Bonds agrees that local standards should be accepted where EN 197-1 is not used. As such, the Criteria (in Chapter 4 of the Criteria document) are now as follows: 'The company/facility shall test their product following EN 197-1[7] or, if EN 197-1 is not used, corresponding nominal strength according to a locally used standard) and report the value'. This ensures that local standards can be used but ultimately corresponds to the compressive strength of the cement produced. These comments grasp the rationale of the TWG to include correction factors. As such, the group are of the opinion they should continue to be used. However, it is noted that, to avoid confusion, the 22.5 and 62.5 categories have been removed post-public consultation. These are not commonly produced and the TWG did not want to indicate that such cement grades should be produced when they lead to other issues.
	41	Given CBI's use case, differentiation of cement class could be appropriate, and rationale is reasonable. However, we are not best placed to provide feedback on this topic at this time.	No response needed.
		While the rationale (incentivising cement companies to encourage their customers to optimize the use of cement in concrete) is commendable, it is not clear it would have the desired effect for a few reasons: ● It seems to potentially create a situation that if all companies were using this method, there would be a risk that the emission budget would not be met - what if all companies declare higher than average strength and thus have a more lenient CO2 requirement? (What is the basis of the assumption that 42.5 MPa is the average strength across the globe?) ● Higher strength cement does not necessarily mean less of this cement will be used in concrete - this depends on the concrete producer. So it is	Clearer rationale is provided in section 4.3.3 of the Background Paper for the correction factors, along with the methodology for their calculation. The TWG strongly held the view that more reactive cements are crucial for bringing emissions down. In other words, more reactive cements have greater scope for substitution with SCMs and thus lower emissions. Cement strength grades are considered the most suitable proxy for cement reactivity. As such, an effective discount on carbon intensity of higher-grade cements is applied to reflect this increased opportunity for substitution. Because the correction factors are calculated based on dilution with inert, unreactive filler, cements that are subsequently diluted with reactive SCMs are thus favoured.

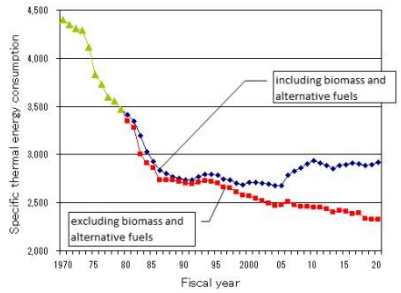
[7] https://datis-inc.com/blog/what-is-en-197-1-standard/

		rewarding cement producers for an outcome that may or may not happen. By a similar logic, one could encourage cement producers to produce cement with a *higher* clinker factor, as these cements could be used with a greater share of cement substitutes in concrete (at least according to the standards in many markets) - but incentivising higher clinker factors is the opposite of what should be done ● As the outcome is uncertain (i.e. whether higher strength cement leads to concrete with less cement), it is not clear that the carbon savings would match those higher cement emissions intensities allowed by the threshold adjustment calculation "Overstrength" (where concretes are produced at higher strengths than required by the design, for many reasons including logistics or lack of awareness) is already a barrier to carbon efficiency in concrete production and this approach seems like it could add to this issue (see for example https://mdpi-res.com/d_attachment/civileng/civileng-03-00004/article_deploy/civileng-03-00004.pdf)	Furthermore, to avoid confusion, the 22.5 and 62.5 categories have been removed post-public consultation. These are not commonly produced and the TWG did not want to indicate that such cement grades should be produced when they lead to other issues.
	43	We have not come across this type of methodology where cement class impact emissions. Also, various plants manufacture different type of cements. The proposed methodology/option will create several complexities for the company. So this should be relooked by the team.	See section 4.3.3 in the Background Paper for full rationale for the correction factors by cement grade. The TWG strongly held the view that more reactive cements are crucial for bringing emissions down. In other words, more reactive cements have greater scope for substitution with SCMs and thus lower emissions. Cement strength grades are considered the most suitable proxy for cement reactivity. As such, an effective discount on carbon intensity of higher-grade cements is applied to reflect this increased opportunity for substitution. Because the correction factors are calculated based on dilution with *inert, unreactive* filler, cements that are subsequently diluted with *reactive* SCMs are thus favoured. Furthermore, to avoid confusion, the 22.5 and 62.5 categories have been removed post-public consultation. These are not commonly produced and the TWG did not want to indicate that such cement grades should be produced when they lead to other issues.
	44	I think it's reasonable but I'm not an expert here.	No response needed.
	45	The International Energy Agency and the Cement Sustainability Initiative (IEA/CSI), an industry group of 24 major cement producers (whose members include about 33% of world's cement production and operate in over 100	No further change proposed. The correction factors are intended to encourage substitution with SCMs by rewarding cements that can be diluted with such materials. The TWG thus agree with these points that clinker substitution will be one of, if not the

		countries) issued a report in 2018 laying out a roadmap for greenhouse gas reduction measure for their industry sector. Their plan describes steps needed to achieve CO2 reductions consistent with at least a 50% chance of limiting the average global temperature increase to 2°C above pre-industrial levels by 2100. "Realizing the sustainable transition of the 2 degree Celsius Scenario (2DS) implies a significant reduction of the global direct CO2 emissions by 24% compared to current levels by 2050…[8] Efforts made under this scenario would result in an average temperature increase of 2.7° C by 2100." In the roadmap, reductions in carbon emissions to conform to the 2DS depend slightly on thermal energy efficiency (3%) and fuel switching (12%), but mostly on clinker substitution with low carbon materials (37%) and, in the long-term, on the future development technologies such as carbon capture and storage (48%) for the industry. Since the promise of carbon capture and sequestration has yet to be realized and is not anticipated to be effective at scale anytime soon, and the peril of rising climate gases in the air (according the last latest IPCC report) imperil humanity's existence, taking actions to reduce these emissions from the cement sector with strategies and technologies which will know will deliver discrete, measurable, and consistent reductions would seem prudent. The IEA/CSI report clearly points to clinker substitution as the most potent path toward carbon reductions in this sector.	most, important decarbonisation levers for the cement industry.
Appropriate thresholds for retrofits or installation of measures which reduce emissions: Would 30-50% reduction be a suitable threshold?	46	For the improvement rate needed, the target is 50% improvement in 30 years (Criteria document, page 14). For a single investment this is out of the question. For shorter periods (5 years or below) it is 30% which is the minimum. In our opinion chasing these targets is significantly challenging for single installations/investments. For a portfolio of investments this might make sense. Industry wide threshold cannot be used at plant level. Apart from technology development, two other issues are to be considered: A) Infrastructure B) Public acceptance / Policy framework. The conditions have not yet been achieved to make decarbonation in the cement industry an investable proposal. The market, including the governmental market, is ill prepared for low carbon cements and their consequences. Also, the needed infrastructure (e.g., renewable energy, collection for recycling of concrete	Climate Bonds and the TWG agree that these proposed thresholds are overly ambitious and not reflective of available technological improvements. As such, decarbonisation measures are either: a) automatically eligible due to their mitigation benefit and lack of downside, or: b) eligible if part of a bundle of measures which achieve the same level of emissions reductions seen in the pathway for the period of the bond tenor These measures are intended to allow investments in old facilities to be potentially eligible if the measures being implemented meet these criteria. Automatically eligible measures are relevant for investors wishing to invest in capital investments across a range of assets through loans etc.

[8] https://www.iea.org/news/cement-technology-roadmap-plots-path-to-cutting-co2-emissions-24-by-2050

		waste, CO2 network, etc.) is not available or available in a limited way. We suggest replacing the whole approach by mere contribution to achieving the pathway.	
	47	Chart 4 in Section 3.2.2 should be deleted for the following reasons since it is considered to provide an incorrect information. 1. There are few new facilities with an energy efficiency of 30% in cement plants. Though it is possible to provide substantial energy conservation using NSP or SP, such facilities have been already installed at the most cement plants. See the below figure 1.  **Figure 1 Thermal energy efficiency and kiln capacity by kiln type** For instance, all kilns in Japan are composed of SP and NSP kilns. The transition is shown in Figure 2.  **Figure 2 Kiln capacity by the kiln type in Japan** Therefore, the proposed mitigation criteria in Chapter 3.2.2 are inappropriate, because Japanese cement companies do not reduce CO2 emissions using substantial reduction equipment with more than 30%, but an accumulation of minor reduction measures	Criteria document: Climate Bonds and the TWG agree that these proposed thresholds are overly ambitious and not reflective of available technological improvements. As such, decarbonisation measures are either: a) automatically eligible due to their mitigation benefit and lack of downside, or: b) eligible if part of a bundle of measures which achieve the same level of emissions reductions seen in the pathway for the period of the bond tenor These measures are intended to allow investments in old facilities to be potentially eligible if the measures being implemented meet these criteria. Automatically eligible measures are relevant for investors wishing to invest in capital investments across a range of assets through loans etc. This means that, even if at a single plant level the emissions reductions are minimal, collectively they are significant and should be encouraged. Background paper: Feedback is highly valued on the list of automatically eligible assets. For clarity, SCM production is removed from the list of automatically eligible assets. However, the TWG held the view that equipment dedicated to the production of SCMs such as calcined clays and other SCMs should be eligible providing it is dedicated to the production of such materials as distinct from clinker. The Cement Criteria do not define optimum cement products for use, though this is a desired effect in the market. Ultimately, these criteria are intended to signal what 'good' looks like from a climate perspective. The cement market determines which of these solutions is most economical. While true that cement production is highly subject to regional contexts, reliance on regional pathways is problematic. Firstly, it does not guarantee that they meet the necessary ambition needed to meet 1.5°C in the sector. Secondly, some regions do not have their own pathways which makes a global pathway a necessity. Ultimately, the entity level criteria in the Cement Criteria reflect regional contexts to an extent: companies that are not yet on the pathway can meet Tier 2 requirements through meeting the pathway by 2030 and having a transition plan that demonstrates how they will get

		through operation management shown in Figure 3.  **Figure 3 Specific thermal energy consumption for cement production Kiln capacity by the kiln type in Japan** source: https://www.jcassoc.or.jp/cement/2eng/e_01a.html 2. An efficiency when installing multiple energy conservation facilities cannot be simply obtained by summing up all efficiencies since it may be offset between those of the facilities. Background paper: In section 4.4.1 on page 22-25, the measures and outlooks from 4.4.1 (recovery of waste heat) to 4.4.9 (grounding/mixing) are generally correct except for 4.4.2. Regarding the SCM of 4.4.2, the effects of Calcined clays, Limestone and Silica fume on their performances are overestimated. Since Japan is a country where many earthquakes occur frequently, the safety criteria are strictly set for the Building Codes and the clinker ratio is 0.83 even higher than the world average value of 0.72. Since "threshold values" are discussed without considering national/regional circumstances at all, the document will not be a global guideline.	there. This would give ample time to overcome various regional barriers currently faced.
	48	We do not think it possible for Japanese cement sector to realize 30 to 50% reduction from retrofits or installation. The reason is quite simple. The Japanese cement companies have already introduce the current best-practice energy saving facilities in its factories since 1990's. If you look at the attached paper, you may see how the Japanese cement sector's energy consumption is lower than others. In Japan, we do accept any best-practice retrofits or installation measures listed in METI's	Climate Bonds and the TWG agree that these proposed thresholds are overly ambitious and not reflective of available technological improvements. As such, decarbonisation measures are either: a) automatically eligible due to their mitigation benefit and lack of downside, or: b) eligible if part of a bundle of measures which achieve the same level of emissions reductions seen in the pathway for the period of the bond tenor

		transition roadmap, which were listed from Japan's technical experts for cement and low-carbon technologies, which include academia, global investors, verifiers and METI's in-house experts. Please refer the attached committee members' list for METI's technical roadmap. For low emission building criteria, CBI consider the national difference. I recommend you to make plural reduction threshold by country, like low-emission building criteria.	These measures are intended to allow investments in old facilities to be potentially eligible if the measures being implemented meet these criteria. Automatically eligible measures are relevant for investors wishing to invest in capital investments across a range of assets through loans etc. This means that, even if at a single plant level the emissions reductions are minimal, collectively they are significant and should be encouraged. While true that cement production is highly subject to regional contexts, reliance on regional pathways is problematic. Firstly, it does not guarantee that they meet the necessary ambition needed to meet 1.5°C in the sector. Secondly, some regions do not have their own pathways which makes a global pathway a necessity. Ultimately, the entity level criteria in the Cement Criteria reflect regional contexts to an extent: companies that are not yet on the pathway can meet Tier 2 requirements through meeting the pathway by 2030 and having a transition plan that demonstrates how they will get there. This would give ample time to overcome various regional barriers currently faced.
	49	Should digitisation measures be allowed as automatically green if the plant is dirty? Especially when it wouldn't provide a 30% reduction in emissions as conditionally eligible ones do.	The documents have been made clearer on this point. The list of automatically eligible measures represents measures with little to no climate downside. I.e., they deliver climate benefits today yet do not lock-in technology incompatible with a 1.5-degree scenario for cement. They are relevant for investors wishing to invest in capital investments across a range of assets through loans etc. This means that, even if at a single plant level, the emissions reductions are minimal, collectively they are significant and should be encouraged. As for a threshold for improvement, this is rather intended to allow a whole bundle of measures into an old production facility to be eligible. However, the Criteria now do not stipulate a minimum 30% improvement for a bundle of measures, which was considered too rigid and ambitious by the TWG. Rather, the measures must simply deliver the same emissions reductions as defined by the pathway. See Box 1 in the Criteria document and section 4.6 in the Background Paper for full details.
	50	We agree with the broad idea that a minimum improvement in emissions is the best way to capture the cumulative impact of measures. A further step to ground the thresholds in emissions materiality and current state of technology. Regarding a 30-50% reduction threshold, there are two additional comments. 30% Minimum Reduction To impose 30% minimum reduction for bond with short tenors (< 5 years) could be too	Climate Bonds and the TWG agree that these proposed thresholds are overly ambitious and not reflective of available technological improvements. As such, decarbonisation measures are either: a) automatically eligible due to their mitigation benefit and lack of downside, or: b) eligible if part of a bundle of measures which achieve the same level of emissions reductions seen in the pathway for the period of the bond tenor

		demanding as these are significant retrofits and require a longer period of transition. While it is evident that the instalment of waste heat recovery systems can result in a 30% reduction in overall plant electricity needs (IFC, 2021), it does not follow that there could be a 30% minimum reduction in emissions just from this. 50% Upper Limit Setting a 50% upper limit for longer term issuances is reasonable but also implicitly assumes further technological improvements down the line. Drawing on the other idea about technological viability in the CBI white paper, it is important to also assess current and expected technologies. Most of the current upgrades come in the form of heat recovery systems or waste heat recovery systems, but thermal emissions only make up 40% of the total carbon emissions of cement production (IFC, 2021). For structures, it is reported that GHG emissions reductions of more than 50% can be achieved through early-stage interventions and optimized design (Allwood, 2021). However, this level of improvement requires early engagement with architectural, transport, civil engineering, design, and construction institutions in a systematic way to implement materially efficient and reusable design for vehicles, machinery, buildings and infrastructure. For these reasons, a retrofitted upgrade is unlikely to see these levels of reductions. As such, there is an implicit assumption of technological improvement that we are imposing if we were to adopt the 50% reduction.	These measures are intended to allow investments in old facilities to be potentially eligible if the measures being implemented meet these criteria. Automatically eligible measures are relevant for investors wishing to invest in capital investments across a range of assets through loans etc. This means that, even if at a single plant level the emissions reductions are minimal, collectively they are significant and should be encouraged. As for early-stage design, the TWG strongly agreed this was key to decarbonising the whole cement and concrete sector. However, as it covers concrete, it was unfortunately outside of the scope of criteria.
	51	It is appropriate for this use case to have a threshold for retrofits or installations. However, we are not best placed to provide a specific comment on a suitable threshold. Additionally, more clarification is needed on the methodology to set the appropriate threshold.	See clarifications in previous points (46 onwards). The methodology now simply links to the pathway set, making it more robust and simple.
	52	What is the basis of the 30–50% ambition and how does it fit with the pathways? Not clear how this fits in with the general requirement to meet emissions intensity pathways? Even 30% seems like a large improvement for one-off measures but if it is for a series of measures throughout the plant then it is reasonable.	See clarifications from previous points (46 onwards).
	53	The proposed reduction level are quite steep. The team should revaluate the threshold values given that there are several challenges in terms of high investment, lack of policy support etc.	See clarifications from previous points (46 onwards).

	54	Provided that the changes do not preclude the addition of other measures, this is fine. The key issue is amine scrubbing – it's not good enough long term.	See clarifications from previous points (46 onwards).
	55	Since the majority of emissions are from the calcination of the limestone, measures that reduce the production of clinker are necessary. Retrofits that add preheaters/precalciners to older kilns or replace wet kilns with dry kilns could be seen as a transition strategy to increasing efficiency in the industry. Because cement kilns are expensive to build and they are often built near a local source of limestone, many older kilns are still being operated across the world. Some of these kilns are older, inefficient "wet" kilns which use much more energy to operate than newer kilns with preheaters/precalciners. For an industrial sector which is already one of the most energy intensive sectors globally, even small improvements in efficiency could yield huge benefits to the climate. Even in the United States, a number of cement kilns continue to use the absolutely most energy inefficient cement making process available, essentially gobbling up any emissions reductions that would/could be made at modernized kilns. According to industry sources, of the 128 kilns at the 91 U.S. cement plants, 10 wet kilns still remain in operation in the United States. The energy intensity of wet kilns is 5.5 MMT btu/ton cement while a kiln with a preheater/precalciner is 3.1 MMT btu/ton cement, essentially there is a much lower energy intensity demonstrated for the various dry processes.[9] Clearly, steering carbon bond investments toward replacing all the wet kilns in the world with dry kilns using preheaters and precalciners would make a major dent in the carbon intensity of cement globally since kilns using preheaters/precalciners use approximately 45% less energy that wet kilns.	See clarifications from previous points (46 onwards). These comments are highly valued. Converting wet to dry kilns is a considered a crucial first step for many plants. However, the TWG made the point that this is effectively building a new facility. As such, at this stage, the facility should be expected to meet the overarching emissions pathway.
Biomass feedstock as a fuel source – additional criteria for usage	56	For carbon neutrality of biomass materials, a separate set of criteria is applied. We have not assessed the concept of CBI on carbon neutrality of biomass but insist that fuel switch to biomass is always eligible.	In order to align with other Climate Bonds sector criteria, Biomass must meet the Bioenergy Criteria. Moreover, the TWG advocated their use only under meeting certain conditions such as demonstrating lower GHG emissions and avoidance of Indirect Land Use Change (iLUC).
	57	It is understandable that the consideration of iLUC in Section 3.2.4 is very important. However, since an energy usage composition varies depending on the country or regional	In order to align with other Climate Bonds sector criteria, Biomass must meet the Bioenergy Criteria. Moreover, the TWG advocated their use only under meeting certain conditions such as demonstrating lower GHG emissions and avoidance of Indirect

[9] Bohan R. 2019. Development of Alternative Fuels in the U.S. Cement Industry. Portland Cement Association. ZKG 1-2. https://www.zkg.de/en/artikel/zkg_Development_of_alternative_fuels_in_the_U.S._cement_industry_3302670.html

		circumstances, iLUC should be applied as a national/reginal option.	Land Use Change (iLUC). While iLUC may be regionally variable, if it is low risk in certain regions, issuers should have no problem meet the Bioenergy Criteria and demonstrating iLUC is not taking place.
	58	I agree to this criteria. Also, I agree to comment that this fuel as an alternative fuel and they should no longer be expected to act as an alternative when more suitable alternative fuels become readily available. I reality, we expect such next generation lower fuels such as ammonia or hydrogen technology is likely to realize in 2040's.	Climate Bonds and the TWG agree with this comment and thus no change is proposed.
	59	We agree with using Climate Bonds Bioenergy Criteria and the 2 conditions set out. Additional Criteria An additional criterion would be the inclusion of local conditions/regulations as far as possible. In the Egypt Cement sector, they use biomass by-products from the sugar industry (Cement News, 2019). This promotes circularity and reduces reliance on fuel subsidies. Timeline Regarding the timeline to phase out feedstock, regulations and policies are not well defined so we take guidance from the market by examining the different plans and timelines set out by issuers. Bulk of the issuers we cover are considering setting a minimum alternative fuels rate by a certain date in the future. Most are targeting a 40%-50% alternative fuel rate by 2040-2050. This is challenging but achievable. As available options increase in the future, it is worth increasing this threshold over time.	Climate Bonds and the TWG agree with this comment and thus no change is proposed. On the inclusion of biomass by-products, these fuel types could fall under the criteria for waste-derived fuels. As for timelines, Climate Bonds criteria are regularly reviewed. This includes review of available fuels for the sector and thus if preferable fuels emerge to Biomass, the TWG may consider blanket exclusion. For now, however, few alternatives exist to fossil fuels and it was therefore seen unsuitable to exclude Biomass outright. See section 4.7.1 for full rationale.
	60	The additional criteria on biomass feedstock production is appropriate since section 3.2 of the Climate Bonds Bioenergy Criteria is robust and comprehensive providing mitigation requirement of criteria. Our suggestion is to align with the roadmap used on the timeline for biomass use.	Climate Bonds and the TWG agree with this comment and thus no change is proposed.
	61	It is not clear whether the criteria are about whether or not such sources may be used at all, or about whether they may be considered CO2-neutral. In general, any criteria strengthening the need to justify that a fuel is CO2 neutral is a good thing.	Climate Bonds and the TWG agree with this comment and thus no change is proposed. Note, emissions from biomass burning are not viewed as zero emissions in the accounting.

	62	The cement sector follows the IPCC guideline to determine carbon neutrality of biomass. Use of biomass has also been identified as a decarbonization lever by the technology roadmaps. Use of biomass is also acceptable by UNFCCC as carbon mitigation option. Therefore, our recommendation is that the switch to biomass should be acceptable.	Climate Bonds and the TWG agree with this comment and thus no change is proposed. Nonetheless, in order to align with other Climate Bonds sector criteria, Biomass must meet the Bioenergy Criteria.
	63	Land use change is incredibly complex. I agree with allowing biogenic waste fractions to be burned (with the caveat above on lack of ambition in the decarbonization pathway if they are). Cement has a very viable set of alternative and climate neutral fuels to biomass. I would personally put biomass out of scope – it's an incredibly wasteful use of a valuable material to use it in a cement kiln. Possibly I would allow burning of waste biomass materials (i.e. materials that are a by-product of food production).	The TWG agree with the comments that biomass is not a long-term solution for cement fuel switching and brings with it considerable risks. However, in the same way as burning waste-derived fuels, it was considered necessary to allow biofuels as a transition fuel. Alignment with the Bioenergy Criteria would then minimise the risks that come with such fuels. As criteria are reviewed, the TWG will consider whether such fuels should be excluded, or a specific cut-off date set for their inclusion. See section 4.7.3 for full rationale.
	64	Biomass use as fuels - generally called biofuels - is not a path GAIA is supportive of; including biofuels use should not be an eligible activity to receive climate bonds, as it would create perverse incentives to use a finite resource generating a very significant amount of GHG emissions. If utilised, the use of biofuels should also be included in the scope for accounting of GHG emissions.	See response for comment 63. Emissions from biofuels are indeed included in the scope of GHG accounting for these Criteria. This is clarified now in the documents.
Adaptation & Resilience Criteria	65	We do not have much to add to the checklists in 3.4.1 and 3.4.2. Main question would be how we would operationalize these requirements. While it is the issuer's responsibility to provide the information, certain considerations come to mind: - Are there standard documents for these concerns, especially for 1.2, 2.1 and 4.1? - 3.4 mentions the range of assessment and impact reports and associated data but do we have actual templates from companies? Who determines the standard? - Has a pilot study been conducted especially for either project finance or corporate finance? How was it received? - How much additional costs would this impose?	No response needed other than Climate Bonds will aim to add additional context and material for verifiers. Few templates exist from companies but other comments (see comment 67) indicate there are common industry practices for this. As such, the verification cost should not be overly onerous. Unclear what section 3.4 is referring to. However, a verifier would be one of CBI's approved verifiers, not the financial institution or asset manager.

		- We are also assuming that the verifier mentioned in 3.4 would be the SPO, not the financial institution or the asset manager?	
	66	We are not best placed to provide feedback on this topic.	No response needed.
	67	This is a standard industry practice and is acceptable.	Comments well received.
	68	Not an expert here.	No response needed.
	69	In the Background Paper, Section 4.4.6, CBI stated that using "waste streams stripped of the recyclable content" will displaces the consumption of fossil fuels with little to no downside. This is clearly oversimplifying the complex issues behind waste burning activity. There are many significant environmental risks that should be taken into account in using waste as alternative fuels: 1. **Waste that is used as alternative fuels (e.g. Refuse-Derived Fuel) is in fact fossil-fuel in disguise which will significantly harm our climate.** In addition to our feedback on question two, we must acknowledge that "the non-organic fraction of municipal waste streams, stripped of the recyclable content" is actually a mix of various waste dominated with fossil-based material. Typically RDF is comprised of: 31% plastic, 30% unknown, 13% paper, 14% textiles, and 12% wood.[10] Sadly, a lot of textile waste is also made from synthetic plastics-based material[11] and/or coated with plastics such Perfluorinated Compounds (PFAS)[12] — which is used to gain water-resistant and stain-resistant characteristics. Moreover, the "unknown" fraction is likely to contain some type of plastics, such as waste tires and plastics-laminated packaging. This means that over more than 60% of RDF is plastics or containing plastics. Consequently, using waste streams as source of alternative fuels does not displace the consumption of fossil fuels. It only displace one fossil-fuel with another and perpetuate fast growing plastic production — locking in new fossil-fuel infrastructure and increase emissions that arise from the exploration, extraction, transport and refining of oil, gas, and coal.[13] 2. **Using "waste streams stripped of the recyclable content" as alternative fuels does not change the fact that many plastics are halogenated and rich in various harmful**	See section 4.7.3 of the Background Paper for full rationale for the inclusion of waste-derived fuels in cement plants. See section 6.3 in the Criteria document for the additional requirements for such fuels. The Cement Criteria have been updated to reflect concerns with using waste-derived fuels, namely: • Emissions from waste burning are now accounted for • All recyclable content must be removed in line with the Climate Bonds Waste Management Criteria, representing more stringent requirements on recycling.

[10] Currie, J. (2011), The valorisation of SRF in cement kilns, Workshop and site visit: Production and utilisation options for Solid Recovered Fuels, IEA Bioenergy Task 32 and 36, Dublin, 20-21 October 2011, quoted in "La puerta de atrás de la incineración de residuos". Greenpeace, 2012.

[11] https://www.eea.europa.eu/themes/waste/resource-efficiency/plastic-in-textiles-towards-a/

[12] https://ipen.org/documents/pfas-clothing-study-indonesia-china-and-russia-shows-barriers-non-toxic-circular-economy

[13] https://www.boell.de/en/2019/11/04/climate-change-not-green-greenhouse

		chemical types. Harmful chemicals such as Bisphenols, Alkylphenols, PFAS, Brominated Flame Retardants (BFRs), Dioxins, Phthalates, UV Stabilizers, Lead and Cadmium are expected to be found in household waste streams.[14] Plastic waste —in particular those containing halogens such as PVC, polytetrafluorethylene/teflon, plastic containing brominated flame retardants— can cause emissions of hazardous substances, such as acid gases and unintentional persistent organic pollutants such as dioxins.[15] Additionally, hazardous domestic waste like Waste Electrical and Electronic Equipment (WEEE) —containing various toxic chemicals with flame retardants— are often found mixed in the municipal waste streams. This situation is particular in countries where separated waste collection is not happening, especially Global South countries. Consequently, determining the halogen content through a chemical analysis of waste-derived fuels should be done to avoid production of Persistent Organic Pollutants (POPs) — particularly dioxins. However, there is no legal requirement on how often this analysis should be conducted and on which halogens it should focus — a toxic loophole that should be closed through excluding waste-derived fuels burning from the draft criteria. 3. It is very hard to guarantee that both all recyclable content is stripped from waste, and that waste burning cement kilns will not hinder recycling targets There are numerous factors that determine whether a material is recycled or not. Material that is theoretically or technically recyclable might not get recycled in various contexts. For an example, a PET bottle could probably not get recycled when in the particular location: 1) the waste collection coverage is low level; 2) it has poor quality of waste separation; 3) the city lacks of solid waste management systems, infrastructures, and budget; 4) the situation of local recycling markets and supporting policies does not encourage recycling. Additionally, separating waste based on its chemical (e.g. halogen) contents is difficult to conduct anywhere in the world. Since both non-recyclable and recyclable waste can be used as alternative fuels to cement kilns, waste prevention and recycling are discouraged, while tending to lock-in an increasing generation of waste over time. In 2017, the City of Ljubljana, which has implemented separate collection of packaging waste and biowaste, found ±40% of recyclable	

[14] https://www.endocrine.org/topics/edc/plastics-edcs-and-health
[15] https://pubmed.ncbi.nlm.nih.gov/29035713/

		waste in its residual waste. Similarly, The City of Milan also had ±40% of recyclables —mostly paper and cardboard— after achieving 60-65% separate collection.[16] Thus, burning waste as alternative fuels are likely to burn some recyclables and hinder further progression of recycling rates. This can be observed in Seoul[17], Madeira and Azores[18], etc. where cities/municipalities are bound to send waste with high calorific value for 20-25 years. 4. **Burning plastics as fuels also pose higher maintenance costs for cement production facilities due to the halogens emitted which cause corrosion in thermal facilities**.[19] As explained in the first point, plastics are rich in halogenated substances. A recent report by International Pollution Elimination Network (IPEN) highlighted that chlorine and bromine may accumulate in cement kiln systems limiting their capacity for thermal recovery of plastic. Hence, the utilisation of Refuse-Derived Fuels requires tighter specifications, including limits on mercury and chlorine content which can be emitted from burning operations, corrode cement kilns or reduce the quality of the cement produced.[20] 5. **Many countries are neither prepared nor equipped to monitor POPs emission from burning waste-derived fuels in cement kilns.** An example from Indonesia where dioxin and furan emission monitoring from cement kilns is only mandated once every four years with the emission standard of 0.1 ng TEQ/Nm3 (stipulated in the Ministry of Environment and Forestry Regulation No. 19 year 2017 concerning emission standard for the cement industry).[21] Accountability and transparency of emission monitoring results has been a long winding problem as well. In the Philippines, POPs monitoring are subject to self-reporting and the disclosure of compliance reports; no independent monitoring data was made available. Moreover, for many developing countries, local laboratories capable of sampling and analysing dioxins (PCDDs/PCDFs) are either nonexistent or very limited in numbers. 6. **High temperatures do not happen all year long in cement kilns.** In Section 4.4.6. "Alternative fuels" in the background paper, CBI states that cement kilns "*can burn a wider range of waste streams for its calorific requirements, due to operating at higher temperatures to other industrial processes*". This statement assumes that burning waste in a very high	

[16] https://zerowasteeurope.eu/library/building-a-bridge-strategy-for-residual-waste/
[17] https://seoulsolution.kr/sites/default/files/policy/03_Smart%20Waste%20Management%20in%20Seoul_final.pdf

[18] https://zerowasteeurope.eu/library/the-hidden-costs-of-incineration-the-case-of-madeira-and-azores/

[19] https://www.tandfonline.com/doi/abs/10.1080/10643389.2020.1717298?journalCode=best20
[20] https://ipen.org/sites/default/files/documents/ipen-plastic-waste-management-hazards-en.pdf
[21] https://ipen.org/documents/refuse-derived-fuel-indonesia

		temperature will result in zero toxic waste or emissions is flawed. It is true that a cement kiln can reach up to 1,450°C when operated in normal conditions. However, there will be events when the temperature of the flue gas is below 850°C (or 1,100°C if the presence of halogenated content of organic substances above 1% of the waste content) when the required temperature levels to prevent POPs formation is not achieved. These events can happen during "other than normal operating conditions" such as scheduled start-ups and shut-downs, unscheduled down times, and technical accidents. Recent studies indicate that it is not uncommon for large combustion facilities to be operating in these "other than normal operating modes.[22] Studies have shown that even small changes in temperature can result in large changes in concentrations of POPs in the flue gas. One case study from 'state of the art' waste-to-energy (WTE) incineration plant, *Reststoffen Energie Centrale* (REC) in Harlingen (the Netherlands) has depicted serious shortcomings and legal loopholes in the temperature control of waste burning. Therefore, even if both burning halogenated waste are successfully avoided and POPs emission monitoring capacity are sufficient, POPs formation, and their concomitant public health impacts, are still very likely to occur. 7. **Waste co-incineration in cement kilns releases more pollutants than waste incineration.** This means more pollution per kg of fuel burnt is released from cement kilns compared to waste incinerators. While the waste incinerator sector is required to meet strict operational and emissions standards, these same regulatory requirements are not required for the cement industry sector. In particular, the exhaust gas flow rate is higher for cement kilns than waste incinerators, which is a major contributing factor to the higher pollution levels emitted by cement kilns. According to US industry compliance data, for each tonne of waste burned in a cement kiln, the exhaust gas flow rate is 5-10 times higher than in a waste incinerator. This means that each pollutant released from cement kilns is 7 times higher compared to a waste incinerator. Therefore, when measured in grams per second, or total grams per year a cement kiln emits far more of the worst air pollutants than a waste incinerator.[23] 8. **Communities have suffered from the unchecked pollution happening in their environment.** To assess the real impact of waste	

[22] Understanding Excess Emissions from Industrial Facilities: Evidence from Texas, Nikolaos Zirogiannis, Alex J. Hollingsworth, and David M. Konisk, Environmental Science & Technology 2018 52 (5), 2482-2490DOI: 10.1021/acs.est.7b04887)

[23] From E.W. Kleppinger (1993) "Folly or Redemption: Can cement kilns really do the job? " EWK Consultants Inc. 407 N Street, SW Washington, D.C. 20024-3701, paper reproduced at http://chej.org/wp-content/uploads/Cement-Kilns-PUB-0401.pdf accessed on April 20, 2022

		incineration on human health and the environment, bioassays could be explored by analysing the presence of POPs in biomatrices in the surroundings of cement kilns. A research analysis conducted by ToxicoWatch Foundation in three countries found that the environment there are under threat by contamination of substances of very high concern in eggs of backyard chicken, pine needles, and mosses.[24] The analysis of chicken eggs around incinerators shows that the majority of eggs exceed the EU action limits for food safety as regulated in the EU Regulation 2017/644. The results of the analysis of the vegetation, pine needles and mosses also show high elevation of dioxin levels in the vicinity of the waste incinerators. Hence, continuous POPs monitoring from cement kilns air emission, toxic ash, and biomonitoring should be conducted to fully protect communities around cement production facilities where waste-derived fuels are burnt. Studies have repeatedly affirmed that cement plants pose significant risks for local communities' health.[25],[26] Below are some relevant cases: ● Apaxco, a small town in Mexico, has been on the frontlines of fights against pollution from cement kilns.[27] A subsidiary of the Holcim-Apasco cement company named Ecoltec started operations in 1998 and has caused at least three major accidents in 2004, 2007 and 2009. The accident in May 2009 resulted in strong odours involving acrylate, which spread to a 4-kilometre-radius, causing headache and eye irritation to the community members. One month and a half before the accident, eleven peasants had died after breathing toxic gases inside a well that they cleaned, presumably contaminated by the company. Researchers from University of Mexico (UNAM) have evaluated the health impacts of the accident in 2009 (305 people were tested) and discovered the followings: ○ 86% had symptoms of acute intoxication ○ 69% of children in primary school had severe memory damage. ○ 46% of children have some alteration in higher mental functions. ○ 74% of those studied present some degree of damage, which in 50% of cases is severe. ● In Western Australia, Cockburn Cement (a subsidiary of Adelaide Brighton) has been at the centre of protests by local residents for many years, as dust and fumes from the facility	

[24] https://zerowasteeurope.eu/library/the-true-toxic-toll-biomonitoring-of-incineration-emissions/
[25] Schuhmacher, M., Domingo, J.L., J. Garreta, Pollutants emitted by a cement plant: health risks for the population living in the neighborhood, Environ. Res. 95 (2004) 198–206.
[26] Rovira J, Nadal M, Schuhmacher M, Domingo JL. Environmental levels of PCDD/Fs and metals around a cement plant in Catalonia, Spain, before and after alternative fuel implementation. Assessment of human health risks. Sci Total Environ, 2014, 85-486:121-9.
[27] https://zerowasteeurope.eu/2017/12/in-mexico-time-to-end-sacrifice-zones/

		damage roofs and cars, and are alleged to harm local residents' respiratory health, with legal cases pending. Adelaide Brighton has plans to increase the use of RDF as an alternative fuel in Australia.[28] ● In Trbovlje, a town in Slovenia, Lafarge Cement had been a significant source of pollution after it took over a 130-year-old cement plant in 2003. The facility burned petcoke, a byproduct of oil refining, with hazardous industrial waste in the name of 'alternative fuel.' The emissions from the facility led to higher cancer rates in the region compared to the rest of the county, and higher chances of chronic respiratory illnesses among children. Uroš Macerl, an organic farmer from Slovenia, successfully shut down the facility by stopping its permit application, which was acknowledged through the Goldman Prize in 2017.[29] ● In Brazil, LafargeHolcim started co-incineration in 2003 in Barroso, Minas Gerais, and has caused constant pollution issues since then. Emission from the facility had immediate effects on the local population who reported symptoms such as sinusitis, sore throat, and respiratory problems.[30] ● Greenpeace conducted in-depth investigations in Cameroon, Brazil, and India. All cases found that there are systematically local laws, national laws, and basic international standards violations — adversely affecting local communities' health.[31] ○ In Figuil (Cameroon), the cement plant of Cimencam (LafargeHolcim's subsidiary) has been regularly emitting large quantities of partially corrosive and toxic waste dust. The operations in the cement plant and the open dumping of such large quantities of corrosive and toxic waste dust, especially near a weekly public market, violate international standards of cement production and would clearly be illegal in Switzerland. As the result, people complain of chronic and acute irritation of the skin, mucous membranes, eyes and respiratory tract. ○ In Barroso (Brazil), the LafargeHolcim plant has created problems since 1955. Both local and national legislation lag behind laws of other Brazilian states and international standards set by the UNEP, the World Bank, and the EU. This leads to "questionable interpretations" as to	

[28] https://ipen.org/sites/default/files/documents/ipen_ntn_rdf_australia-v1_3w-en.pdf
[29] https://www.goldmanprize.org/recipients/uros-macerl/

[30] https://www.greenpeace.ch/static/planet4-switzerland-stateless/2020/11/306f5644-lafargeholcimreport-gp_execsummary en_greenpeace_4nov2020.pdf

[31] https://www.greenpeace.ch/static/planet4-switzerland-stateless/2020/11/306f5644-lafargeholcimreport-gp_execsummaryen_greenpeace_4nov2020.pdf

		whether the emission limits for dioxins and furans as well as other pollutants are being adhered to or not. Today there are still frequent incidents and pollutant emissions, which cover the roofs of the town with a layer of dust. There is strong evidence of epidemiologically significant adverse health effects towards citizens in Barroso which suffer from respiratory diseases — which have become the most common reason for hospitalization and the second most frequent cause of death. ○ In Ropar, Punjab (North India), the LafargeHolcim plant also systematically violates local laws and basic international standards, such as the air quality guidelines of WHO and the World Bank. Publicly-available documents from government show that the LafargeHolcim subsidiary Ambuja Cement has built an illegally operated fly ash drying plant which releases high emissions. There are shocking images of fugitive dust emissions from the cement production inside private homes — causing irritation of the skin and burning of the eyes. 9. **Incineration of plastics does not eliminate the presence of microplastics and its toxic additives in ash.** Although the public awareness of health concerns from stack emission of waste incineration is growing, the toxic potency of contamination from waste incineration ash and its 'green' applications are being largely underestimated. In contrast to the abundance of data on flue gas emissions, data on hazardous substances in bottom and fly ashes from waste incineration are not widely available. Studies have revealed the neglected presence of microplastics from waste incinerator fly ash and bottom ash — which adsorb all kinds of heavy metal on the surfaces of microplastics.[32], [33],[34] Another report by Zero Waste Europe mapped eight studies on waste incinerator bottom ash and found that POPs, such as PCDD/Fs and PFASs, are present in bottom ash in larger volumes than in fly ash.[35] In fact, PFASs accumulate at three times greater the total concentration in bottom ash than in fly ash. Even a very small amount of POPs —also known as the "forever chemicals"— should not be deemed negligible due to their toxic, bioaccumulative, and highly persistent nature. Reutilization of incinerator ash as alternative raw materials (e.g. as construction material or mixed into cement as raw material) would contribute to the release of POPs and toxic heavy metals into our environment. A study concluded that RDF usually has a higher content of Sb, Hg, Cd, As, Pb, Cu, Cr and Zn than pet coke. On the other hand, coal can also present	

[32] https://pubmed.ncbi.nlm.nih.gov/32763713/
[33] https://www.sciencedirect.com/science/article/abs/pii/S0048969721015965
[34] http://hjhx.rcees.ac.cn/en/article/doi/10.7524/j.issn.0254-6108.2019070805
[35] https://zerowasteeurope.eu/wp-content/uploads/2022/01/zwe_Jan2022_toxic_fallout_research_report.pdf

		large amounts of Hg, Co, Cd and Tl.[36] These residues are often perceived as "useful" applications or as "green" solutions throughout the construction sector.[37] However, the content of hazardous compounds in those options exceed the safety limits recommended by scientific researches and the amended Basel Convention. A study showed that stabilization/solidification of incinerator fly ash is only a temporary concentration control. It could not guarantee its long-term security and stability, especially under an acid environment.[38] When a cement production facility "recycles" toxic ash into the kiln the sink becomes the clinker and the product become toxic cement. Both should not be considered as an environmentally sound practices due to the high potential of toxic chemical leakage (e.g. heavy metals, dioxins, PCBs, PFAS, and other persistent organic compounds).	
Additional comments on entity criteria	70	The time period for the cement industry should be considered not only focusing on the carbon transition but having a well-balanced transition harmonized with development for low carbon technology, activities for a circular economy and contribution to the SDGs. For instance, the Japanese government recently made a public the cement transition roadmap collaborated with Japanese cement sector. This roadmap includes not only reduction measures of CO2 but also activities for circular economy. https://www.meti.go.jp/policy/energy_environment/global_warming/transition/transition_finance_technology_roadmap_cement_eng.pdf	Climate Bonds sector criteria are intended to directly address climate impacts of investments. As such, non-climate environmental objectives such as water and other SDGs are normally not included. However, circular economy is an important aspect addressed for the use of waste-derived fuels. Land use Change is another important aspect addressed for the use of biofuels.
	71	Please reconsider whether the current single transition pathway for all the countries appropriate or not. I do not think it realistic even if you make a grace period. In order to switch from the current situation to align with the transition pathway, and it needs huge amount of funding for them. I think such financing can also be named as transition finance.	The transition pathway chosen for companies is adopted from the SBTi 1.5-degree approach which was in turn developed through close stakeholder engagement with industry. Moreover, it reflects a carbon budget necessary for a 1.5-degree warming scenario. The level of ambition thus cannot be lesser than this. Alternative pathways do not exist for specific regions, moreover. See section 4.3.1 in the Background Paper for full rationale of the company level pathway and methodology.
	72	Striking the balance between pragmatism and long term net zero aspirations is key. The question and background paper already alludes to this but there should be a more comprehensive carrot and stick approach instead of just a simple grace period. There are already building blocks of this approach in the financing markets. For companies who have already adopted a net	An updated methodology is now set for cement companies. It includes a two-tier certification system to provide the flexibility this comment proposes. Full details are found in section 5 of the Criteria document, and section 4.3.1 of the Background Paper.

36 Genon G, and E. Brizio. Perspectives and limits for cement kilns as a destination for RDF. Waste Management, 2008 (New York, N.Y.) 28, 2375 – 2385.
37 https://zerowasteeurope.eu/wp-content/uploads/2019/11/zero_waste_europe_cs_the-hidden-impacts-of-incineration-residues_en-1.pdf
38 https://www.researchgate.net/publication/328692248_Review_on_Cement_StabilizationSolidification_of_Municipal_Solid_Waste_Incineration_Fly_Ash

		zero target by 2050 and already performing at or below the carbon emissions intensity, the ESG financing market has demonstrated the appetite and depth. We suggest that flexibility in the loan structures can be built in to accommodate the lead time it requires for initiatives to bear fruit. For companies who have demonstrated otherwise, the capital markets would become more and more difficult to access as cost of capital will continue to increase.	
	73	More clarification on the certification approach would be helpful. Could you please clarify how this differs from an initiative such as SBTi and how do companies use this certification with respect to finance?	Clarification is now provided in the document. See section 5 of the Criteria document and section 4.3.1 of the Background Paper for full details. In short, the SBTi pathway is adopted for companies, but the convergence mechanism is different for the Cement Criteria. They instead prefer to require all companies to meet the pathway by 2030 at the latest.
	74	Rather than a grace period, could a convergence approach be used (as is the intention of the SDA)?	The Cement Criteria now adopt the SBTi pathway for companies. However, it was concluded by Climate Bonds and the TWG that the convergence tool as used by SBTi will not be used. Requiring all companies to converge on a common endpoint by 2050 works assuming that all companies adopt the pathway and method. However, Climate Bonds cannot assume that all companies will do this, let alone meet the pathway. Climate Bonds thus prefers to instead require a more aggressive convergence with the sectoral pathway to avoid the risk of overshoot. Ultimately, this will be harder for companies not yet on the pathway, but easier for those already beneath it. Full details and rationale are found in section 5 of the Criteria document and section 4.3.1 of the Background Paper.
	75	The standard should consider providing more time to companies from emerging or under-developed countries.	The two-tier certification system is intended to achieve this. In other words, regions or countries that are in earlier stages of development or decarbonisation can meet the Tier 2 requirements which allow a period of not meeting the pathway while a transition plan is enacted that will allow them to achieve the pathway. Full details and rationale are found in section 5 of the Criteria document and section 4.3.1 of the Background Paper.
	76	5 years for developed countries, 10 for all others.	The two-tier certification system is intended to achieve this. In other words, regions or countries that are in earlier stages of development or decarbonisation can meet the Tier 2 requirements which allow a period of not meeting the pathway while a transition plan is enacted that will allow them to achieve the pathway.

			Full details and rationale are found in section 5 of the Criteria document and section 4.3.1 of the Background Paper.
	77	The cement industry is vertically integrated. Each company owns facilities that are modernized and facilities that are old, highly inefficient wet kilns. Continuing to use the older, more energy intensive kilns adds to the industry's (and the company's) tremendous carbon footprint. Efforts should be made immediately to retire these older cement plants. For example, due to the passage of the Infrastructure Bill in the US, cement production will rise in the United States, therefore investments made now to retire all the old wet kilns and move to more sustainable building materials would have huge impacts on the carbon footprint of that new infrastructure.Those investments, which would reduce fuel usage at the kilns and start the transition to more sustainable construction materials should be made immediately to reduce the impact of the increase of carbon from cement production. As well, the kiln infrastructure in China also has newer, more efficient kilns, and older, extremely inefficient kilns. It would seem that a sound transition policy for the cement industry might be to invest in modernizing all the old, inefficient cement kilns in China while more modern building materials, which are truly low carbon, can get adopted into building codes globally. Since the ultimate solution to the incredible carbon emissions from super-heating limestone to make pozzolons is to replace this practice with the use of true low carbon building materials, time will be needed to to educate architects, builders, and craftsmen on how to use those materials safely and both government, planners, and local building inspectors will need to be trained and certified on how to properly and safely use these new materials. This transition will take time, dedication, and lots of education. It must be our imperative to start now.	Climate Bonds and the TWG fully agree with these comments. Improved kilns are encouraged through the emissions pathway for facilities. The TWG strongly agreed better use of building materials was key to decarbonising the whole cement and concrete sector. However, as it covers concrete and other sectors, it was unfortunately outside of the scope of criteria.
General, including editorials & clarifications	78	Background Paper (section 2.2): Key levers to decarbonise are missing here - Fuel substitution - CCUS - Efficiencies See GCCA roadmap for further details	Climate Bonds is grateful for these comments and has implemented them into the documents.
	79	Background Paper (section 2.3, page 10): Generating between 6 and 8% of man-made greenhouse gas emissions -> of CO2 emissions [cement is around 3% of GHG emissions]	There are a wide variety of sources stating different numbers. Rather than stipulating an actual number, the wording will rather reflect that the number lies somewhere in this range.

	80	Mineralisation to be added along with carbon cured solutions	Potentially outside of scope as occurs at the concrete stage.
	81	Background paper (section 2.4 - investments page 11): Wood based solutions is not a relevant investment here – to be deleted	This is simply added for context that in some limited cases, timber solutions can be used in construction. It is not part of the criteria, however.
	82	Draft background paper page 11: "The Energy Transitions Commission estimates that cement will be the costliest of all the industrial sectors to decarbonise by some distance" – reference-? this is contradictory to other studies – should be deleted	This wording can be deleted as it is a disputed and vague sentence.
	83	Draft background paper (page 14, section 4.1.1): Please turn the paragraph in a positive way and use the word increased efficiency as opposed to dilution. => It is easy and cheap to lower the embodied carbon of a tonne of cement by using it more efficiently – more efficiency in clinker, in cement and in concrete. This is contrarily to what the document claims, a future proof strategy.	The wording has been changed accordingly to strike a more positive note for making emissions reductions in the sector.
	84	Draft background paper (page 19, section 4.3 intro): It is not correct to say that 95% reduction can be achieved without breakthrough technologies	No response needed.
	85	We find the approach of green labelling of some specific installations/ equipment far too simplistic and even actually incorrect for some. General statements on required sub-installations cannot be made as each plant is different. Installations need to be looked at in an integrated way. The concept suggests taking from the bookshelf a sub installation that is green and eligible, while there is always much more behind ECRA's technology papers (2017) also indicate that just putting improvements together is not possible. In the same way, we believe that some levers should always be eligible : - Fuel substitution including biomass - CCUS	This comment is well received, but this relates more to financial investment structures. Automatically eligible measures are relevant for investors wishing to invest in capital investments across a range of assets through loans etc. This means that, even if at a single plant level, the emissions reductions are minimal, collectively they are significant and should be encouraged. This was the view of the TWG. Fuel substation including biomass and CCS are eligible subject to meeting cross-cutting criteria. However, CCU is outside of scope simply because the TWG did not have time to robustly discuss it.
	86	Definition of clinker wrong, P1	Amended.
SCM inclusion	87	Draft background paper (page 23 – SCMs): SCM – we cannot accept that only calcined clays and ground limestone are accounted for as	Slag and fly ash are eligible for use in cement production. This has been cleared up.

		eligible. Slag and fly ashes still have an important role to play and the near- and medium-term future.	Climate Bonds and the TWG agree with this viewpoint and as such cement producers using fly ash and slag to reduce their cement emissions are not outside of scope. Rather, for the avoidance of doubt, 'production of' these SCMs (i.e., coal energy and steel production) cannot be part of bond proceeds.
	88	As shown above, it is suggested that SCM is effectively used as an alternative clinker to reduce the clinker ratio, but a composition of cement varies by national/regional circumstances. In particular, Japan has to take into consideration that the Building Codes is strictly regulated due to an earthquake countermeasure.	Climate Bonds and the TWG agree with this comment, which is why a set clinker factor for eligible plants is not set.
CCU and CCS	89	Draft background paper (section 4.4.8 CCU): It is not acceptable that CCU and CCS are not treated equally. The proposed approach does not incentivise CCU where CCS is not an option.	CCU is outside of scope simply because the TWG did not have time to discuss it. It is understood that the 'Utilization' stage takes place at the concrete stage and is out of scope for now. Future iterations of the Criteria will aim to address and include CCU, subject to additional criteria.
	90	Carbon capture is one of the key technology for decarbonisation of concrete sector. So this should be included in scope.	This is now within scope.
Recarbonation	91	Carbonation: Recarbonation should also considered as eligible, especially mineralisation and enhanced recarbonation	Recarbonation is not included because it is typically small during the lifetime of structures (2-5%) and can be large only if the concrete is crushed at the end of life. Neither the real-life expectancy of buildings nor the End-of-Life is guaranteed, and therefore, we chose to exclude carbonation.
Municipal Solid Waste Fuels	92	There are several issues with the current scope of the activity: 1. Lack of coherence and alignment with a low-carbon and climate-resilient economy Both in the draft criteria and background paper, CBI states that fuel substitution using "non-organic fraction of municipal waste streams" or "waste streams stripped of the recyclable content" as alternative fuels is favoured. Yet, in Section 2.2 "Alignment with other sector criteria", the waste management sector is missing. It seems that the current CBI criteria for the cement sector will be a perverse incentive to promote incineration of waste in cement kilns, which is absolutely the opposite to climate mitigation. In many parts of the world, waste is not separated from its organic fraction, and the infrastructure to do so does not exist. Even in places like California with an advanced recycling infrastructure, efforts to strip out the organic component of the waste stream are just beginning. In India and China, where the vast majority of cement will be made in the next 3 decades, there is little source separation of the	See response to comment 69.

		organic fraction of waste. Local governments implement waste separate and recycling efforts, once that waste is headed to a large combustion unit that must be fed waste to make its primary product and contracts for fuel are signed, the incentive for recycling the organic fraction of the waste and removing recyclable waste is removed. In some local jurisdictions large capital intensive incinerators have negotiated “put or pay” contracts. These contracts force local jurisdictions to deliver a certain amount of waste to the combustion facility and when that volume is not met, the local jurisdiction must pay the combustion facility. These “put or pay” contracts frustrate efforts at waste reduction and directly contravene the IPCC 2022 recommendations on the circularity necessary to meet the greenhouse gas reduction goals agreed to in the Paris Agreement. The CBI's 2019 criteria on Waste Management classify “Facility producing electric and/or heat via the combustion of municipal solid waste OR mixed residual waste” and “Facility producing electric and/or heat via gasification of residual municipal solid waste” as activities that require further assessment to determine its eligibility. However, the EU —through EU Sustainable Financing Taxonomy— has excluded Waste-To-Energy incineration from their sustainability agenda and decided to stop all financial support for this highly carbon-intensive process. Given the regulation, CBI decided to exclude waste incineration from eligibility criteria within the EU — but open for waste incineration investment outside of the EU. This decision was despised by one-hundred-and-three civil society organisations from all over the world in a letter submitted by Zero Waste Europe. Despite the strong urge from global communities to exclude waste incineration from its eligibility criteria outside the EU —impacting primarily on countries from the Global South— CBI has introduced another form of waste incineration in this draft criteria for the cement sector. Zero Waste Policy Brief on CBI’s Waste Management Criteria comprehensively explains the many reasons why waste incineration is not a solution both for our climate or waste problems. **We urge CBI to exclude fuel substitution using the “non-organic fraction of municipal waste streams” or “waste streams stripped of the recyclable content” as alternative fuels from the scope of the activity.** 2. **Waste-derived fuels production business model is an unfair business model, demanding hefty financing supports from the limited local administratives’ budget**	

		We recommend CBI to not provide financial support for "Construction, upgrade and operation of waste-derived fuels". This unfair business model requires local governments to commit not only in supplying a huge yet steady amount of waste for years —which should be prevented, not burnt— but also pay and subsidise the cement industry in acquiring waste-derived fuels from municipal solid waste. One example is the RDF production facility in Cilacap (Indonesia), where the Cilacap Environment Agency is financially burdened with RDF production costs (operational cost) in the form of a "cost-sharing" agreement between the local government and PT. Semen Bangun Indonesia.[39] Almost half of the operational cost for RDF production is paid by the Cilacap Regency government. In addition to the hefty subsidy that the Cilacap Regency Government provided, the Ministry of Public Works and Central Java Province government also required to provide 46% of the capital cost — or equivalent with USD 2.9 million. More than 51% of the project's capital expenditure is covered by The Danida ESP3 project contributed in the form of a grant. Given the already-limited public budget for solid waste management, these subsidies should have been used to invest in waste prevention, recycling, and composting projects instead. Clearly, this kind of business model might not be easy to be replicated in other places and pose high financial and environmental risks — thus, not suitable to be included as part of a conventional bond, much less the green or climate bonds market. 2. **Reinforcement of perverse incentives to increase waste incineration** **We urge CBI to exclude municipal solid waste utilization as alternative fuels from the cement criteria.** By allowing waste burning in cement kilns, CBI would perpetuate waste burning practices globally. INTERPOL alerted an alarming increase in illegal plastic pollution trade across the world since 2018.[40] The INTERPOL report indicates that there has been a considerable increase over the past two years in illegal waste shipments, primarily rerouted to South-East Asia. Under the guise of recycling, plastics have been dumped or illegally incinerated in recent years. Incineration for energy recovery in the cement industry is not immune to criminality. In Romania, the cement industry has been infamous for burning waste illegally imported from Italian facilities suspected to be managed by Italian mafia groups. In Ireland, the cement industry burns an increasing amount of plastic waste which used to be exported to China.	

39 Laporan Assessment: Proses Pengelolaan Sampah Terpadu Refuse-Derived Fuel (RDF) Kabupaten Cilacap (WALHI Jawa Tengah, 2021)
40 https://www.interpol.int/News-and-Events/News/2020/INTERPOL-report-alerts-to-sharp-rise-in-plastic-waste-crime

		After the findings by INTERPOL, International Pollutant Elimination Network (IPEN) spotted illegal plastics burning resulting from waste trade activities in South-East Asian countries. The report exposed Australia's massive investment in pelletized plastic waste processing which then sent and rebranded as refuse-derived fuel (RDF) to be burnt in Indonesia, Malaysia, and The Philippines — perversely as clean and renewable energy.[41] There are also significant RDF exports from Malaysia to India and from Indonesia to China. Thailand exports Solid Recovered Fuel (SRF) to China, India, Malaysia, and Indonesia. While the bulk of Process Engineered Fuel (PEF) is exported to cement kilns in the Philippines. Additionally, Global North countries like the U.S. and UK are also contributing to this practice by disguising hard-to-recycle waste as "recyclables".[42] On top of this, another perverse incentive that encourages plastics burning in cement kilns is plastic credit. Various institutions create standards that allow waste incineration —in cement kilns or other industrial boilers— to be accredited plastic credits. Although these credits are claimed as an offset for plastic reduction goals, this practice actually releases the embedded fossil-carbon in plastics, emitting carbon through a highly intensive energy process, and disincentivizing priority measures like plastics reduction and recycling — which will save more energy and prevent greenhouse gas emissions compared to plastics burning. Several standards that allow this polluting practice are Verra's Plastic Waste Reduction Standard, Plastic Credit Exchange's Plastic Pollution Reduction Standard, and the Guidelines for Corporate Plastic Stewardship (developed by The 3R Initiative, Environmental Action, South Pole and Quantis). 3. The scope of activity needs to be redefined to include production curtailment A full 45% of the greenhouse gas emissions from the industrial sector emanate from cement production. Unfortunately, cement production is rising as new cities poke their head out of the industrial core in emerging economies. Absent a dramatic transformation is what global societies use as its building materials, cement will continue to be one of the largest industrial contributors to climate gases. Tinkering around the edges using fuel substitution will simply not get the reductions needed from this sector if we are to avoid the worst effects of climate change. Unfortunately, "The cement sector is regarded as a sector where mitigation options are especially narrow	

[41] https://ipen.org/sites/default/files/documents/ipen_ntn_rdf_australia-v1_3w-en.pdf
[42] https://www.boell.de/en/2019/11/04/waste-exports-rubbish-dump-closed

		according to the IPCC, therefore wholesale movement into low carbon building materials is the only path out of the cement industry's climate-forcing carbon footprint." [//report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_Chapter11.pdf] By the numbers: "World cement production has increased around 20% in the past decade and reached a high of 4100 million tonnes in 2019. (It is expected to continue to rise). The electrical energy consumed in cement production is approximately 110 kWh/tonne. Only 30% of the electrical energy is used for raw material crushing and grinding while around 40% of this energy is consumed for grinding clinker to cement powder. Hence, global cement production uses 18.7 TWh which is approximately 2% of the world's primary energy consumption and 5% of the total industrial energy consumption. Furthermore, manufacturing of cement emits 3 Gton CO2, which is 45% of the industrial sectors CO2 emission. (IEA, 2020)." Moreover, a simple substitution of fuels will not solve the threat that the cement industry poses to humanity, since the majority of greenhouse gas emissions from the cement sector come from heating the limestone to form pozzolans. "The decarbonation of limestone to give the calcium required to form silicates and aluminates in clinker releases roughly 0.53 t CO2 per ton of clinker. In 2005, cement production (total cementitious sales including ordinary Portland cement (OPC) and OPC blends had an average emission intensity of 0.89 with a range of 0.65–0.92 t CO2 per ton of cement binder. Therefore, the decarbonation of limestone contributes about 60% of the carbon emissions of Portland cement, with the remaining 40% attributed to energy consumption, most of which is related to clinker kiln operations; the WWF-Lafarge Conservation Partnership estimated that the production of clinker is responsible for over 90% of total cement production emissions." We urge you to redefine the scope of the activity to reduce emissions from this large sector and include production curtailment.	