



Concrete Industry Guidance Document on Sustainability Performance Indicators

Issue 13 - January 2019

Supporting the Concrete Industry
Sustainability Performance Report

Concrete Industry Guidance on Sustainability Performance Indicators

Issue 13 –2019

Supporting the Concrete Industry Sustainability Performance Report and the Industry Guidance to BES 6001

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MPA BRMCA	MPA - British Ready-mixed Concrete Association	www.brmca.org.uk
CAA	Cement Admixtures Association	www.admixtures.org.uk
MPA CSMA	MPA Cementitious Slag Makers Association	www.mineralproducts.org/prod_slag01.htm
MPA	Mineral Products Association	www.mineralproducts.org
MPA TCC	MPA - The Concrete Centre	www.concretecentre.com
UKQAA	UK Quality Ash Association	www.ukqaa.org.uk
BAR	British Association of Reinforcement	www.uk-bar.org

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INTRODUCTION

The concrete sector, represented by the Sustainable Concrete Forum (SCF), established a sustainability strategy in 2008 based on stakeholder consultation that includes eight key commitments. These are listed in Appendix A1, which is a copy of the declaration to support the Sustainable Construction Strategy for the UK Concrete Industries.

As a result the annual Concrete Industry Sustainability Performance Report has been developed together with a series of Performance Indicators (PI's) under the following headings:

- **Sustainable Consumption and Production**
- **Climate Change & Energy**
- **Natural Resources and Enhancing the Environment**
- **Creating Sustainable Communities**

Performance reports can be downloaded from www.sustainableconcrete.org.uk

As many of the initial objectives were targeted to be achieved in 2012, the strategy was updated during 2012 and a copy of the renewed aims and objectives is also included in Appendix A2.

The Performance Indicators (PI) are used as a method of monitoring and measuring performance of the concrete industry against agreed targets. These measurements allow participating companies and associations to assess their progress and to demonstrate to clients and stakeholders their commitment to continual improvement.

This document is intended to provide guidance to those involved in the collation of company specific and industry data and to provide more detailed and transparent information to support the concrete industry's commitment to provide data on its performance. Each year the data is reviewed taking account of developments within the industry and the guidance is amended to ensure ongoing quality, comparability, credibility and transparency of performance reporting. The incremental improvements in the requirement for data also help support the promotion of sustainable and responsibly sourced products.

In order to monitor the progress across all of the different sectors within the Concrete Industry, the indicators use the concept of a tonne of average "concrete" and "concrete + reinforcement" (A definition of the scope of the industry is given in "SCF Scope of the Concrete Industry"). This approach takes data collected from the concrete production sectors and adds in data collected from the materials supply chain in proportion to their use in concrete products. Appendix C presents a more detailed overview of the data collection process.

Due to the product differences across the concrete industry the reported values for the "average products" are indicative rather than absolute for any specific products. In the case of CO₂ emissions, product specific information is provided on www.sustainableconcrete.co.uk.

Each Trade Association is responsible for agreeing its own specific targets against each PI and issuing suitable pro-forma spreadsheets to its members to assist with the data collation process. A data collection spreadsheet based on these Guidelines is issued to each trade association at the end of each calendar year together with the updated PI Guidance document. The information is then brought together to produce overall 'Concrete Industry' figures for annual performance and establishing pan-industry targets.

For those companies wishing to seek certification against the BRE Environmental and Sustainability Standard BES 6001 'Framework Standard for the Responsible Sourcing', the PI's

within this guidance document can provide suitable metrics and benchmarks that link directly to the requirements of this standard. Further information is available within the “Concrete Industry Guidance Document to BES 6001” (available on all relevant association web sites and at www.sustainableconcrete.org.uk)

SCF SCOPE OF THE CONCRETE INDUSTRY

The concrete industry represents the ready-mixed concrete market together with the precast concrete industries and their supply chains. In 2012 the coverage of these sectors was estimated to represent 81% of all concrete placed on the market in the UK.

The different concrete product sectors covered are:

1. Bulk ready-mixed concrete
2. Structural Precast products
3. Paving / landscaping products/flags
4. Aircrete products
5. Lightweight and dense concrete blocks
6. Roof Tiles
7. Precast flooring products / walling & cladding products, railway sleepers
8. Pipes, Manholes & Culverts

The bulk ready-mixed market covers the majority of product placed on the market which comes under the direct control of BRMCA members. The scope of the Industry does not cover bagged product sold through merchants and does not include the majority of volumetric concrete providers.

Currently, the SCF scope does not include bulk mortar, screeds or render products.

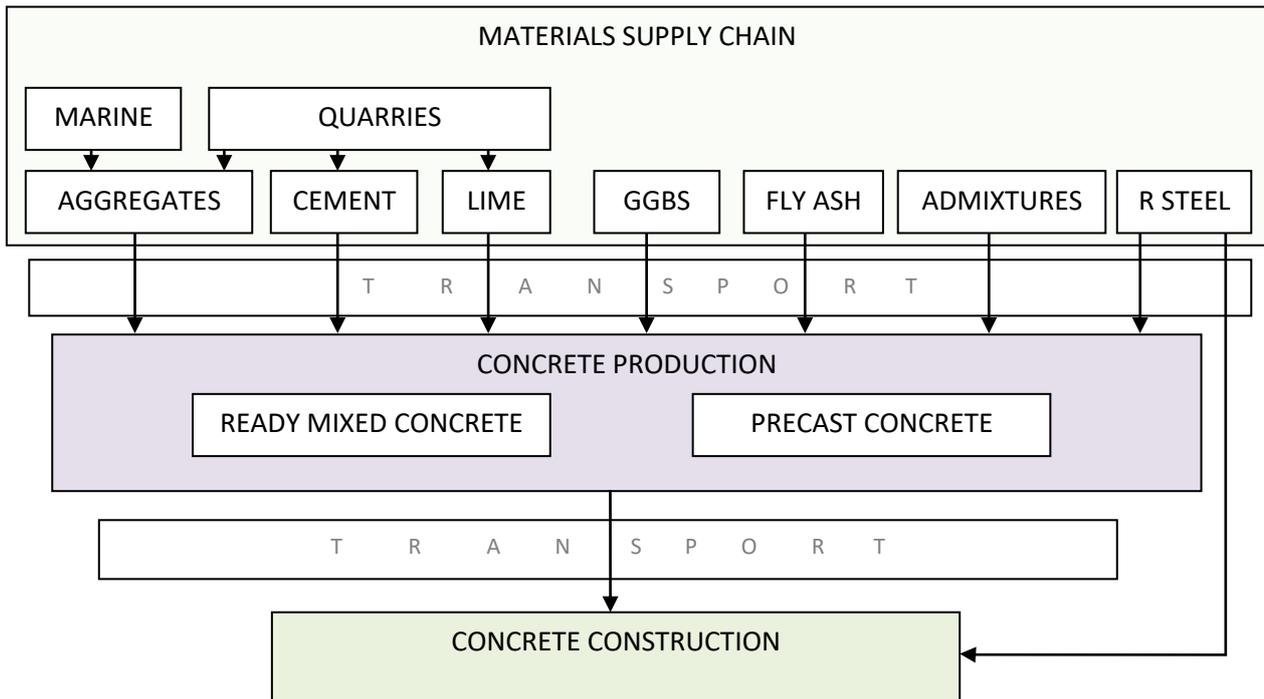
The supply chain, which includes extraction, is defined as those materials that are directly included in the products identified above. These materials include;

- I. Cement products
- II. Aggregates
- III. Ground granulated blast furnace slag (GGBS)
- IV. Fly Ash
- V. Admixtures
- VI. Reinforcement Bar
- VII. Lime

The scope of this definition can be different from that of individual members or trade associations within the supply chain sector. All members of the Sustainable Concrete Forum are fully signed up to the Sustainable Construction Strategy and as a consequence the influence of this strategy does extend further than purely the scope defined here and reported in the annual reports.

Figure 1 shows a schematic representation of the concrete industry covered by the SCF strategy.

Figure 1: Schematic Representation of the Concrete Industry



GENERAL DATA REQUIREMENTS

0.1 General Data collection Requirements

1. As a default value for all the indicators, a conversion factor of 2.38t/m^3 (representing the average density of UK concrete) is used where appropriate. Where lightweight or heavyweight concrete is included, the appropriate conversion factor used is to be stated.
2. Fuel and freight transport conversion factors for 2018 data are provided in Appendix B together with the reference sources.
3. A number of the performance indicators are based on the production output placed into the concrete supply chain during the data collection year. In situations where significant levels of materials are stockpiled, it may be more relevant to use the sales tonnage rather than the production tonnage.
4. The data requirements only cover concrete raw materials, steel reinforcement and concrete products produced by the reporting manufacturer or the trade association.

0.2 General Report output information (for further detail see Appendix C)

- Unless specified, for indicators which are expressed on a 'per tonne' basis, the impacts are aggregated based on the 'rolling mix' for concrete that was identified in the reporting year. In order to elaborate further on some of the trends in performance, certain indicators are also based on a 'Baseline Average mix' for concrete relating to the average mix proportions established during the base year of 2008.

The 2008 average mix proportions were:

Cement + Cement blends	8.9%
Fly ash	0.7%
GGBS	3.2%
Other cementitious material	0.3%
Primary Aggregates	75.9%
Secondary Aggregates	4.2%
Water	6.8%

- The indicators have been extended from the industry average concrete to cover the industry average concrete + reinforcement.
- **Concrete:** This includes contributions from the aggregate, cement, ggbs, fly ash and admixtures raw material sectors as well as the contributions from the ready-mixed and precast concrete manufacturing sites.

Concrete + reinforcement: This includes all of the sectors included in 'concrete' with the addition of the steel reinforcement sector.

The steel reinforcement sector comprises of data from both mills and fabricators. The impact from both of these sources is allocated to the average steel reinforcement content of the total concrete produced using the values:

- 0.11tonnes/m³ for 50% of ready-mixed concrete production and
- 0.117tonnes/m³ for 16% of precast production

2020 targets are based only on the 'Concrete' indicator.

The following indicators are reported for both concrete and reinforced concrete:

- 1.1 Environmental management systems
- 1.2a Waste Minimisation
- 1.3 Emissions excluding CO₂
- 1.5 Quality and Performance
- 2.1 Energy Efficiency
- 2.2 CO₂ emissions (Production)
- 3.2a Mains water use
- 4.1b Health and Safety - lost time injuries
- 4.2a Employment and skills
- 4.3. Local community

1 Sustainable Consumption and Production PI's

1.1 Environmental Management Systems

Performance Indicator and reporting measures

Percentage of production sites covered by a 'UKAS' certified Environmental Management System (EMS)

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total Number of production sites	• % of production sites certified
2. Total number of certified sites	

Definitions and Reporting Conventions

A production site is classified as any UK facility producing raw materials or manufacturing the product.

Individual production facilities covered by overall site certification should be included. For example, a ready-mixed or precast facility located within a quarry, and therefore covered by the 'site/quarry' certification should be included.

The term 'UKAS' refers to certification being granted / issued by a UKAS accredited certifying body. This may be site specific or company-wide dependent upon the type of certification sought. The EMS standards acceptable under these indicators are BS EN ISO 14001, Eco Management and Audit Scheme (EMAS) and BS 8555 for Small and Medium sized Enterprises (SME).

1 Sustainable Consumption and Production PI's continued

1.2a Waste Minimisation

(Reported under Natural Resource Protection and Enhancing the Environment)

Performance Indicator and reporting measures

Waste to landfill as a proportion of production output.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total production tonnage	• Kg of waste to landfill per tonne of concrete produced
2. Total kg of waste sent to 'landfill'	

Definitions and reporting conventions

All controlled and licensed waste produced and disposed of that is subject to landfill tax, including any waste sent to incineration without energy recovery.

Any waste leaving site to be sorted for recycling and/or landfill must be assumed to be 'Landfill waste' unless evidence can be provided to indicate otherwise. Such evidence must be independent and be supplied by the 'sorting/recycling depot'.

Exclusions

Waste used for backfilling quarries and site restoration is excluded.

1.2b Net Waste Ratio

(Reported under Natural Resource Protection and Enhancing the Environment)

Performance Indicator and reporting measures

Waste materials and by-products used in the concrete industry divided by the total concrete industry waste to landfill.

This indicator is derived from other measures contained in these guidelines

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total tonnage of waste materials and by-products used	– Ratio of total waste usage in the concrete industry to waste landfilled by the concrete industry
2. Total waste to landfill	

Definitions and reporting conventions -

Waste and by-products include;

- Recycled and secondary aggregate
- Fly ash
- Ggbs
- Other additional cementitious materials diverted from waste streams
- Materials diverted from the waste stream and used as fuel
- Waste fuels used in cement manufacture
- Other suitable materials that have been diverted from the waste stream for use in concrete or constituent materials production.

For further details of the calculation see Appendix C.

1 Sustainable Consumption and Production PI's continued

1.3 Emissions (Excluding CO₂)

Performance Indicator and reporting measures

Number of convictions for air and water emissions per annum.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Number of convictions within the given calendar year	- Number of convictions within the given calendar year in the concrete industry

Definitions and reporting conventions

This indicator includes the number of convictions only. Pending or unsuccessful prosecutions are not included. Convictions that are subject to appeal are treated as pending.

Note - Individual associations may request additional information. However, this PI represents the minimum requirement for SCF reporting purposes.

1 Sustainable Consumption and Production PI's continued

1.4 Notes on Stakeholder Engagement Requirements

Performance Indicator and reporting measures

No single indicator is currently in place. Performance is reported qualitatively through a combination of the SCF, Trade Associations and individual company reports.

Stakeholder engagement can be undertaken by relevant Associations/SCF on behalf of their members. This is a recognised method of supporting the stakeholder engagement requirements within BES 6001 - Please refer to the Concrete Industry Guidance Document to BES 6001 for further information and specific restrictions.

Individual companies are requested to supply data to their relevant Associations. Associations will publish this by product and also supply all PI data to the SCF 'data collection body' for use in SCF reporting.

Definitions and reporting conventions

An organisation's communication tools serving to demonstrate evidence of stakeholder communication and engagement. These may include, but are not restricted to:

- a. Annual corporate concrete industry sustainability report
- b. Annual company social responsibility report
- c. Annual company environmental performance declaration
- d. National stakeholder engagement forum/workshop or similar
- e. Community newsletters
- f. Association/SCF reports and/or website literature
- g. Open days, liaison groups or council meetings
- h. Other as appropriate

The above enables the organisation to demonstrate transparency and openness to its stakeholders, and can be undertaken by the relevant Trade Association/SCF on behalf of the organisation, provided that the organisation can demonstrate that it has supplied data to support such activities.

1.5 Quality and Performance

Performance Indicator and reporting measures

Percentage of production sites covered by a 'UKAS' certified BS EN ISO 9001 quality management system.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total number of production sites	- % of production sites certified
2. Total number of certified sites	

Definitions and reporting conventions

A production site is classified as any facility producing raw materials or manufacturing the product.

Individual production facilities covered by overall site certification should be included. For example, a ready-mixed or precast facility located within a quarry, and therefore covered by

the ‘site/quarry’ certification should be included.

The term ‘UKAS’ refers to certification being granted / issued by a UKAS accredited certifying body. This may be site specific or company-wide, dependent upon the type of certification sought.

1.6 Responsible Sourcing

Performance Indicator and reporting measures

% of production certified to BES 6001 “Responsible Sourcing of Construction Products”

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Concrete production tonnes	– % of concrete production tonnage certified to BES 6001
2. Concrete production tonnes certified to BES 6001	
Additional Inputs:	Reported:
3. Steel reinforcement tonnes	– % of steel reinforcement tonnage certified to BES 6001
4. Steel reinforcement tonnes certified to BES 6001	
5. Concrete tonnes certified at Pass level	
6. Concrete tonnes certified at Good level	
7. Concrete tonnes certified at Very Good level	
8. Concrete tonnes certified at Excellent level	
9. % of ready-mixed concrete certified	– % of ready-mixed concrete certified
10. % of precast concrete certified	– % of precast concrete certified
11. Concrete tonnes certified at BREEAM Score 5	
12. Concrete tonnes certified at BREEAM Score 6	
13. Concrete tonnes certified at BREEAM Score 7	

Definitions and reporting conventions

This indicator refers to the availability of the delivered product. The ‘concrete’ indicator covers both ready-mixed and precast concrete delivered to sites as a percentage of the production volume.

In order to integrate steel reinforcement, the scope of this indicator needs to be expanded. Data is being collected and reported although not currently incorporated into a PI. The coverage of BES 6001 in steel reinforcement is based on the certification data of fabricators rather than that of the mills, as the fabricators generally represent the final manufacturing stage prior to supply to construction sites.

For each product certified the BRE website indicates a BREEAM Responsible Sourcing Certification Scheme Score to different levels for use in calculating credits for responsible sourcing within a range of BREEAM schemes. This is an indication of the rigour and quality of a range of responsible sourcing schemes including BES 6001. Due to the optional nature of certain requirements in BES 6001 individual certifications can obtain higher BREEAM scores than a generic analysis of BES 6001 achieves so BRE have committed to publishing individual certificate scores which can be viewed via the link below

References

- BRE <http://www.greenbooklive.com/search/scheme.jsp?id=153>

2 Climate Change and Energy PI's

2.1 Energy Efficiency

Performance Indicator and reporting measures

kWh of energy used in production as a proportion of production output.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total energy consumption (kWh)	– Energy consumption per tonne of concrete produced <ul style="list-style-type: none"> ○ Rolling mix ○ Standardised Mix
2. Total production (tonnes)	

Definitions and reporting conventions

KWh of delivered electricity (consumed power) and fuels (converted to kWh using the conversion factors found in Appendix B) consumed in manufacturing at the production site (excluding external transport).

A production site is classified as any facility producing raw materials or manufacturing the product.

Production output is the total tonnage or volume of the product produced.

For 'Primary fuels used in cement and reinforcing steel production' which is required to participate in EU ETS, the conversion factor will be determined in accordance with the EU ETS monitoring and reporting guidelines. We consider that EU ETS is an International regulatory convention which takes precedence in reporting carbon data. Where activities are not regulated by measures such as EU ETS then Defra defaults are used. Therefore, in the case of sectors and energy sources not covered under EU ETS then the gross calorific conversion values should be used. The more common conversion factors are provided in Appendix B.

2.2 CO₂ Emissions (Production)

Performance Indicator and reporting measures

CO₂ (carbon dioxide) emissions as a proportion of production output in kg of CO₂ per tonne of production output based on 'Standardised Mix' and 'Rolling Mix'

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total CO ₂ produced (tonnes)	– CO ₂ produced per tonne of concrete produced <ul style="list-style-type: none"> ○ Rolling Mix ○ Standardised Mix
2. Total production output (tonnes)	

The calculation of CO₂ emissions should be compiled based on all activities that contribute as sources of CO₂. An example of the underlying data set is shown below.

Definitions and reporting conventions

Production output is the total tonnage or volume of the product produced.

CO₂ emissions are directly and indirectly generated in production, and will include:

- (i) Direct CO₂ emissions, i.e. the release of CO₂ emissions into the atmosphere directly from the sources at the production site. These include both the ‘combustion CO₂ emissions’ and the ‘process CO₂ emissions’, for example CO₂ emissions generated in cement manufacture from the combustion of fuels and the calcination process. ‘For cement production’, which is required to participate in EU ETS, carbon emissions for primary fuels and calcination are determined in accordance with: EU ETS Monitoring and Reporting Guidelines. Any biomass used for fuel is considered ‘carbon neutral’.

In the case of sectors and energy sources not covered by EUETS, the Defra conversion values should be used.

The more common conversion factors and source references are provided in Appendix B.

Example of Direct CO₂ emissions calculation/reporting:

Material produced	Source of energy / CO ₂	Quantity of fuel consumed	kWh	kg CO ₂
Cement	Process emissions	N/A	N/A	1,234,567
Aggregate	Gas Oil	5,678 litres	60,999*	15,467**

Note-*5678 litres multiplied by kWh/litres conversion factor of 10.743 (see Appendix B1).

**5678 multiplied by CO₂/litre conversion factor of 2.724 (see Appendix B1)

- (ii) Indirect CO₂ emissions, as generated by the consumption of electricity, converted to CO₂ using kg CO₂/kWh conversion factor in Appendix B.

For reinforcing steel production’ only, conversion to CO₂ is made using factors agreed with DECC (Underlying Climate Change Agreement for the Steel Sector and Climate Change Agreements: Conversion factors and procedures, Nov 2008).

This indicator excludes external transport emissions.

The data collected for this indicator will be presented as a ‘Rolling mix’ and a ‘Baseline Average mix’. The ‘rolling mix’ will be calculated on the CO₂ emissions from the annual reported use of the concrete components. The ‘Baseline Average mix’ mix will be calculated from the annual concrete production using the ratio of components for the average concrete established in 2008. The ‘rolling mix’ will indicate the net actual changes in CO₂ emissions which is a combination of production efficiencies and changes of product mix in the market. The ‘Baseline Average mix’ will indicate improvements in production efficiency on an annual basis.

A more detailed description of these calculation are given in Appendix C

2 Climate Change and Energy PI's continued

2.3a Transport - Delivery distances

Performance Indicator and reporting measures

Total and average delivery distance in km travelled per mode (from factory gate to customer and the return journey).

Total and 'average' delivery distances are reported for the product in km, combining all forms of transport, as well as the average km travelled for each (i.e. road, rail, water and other as appropriate).

Inputs from concrete + materials Production:	Reported
1. Total road delivery distance travelled (km)	- Average delivery distance for concrete products (km) - Average delivery distance for raw materials
2. Number of road deliveries	
3. Average road delivery distance (km)	
4. Total rail delivery distance travelled (km)	
5. Number of rail deliveries	
6. Average rail delivery distance (km)	
7. Total water delivery distance (km)	
8. Number of water deliveries	
9. Average water delivery distance (km)	

Definitions and reporting conventions

Average distance travelled by road vehicle, train, or vessel, whilst making a delivery, is reported including any associated empty return journey.

Where appropriate the number of deliveries can be calculated by total delivery distance divided by the average load size per mode (2.3c)

This metric relates to the average delivery distance of all constituent materials and concrete that involves external movement between different sites rather than for internal movement within the same site.

Examples

- From concrete production facility to site.
- Raw material transport to concrete production facility
- All transport via local supply depots should be included
- All transport data should include return journeys
- Multimode transport should be broken down and reported against each mode
- Milk rounds should be included as a single journey with a total load

While this is not used directly as an indicator it is used to communicate the average transport distance of concrete products and raw materials.

2 Climate Change and Energy PI's continued

2.3b Transport Mode

Performance Indicator and reporting measures

Proportions of product and materials moved and split by three modes: Road, rail, water.

Report the total concrete products or raw materials used in concrete, transported (tonnes) and the total moved by each mode of transport (road, rail, water and other as appropriate).

Inputs from concrete + materials Production:	Reported
1. Total tonnes of product transported	<ul style="list-style-type: none">Overall proportions of concrete products and materials transported by road, rail and water (%)
2. Total tonnes of product transported by road	
3. Total tonnes of product transported by rail	
4. Total tonnes of product transported by water	

Definitions and reporting conventions

Other modes of transport may be listed if appropriate. In the case of water transport the type of vessel should be identified e.g. inland barge etc. If there is more than one type of water transport, each should be identified and reported.

This metric relates to the delivery of all constituent materials and concrete that involves external movement between different sites rather than for internal movement within the same site.

Examples

From concrete production facility to site.

Raw material transport to concrete production facility

All transport via local supply depots should be included

Transport from licence site to wharf should be included in the production CO₂ emissions for marine aggregates.

Importation from outside the UK of raw materials used in concrete production facilities should be included

Multimode transport should be broken down and reported against each mode

Milk rounds should be included as a single journey with a total load

As there is potential for double-counting in this metric, for example where products are transported by rail followed by a short road journey to the final delivery point, it would be preferable for this type of delivery to be isolated and reported separately. If this is not possible then it is preferable to report the highest impact section of the journey to avoid over reporting the tonnage transported.

2 Climate Change and Energy PI's continued

2.3c Transport average load size

Performance Indicator and reporting measures

Average load moved for each mode (tonnes).

The average load size in tonnes is reported for each mode of transport (road, rail, water and other as appropriate).

Inputs from concrete + materials Production:	Reported
1. Average load size - Road (tonnes)	<ul style="list-style-type: none">• Average load size for:<ul style="list-style-type: none">○ All concrete○ Ready mix○ Precast
2. Average load size - Rail (tonnes)	
3. Average load size - Water barges (tonnes)	
4. Average load size - Water Marine vessels (tonnes)	

Definitions and reporting conventions

This metric relates to the delivery of all constituent materials and concrete that involves external movement between different sites rather than for internal movement within the same site.

The load size provides an indication of the efficiency of delivery transport in maximising loading and reducing numbers of deliveries. The value is also used along with the vehicle type to determine the DEFRA fuel conversion factors to be applied to carbon dioxide emissions calculations in 2.3d which are used as default in the absence of specific vehicle emission rates.

2 Climate Change and Energy PI's continued

2.3d CO₂ Emissions (Transport)

Performance Indicator and reporting measures

CO₂ emissions of external and internal delivery transport through the supply chain of concrete as a proportion of total products transported. (kg CO₂ / tonne)

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total kg CO ₂ produced by delivery transport per tonne of product or material delivered (kg/tonne)*	<ul style="list-style-type: none"> Total kg CO₂ produced by delivery transport per tonne of concrete product delivered (kg/tonne)
2. Range of inputs from 2.3a, 2.3b, 2.3c.**	
Additional inputs if available:	
3. Type of default vehicle option in DEFRA conversion factors to be used	
4. % laden weight if different from the default value of 50%	
5. Actual average greenhouse gas emissions per vehicle per km if available for reported vehicles/vessels	

Definitions and reporting conventions

CO₂ emissions resulting from the total supply chain transport impact reported in relation to the tonnage of concrete products delivered.

Onsite transport associated with extraction and manufacture within sectors of the concrete supply chain should be reported under CO₂ emissions (production)

In the cases where sectors of the concrete supply chain share the same site the transport impact is likely to be minimal or could be included in the transport element of the production emissions. The difference between the total products transported (2.3b) and the total production volume reported for the concrete market (production output), will be assumed to have no transport emissions. If this is not the case these emissions should be reported separately.

Reporting Options

The calculated value of kg of CO₂ per tonne can either be reported from calculation by the reporting company or trade association or subsequently calculated from the range of data inputs reported in 2.3a, 2.3b and 2.3c**.

If reported directly an example calculation is to be included. For guidance a typical calculation method is included in Appendix B3.

If to be calculated from the inputs in 2.3a, 2.3b and 2.3c, the additional data requested in the table above should be provided where possible, otherwise default DEFRA conversion values for CO₂ from different modes of transport and vehicle types are used.

3 Natural Resources and Enhancing the Environment PI's

3.1a Materials Efficiency

Performance Indicator and reporting measures

Material diverted from the waste-stream for use as a fuel source as a % of total energy use.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Proportion of energy use obtained from materials diverted from the waste stream as a % of total energy	• Proportion of energy obtained from materials diverted from the waste stream as a % of total energy used in concrete products
2. Total waste used (tonnes)	

Definitions and reporting conventions

Includes all waste or waste-derived fuels (e.g. meat and bone meal, packaging, paper, plastic, chipped tyres, waste oils, sewage sludge) and other waste fuels used directly in the production process.

The total energy use of concrete is calculated from the data collected under indicator 2.1 Energy Efficiency.

3 Natural Resources and Enhancing the Environment PI's continued

3.1b Materials Efficiency

Performance Indicator and reporting measures

The percentage of additional cementitious materials (GGBS, fly ash etc.) as a proportion of total cementitious materials used.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total additional cementitious material used at the mixer (tonnes)	<ul style="list-style-type: none"> Additional cementitious material used as a proportion of total cementitious (%)
2. Total CEM I used (tonnes)	
3. Total CEM II used (tonnes)*	
4. Total CEM III used (tonnes)*	
5. Total CEM IV used (tonnes)*	
6. Total Cementitious materials used	

*Note: * The ready mix sector can only provide total usage data for CEM II, CEM III and CEM IV not broken down into each type to maintain compliance with the Competition and Marketing Authority agreement in place since 2016*

Definitions and reporting conventions

This indicator is intended to demonstrate the amount of CEM I use, in concrete, which has been saved by the use of additional cementitious materials and is therefore not applicable to all constituent materials of concrete.

Additional cementitious materials' are defined as GGBS (GGBS to BS EN 15167-1) and fly ash (Fly ash to BS EN 450 Part 1, Category N and S, where they are used to replace CEM I in concrete.), limestone, silica fume and any waste, recycled, secondary or by-product materials that can be shown to have cementitious properties, used in the UK as separate additions.

This indicator includes additional cementitious materials added during cement production as well as those added during the manufacture of concrete.

The indicator is primarily based on data collected from the concrete manufacturers where the usage at the mixer of CEM I, blended cements and additional cementitious materials used are collected by type.

For subsequent calculation of the SCF PI, the additional cementitious materials within blended cements are broken out and included in the respective totals reported.

As a default condition, the combination cements will be assumed to have the following composition.

CEM II = 70% CEM I and 30% Fly Ash

CEM III = 50% CEM I and 50% ggbs

CEM IV = 50% CEM I and 50% fly ash.

This data is also cross checked against data collected from cement manufacturers on the amount of composite cements enter cement supplies to the concrete industry.

3 Natural Resources and Enhancing the Environment PI's continued

3.1c Materials Efficiency

Performance Indicator and reporting measures

Recycled/secondary aggregate use as a proportion of total aggregate use within concrete production

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total recycled/secondary aggregate used (tonnes)	• Recycled/secondary aggregate used as a proportion of total aggregates (%)
2. Total primary aggregates used (tonnes)	
3. Total aggregate used (tonnes)	

Definitions and reporting conventions

'Recycled/secondary aggregate' may be classified as below:

- Materials that have previously been used and subsequently re-processed, for example from demolition, rail ballast and/or hardened concrete (when re-processed known as Recycled Concrete Aggregate - RCA), and/or waste/by-product materials such as china clay, fly ash, glass, furnace bottom ash, steel slags and filler dust.
- Materials that do not attract an aggregate levy.

The information for this indicator is collected from ready-mixed and precast concrete production.

3 Natural Resources and Enhancing the Environment PI's continued

3.1d Materials Efficiency

Performance Indicator and reporting measures

% of waste derived and recovered material as a proportion of total production of cement.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Proportion of waste derived and recovered material as a percentage of total production of cement (%)	<ul style="list-style-type: none"> Used within Net Waste ratio (PI 1.2b)
2. Total waste derived and recovered material used (tonnes)	

Definitions and reporting conventions

Waste derived and recovered material used in the manufacture of cement is defined as material that is:

1. Classified as waste or would be used within other recovery operations
2. A by-product or residue from internal or external production processes
3. Re-processed and meets the 'End of Waste Protocol' specifications

3.1e Materials Efficiency

Performance Indicator and reporting measures

% of recycled ferrous scrap metal as a proportion of total constituent raw materials used.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Proportion of additional ferrous scrap metal used as a % of total constituent raw materials used in reinforcement production	– Proportion of additional ferrous scrap metal used as a % of total constituent raw materials used in reinforcement production
2. Total tonnes of constituent raw materials used in reinforcement production (tonnes)	

Definitions and reporting conventions

This indicator is intended to demonstrate the amount of recycled content used in the manufacture of reinforcing steel.

Constituent raw materials are defined as those added at the point of crude steel production which are inherent in the finished product. Examples include ferrous scrap metal, iron ore, carbon, and ferroalloys. Process materials used to aid manufacture are not considered.

The information for this indicator is collected from steel mills only.

3 Natural Resources and Enhancing the Environment PI's continued

3.2a Mains Water Use

Performance Indicator and reporting measures

Mains water use as a proportion of production output.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total mains water consumption (litres)	– Mains water per tonne of production (l/t)
2. Total production (tonnes)	

Definitions and reporting conventions

Mains water only, including that used within production sites, associated offices, canteens, toilets etc. Production output is the total tonnage or volume of the product produced.

3.2b Controlled Water Use

Performance Indicator and reporting measures

Controlled groundwater use as a proportion of production output.

Inputs from concrete + materials Production:	Internal Report only:
1. Total controlled groundwater consumption (litres)	– Controlled groundwater per tonne of production (l/t)
2. Total production (tonnes)	

Definitions and reporting conventions

Controlled groundwater is defined as all water abstracted from boreholes and other surface water features such as rivers and streams, lakes, ponds, reservoirs, springs (which may be interconnected) and which needs an abstraction licence, known as a 'Full Licence' in the Water Act 2014. Any abstraction which does not exceed 20 cubic metres per day and therefore does not need an abstraction licence should be included. If not measured, 20 cubic metres (20,000litres) per operational day can be assumed. Production output is the total tonnage or volume of the product produced.

Exclusions

- Any water abstracted from one part of the ground water source and then returned to another part of that source without being used; typically this will be quarry dewatering water which is discharged to a river without use. This is water requiring a transfer licence under the Water Act 2014.
- Water used from closed systems (e.g. lagoons in a closed washing system) in which it is recycled, and from rainwater sumps for which an abstraction licence is not required.

3 Natural Resources and Enhancing the Environment PI's continued

3.3 Site Stewardship

Performance Indicator and reporting measures

% of 'relevant' production sites that have a 'site specific action plan' as a proportion of the total number of 'relevant' production sites

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total number of 'relevant' production sites	- Proportion of 'relevant' sites that have 'site specific action plans' (%)
2. Total number of relevant sites operating 'site specific action plans'	
Additional inputs:	
3. Total number of relevant sites that have statutorily agreed restoration plans	
4. Total number of relevant sites that have biodiversity action plans monitored under an ISO 14001 EMS or other third party scheme	
5. Total number of relevant sites that have geodiversity action plans monitored under an ISO 14001 EMS or other third party scheme	

Definitions and reporting conventions

A production site shall be classified as any facility producing raw materials or manufacturing the product.

It is recognised that certain sites have less or no need for site stewardship plans and therefore the organisation shall hold a list of 'relevant' sites for the purposes of 'site stewardship', together with justification of exclusions.

In the context of this Guidance, the term 'relevant' refers to production sites such as quarries or cement works that can directly impact on the environment (it is unlikely to include ready mixed concrete plants).

The term 'Site specific action plans' refers to restoration plans, biodiversity and geodiversity schemes

4 Creating Sustainable Communities PI's

4.1 Health and Safety

4.1a Reportable Injuries

Performance Indicator and reporting measures

Reportable Injuries per 100,000 'direct employees' per annum

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Number of reportable injuries	– Reportable injuries per 100,000 direct employees
2. Total number of direct employees	

Definitions and reporting conventions

A Reportable Injury is defined as any injury that is reportable under the Reporting of Injuries, Disease and Dangerous Occurrences Regulations 1995 (RIDDOR) Guidance can be obtained from HSE at: <http://www.hse.gov.uk/pubns/priced/l73.pdf>

The term 'direct employee' means all employees on the company payroll and excludes any contract workers.

4.1b Lost Time Injuries

Performance Indicator and reporting measures

Lost Time Injuries for 'direct employees' per 1 million hours worked

Inputs from concrete + materials Production:	SCF Performance Indicator
3. Number of lost time injuries	– Lost time injuries per 1 million hours worked by direct employees (Lost Time Injury Frequency Rate or LTIFR)
4. Total number of direct employees	
5. Total hours worked by direct employees	

Definitions and reporting conventions

Lost time Injuries per million hours worked is commonly referred to as 'Lost Time Injury Frequency Rate' (LTIFR).

Lost Time Injury is defined as an occupational injury resulting in the absence of the injured party for one or more working shifts.

The term 'direct employee' means all employees on the company payroll and excludes any contract workers.

4 Creating Sustainable Communities PI's continued

4.1c Health and Safety Management Systems

Performance Indicator and reporting measures

Percentage of production sites covered by a 'UKAS' certified Health and Safety Management System (HSMS)

Inputs from concrete + materials Production:	SCF Performance Indicator
3. Total Number of production sites	• % of production sites certified
4. Total number of certified sites	

Definitions and Reporting Conventions

A production site is classified as any UK facility producing raw materials or manufacturing the product.

Individual production facilities covered by overall site certification should be included. For example, a ready-mixed or precast facility located within a quarry, and therefore covered by the 'site/quarry' certification should be included.

The term 'UKAS' refers to certification being granted / issued by a UKAS accredited certifying body. This may be site specific or company-wide dependent upon the type of certification sought.

The HSMS standards acceptable under these indicators are BS OHSAS 18001 and ISO 45001.

4 Creating Sustainable Communities PI's continued

4.2c Diversity

Performance Indicator and reporting measures

A partial measure of the diversity of the workforce by reporting on the proportions of male and female employees within a range of age groups.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Number of direct male and female employees in each of the age ranges: < 30 years 30-50 years >50 years	- Proportion of direct male and female employees within each of the age ranges
2. Total number of direct employees	

Definitions and reporting conventions:

The age groups shown are utilised within the wider Global Reporting Initiative (GRI) category G4-LA12 relating to diversity of the workforce.

The GRI guidance notes that detailed information on the composition of the workforce helps in assessing which issues may be of particular relevance to certain segments of the workforce.

Age	Male %	Female %
<30 years		
30-50 years		
>50 years		
Total		

Example reporting table

4 Creating Sustainable Communities PI's continued

4.3 Local Community

Performance Indicator and reporting measures

% of relevant production sites with community liaison activities.

Inputs from concrete + materials Production:	SCF Performance Indicator
1. Total number of 'relevant' production sites	– Proportion of 'relevant' sites that have 'community liaison activities' (%)
2. Total number of relevant sites operating 'community liaison activities'	

Definitions and reporting conventions

The term 'community liaison activities' can refer to, but is not exclusively limited to the following:

1. Liaison groups or council meetings
2. Open days
3. Public meetings
4. Community Newsletters
5. Social, recreational and educational activities involving the local community
6. Other as appropriate

It is recognised that the impact of certain sites on the local community are less significant than others and therefore the organisation shall hold a list of 'relevant' sites for the purposes of community liaison activities, together with justification of exclusions.

The term 'relevant' refers to mineral extraction sites in the cement and aggregates sectors but could also include other specific operations that SCF members consider to have a potential significant impact on the local community. This may apply to production sites within close proximity to sensitive receptors. It is expected that any production site that receives a high level of complaints would be considered a 'relevant' site.

The vast majority of single production plants/sites such as ready-mixed concrete and precast plants are expected to be excluded as they are generally located within industrial areas and have little or no impact upon their immediate community.

Where plants/sites are excluded from the mainstream 'liaison activities' stated above, records should be maintained in relation to any other discussions held with their local community as appropriate.

Appendix A1 Concrete industry sustainability strategy 2008



Sustainable Construction Strategy

FOR THE UK CONCRETE INDUSTRIES

We, the undersigned, agree to contribute to the fulfilment of the UK Concrete Industries' vision to be recognised as leaders in sustainable construction; to support the four strategic objectives and to deliver the eight commitments, as outlined in the Concrete Sustainable Construction Strategy dated 14 July 2008 and as summarised here.

We agree as companies to implement these fully, or as trade associations to encourage our members to do so. We will communicate the strategy both internally and externally to try and ensure the commitments become a reality.

As instruments of change, trade associations will facilitate the collection of performance data from members, establish performance benchmarks, agree performance targets with their membership, take part in periodic target setting and reviews at association and industry levels, and contribute to a published annual performance report for the UK concrete industries.

Vision

By 2012, the UK concrete industry will be recognised as the leader in sustainable construction, by taking a dynamic role in delivering a sustainable built environment in a manner that is profitable, socially responsible and functions within environmental limits.

Strategic objectives

1. Agree and adopt a common framework.
2. Improve our environmental profiles.
3. Enable our clients to achieve sustainable construction.
4. Communicate our progress and solutions.

Commitments

1. To launch an annual Sustainability Performance Report for the UK Concrete Industries commencing in March 2009.
2. To set targets for Performance Indicators by the end of 2009.
3. To design an industry R&D Programme to reduce CO₂ and other impacts.
4. To design an industry Skills Transformation Programme aimed at positioning the industry to play a leading role in meeting the challenge of sustainable construction.
5. To provide clients with industry data for LCA (life cycle analysis) models.
6. To develop sustainable construction solutions.
7. To provide clients with the knowledge and tools to adopt new solutions.
8. To demonstrate the benefits of concrete in the built environment.

[Signed] on behalf of [Company]

_____ Aggregate Industries
 _____ CEMEX
 _____ Hanson
 _____ Lafarge
 _____ Tarmac
 _____ Brett Group
 _____ Marshalls plc
 _____ Trent Concrete

[Signed] on behalf of [Trade Association]

_____ BCA
 _____ QPA
 _____ BPCF
 _____ CSMA
 _____ CAA
 _____ UKQAA
 [Signed] on behalf of The Concrete Centre
 _____ The Concrete Centre

30 July 2008

Appendix A2 Concrete industry sustainability strategy 2012



The Concrete Industry Sustainable Construction Strategy

Vision
The UK concrete industry will be recognised as a leader in sustainable construction, by taking a dynamic role in delivering a sustainable, zero carbon built environment in a socially, environmentally and economically responsible manner.

Strategic objectives

1. Commit to our role in achieving a sustainable built environment and contribute to construction industry and government initiatives
2. Engage with the broader supply chain to inform good practice and continue to explore new ways of improving our sustainable production performance
3. Communicate with clients to provide knowledge of concrete solutions to enable the design and construction of a sustainable built environment

Commitments

1. Contribute to the delivery of a zero carbon built environment
2. Provide Life Cycle Assessment data compliant with codes and standards
3. Develop a Material and Resource Efficiency Programme to inform best practice across the life cycle of concrete in the built environment
4. Develop a Low Carbon Freight Initiative to support improvement in transport performance through the concrete supply chain to construction sites
5. Develop a Water Strategy to support the measurement and reporting of sustainability performance and target setting
6. Target continuous improvement of sustainable production performance and report performance annually

www.sustainableconcrete.org.uk



Concrete provides solutions for all areas of the built environment, including vital infrastructure projects.

Our vision for the future

The strategy represents progression, continuous improvement and an increase in scope. The concrete industry will continue to develop performance indicators to ensure the relevance of our metrics. New targets for performance improvement will be set including:

- 90% reduction in waste to landfill by 2020 (from 2008 baseline)
- 30% reduction in CO₂ emissions from concrete production by 2020 (from 1990 baseline)
- 95% of production certified to responsible sourcing standard BS5 6001 by 2020
- 100% of relevant production sites with action plans for site stewardship and biodiversity

The industry will facilitate further engagement with the broader supply chain for concrete, offering the opportunity to inform development of the strategy and supporting initiatives. Collectively as an industry - and individually as manufacturers, sector trade associations and MPA The Concrete Centre - we are committed to supporting stakeholders in raising the potential, and understanding the sustainability credentials, of concrete and its constituents.

The online hub for more information is: www.sustainableconcrete.org.uk

"The overall theme of the extended strategy is a widening of focus from the sustainability of concrete production to the contribution concrete can make to a sustainable built environment."

Andy Spencer,
Chairman, Sustainable Concrete Forum



Jonathan Porritt, speaking at the launch of the Best Concrete Industry Sustainability Performance Report.

The journey so far

In 2008, the UK concrete industry committed to the Concrete Industry Sustainable Construction Strategy. This commitment was made by manufacturers and sector associations from the aggregate, cement, GGBS, fly ash, admixtures, ready-mixed and precast sectors, with support from the industry body MPA The Concrete Centre.

Four performance reports have been published and are testament to achieving a common framework of industry-wide reporting and an ambition of continuous improvement. Communicating and educating our colleagues and customers was also a key strategic objective. The training, events and new guidance delivered are essential in enabling the design of a more sustainable built environment using concrete.

As the UK construction industry's approach to sustainability develops, our industry strategy needs to stay ahead of supply chain requirements. In 2012, we are delighted to announce the launch of an updated Concrete Industry Sustainable Construction Strategy.

For an up-to-date listing of manufacturers and trade bodies committed to the strategy, please visit www.sustainableconcrete.org.uk.

To ensure successful implementation of the concrete industry strategy a Sustainable Concrete Forum was established to oversee delivery of the objectives and commitments.

As we reflect on our achievements to date, we acknowledge the founder members of the Forum. In addition, reference should be made to BAR (British Association of Reinforcement), which joined the process and contributed data from 2009.

Founder members of the Forum:

- Aggregate Industries www.britishtoprecast.org
- British Precast Association
- Brett Group
- Cement Admixtures Association www.admixtures.org.uk
- CEMEX
- Cementitious Slag Makers Association www.ukcsma.co.uk
- Hanson UK
- Lafarge Aggregates
- Lafarge Cement
- Mineral Products Association www.mineralproducts.org
- MPA British Ready-Mixed Concrete Association www.zbricca.org.uk
- MPA Cement <http://cement.mineralproducts.org>
- MPA The Concrete Centre www.concretecentre.com
- Marshalls plc
- Tarmac
- UK Quality Ash Association www.ukqaa.org.uk

An up-to-date listing of the manufacturers and trade bodies signed up to the strategy can be found at www.sustainableconcrete.org.uk.

Published by MPA The Concrete Centre, on behalf of the Sustainable Concrete Forum
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For details visit:

<https://www.sustainableconcrete.org.uk/Sustainable/Our-Strategy.aspx>

Appendix B1 (DEFRA Fuel conversion factors for 2018 data)

Fuel Type	Units	kg CO ₂ per unit	Derived conversions
Electricity Grid	kWh	0.30482**	
Natural Gas	kWh	0.18362	
	therms	5.381	
Gas Oil	tonnes	3190	kWh/tonne 12580
	kWh	0.25359	litres/tonne 1171
	litres	2.72417	kWh/litre 10.743
Diesel (100% Mineral diesel)	tonnes	3164.3	kWh/tonne 12690
	kWh	0.24942	litres/tonne 1194
	litres	2.65020	kWh/litre 10.6281
Petrol (100% mineral petrol)	tonnes	3135	kWh/tonne 13100
	kWh	0.23939	litres/tonne 1368
	litres	2.29167	kWh/litre 9.576
Fuel Oil	tonnes	3216.99	kWh/tonne 12030
	kWh	0.26733	litres/tonne 1016
	litres	3.16633	kWh/litre 11.8405
Burning Oil (Kerosene & Paraffin)	tonnes	3149.67	kWh/tonne 12830
	kWh	0.24544	litres/tonne 1248
	litres	2.52377	kWh/litre 10.280
Industrial Coal	tonnes	2427.5	kWh/tonne 7550
	kWh	0.32153	
Domestic Coal	tonnes	2630.61	kWh/tonne 8360
	kWh	0.3147	
Wood Pellets (CO ₂ e)	tonnes	61.52297	kWh/tonne 5080
	kWh	0.01506	
Coking Coal	tonnes	3043.79	kWh/tonne 8840
	kWh	0.34424	
LPG (Propane & Butane)	kWh	0.21419	kWh/t 13710
	therms	6.2773	Litres/t 1934
	litres	1.51703	kWh/litre 7.03889
Other Petroleum Gases	tonnes	2587.04	kWh/tonne 14070
	kWh	0.18386	
Naptha	tonnes	3131.33	kWh/tonne 13300
	kWh	0.23550	litres/tonne 1488
	litres	2.104	kWh/litre 8.9382
Lubricants	tonnes	3171.09	kWh/tonne 12034
	kWh	0.26351	
Petroleum Coke	tonnes	3386.49	kWh/tonne 9930
	kWh	0.34092	
Refinery / Misc	kWh	0.24519	
	therms	7.186	

** Total of yearly generation data + Losses & Distribution data.

<http://www.ukconversionfactorscarbonsmart.co.uk/>

The data is taken from “UK Government conversion factors for Company Reporting” Conversion Factors 2018 Version 1.01 (obtainable at link above) In the case of electricity the figure is based on the yearly average CO₂ emissions for generation data + transmissions and distribution losses added together. In the case of fuel conversion factors the figures are based on CO₂ emissions for Scope 1 and where appropriate the gross calorific value is used.

Appendix B2 (DEFRA Freight Transport conversion factors for 2018 data)

Transportation Type	Units	Total Direct GHG kg CO _{2e}
Road freight - Rigid 7.5-17t / 50%	km basis	0.6283
Road freight - Rigid >17t / 50%	km basis	0.93372
Rail	tonne.km	0.03351
Maritime - Bulk Carrier (100,000-199,999 dwt)	tonne.km	0.00304
Diesel (retail station biofuel blend)	CO _{2e} /litre	2.62694
Diesel (100% mineral diesel)	CO _{2e} /litre	2.68779

Appendix B3: Example transport CO₂e calculation

Table 1 shows fictitious input data for an organisation delivering 58,000 t of material or product by road and rail:

Table 1:

KPI	Units	Data Required	Average	Total
2.3a Average delivery distance travelled from factory gate to customer)	km (including return)	Road	50 ⁽²⁾	125,000 ⁽¹⁾
		Rail	200	400
		Water	0	0
		All deliveries	50.1	
2.3b Tonnes or m ³ moved split by three modes: road, rail, inland barge	Tonnes moved and total by each mode	Road		55,000 ⁽³⁾
		Rail		3,000
		Water		0
		Total		58,000
2.3c Average load for each mode	Tonnes per load	Road	22 ⁽⁴⁾	
		Rail	1,500	
		Water-Barge	0	
		Water-marine	0	

123 = data input by organisation

N.B. As a cross-check of the data input: Total distance transported⁽¹⁾ should be equal to average distance⁽²⁾ x total tonnes⁽³⁾/average load size⁽⁴⁾.

GHG CO₂e Calculation basis

Key to calculation of kg CO₂e per tonne of material or product delivered is the **Emission Factor** which converts distance and tonnage of deliveries to carbon dioxide equivalent emissions.

For detailed calculations it is always preferable to use actual emissions data (e.g. in kg CO₂e per km for road transport) if this is known. If this is the case then the values used should be reported as additional information in the KPI data submission.

As actual emissions data is complex to collect, where it is not available the CSF PI calculation uses DEFRA default factors recommended for business reporting for a range of transport types. Appendix B2 of this Document includes the 2015 DEFRA values for factors

used for the types of transport assumed in the calculation of transport GHG in the SCF report if actual data is not available.

Example Calculation

Road Transport:

- **Total road CO₂e (kg)** = Total km x **Emissions Factor** (kg CO₂e per km)

If the actual Emissions Factor for the type of road transport and the percentage fill used is **known** then this value should be used preferentially.

If the Emissions Factor is **not known** then the DEFRA default factors appropriate for the type of transport should be obtained from Appendix B2 of this Guide where the percentage fill can be assumed as 50% (average of full outward and empty return). Where an appropriate vehicle type and fill percentage is not contained in Appendix B, then the Emission Factor can be obtained from the DEFRA guidance from the following website:

<http://www.ukconversionfactorscarbonsmart.co.uk/>

For this example where the average load size is 22 tonnes, the DEFRA factor for Rigid >17 t @ 50% fill has been used = 0.9337 kg/km. (See Appendix B2)

Therefore, Total road CO₂e (kg) = 125,000 x 0.9337 = **116,712 kg**

- **Road CO₂e per tonne** = Total road CO₂e / Total tonnes moved
= 116,712/55,000 = **2.12 kg/tonne**

Rail Transport:

- **Total rail CO₂e (kg)** = Total km x Average load t x **Emissions Factor** (kg CO₂e per t. km)
If the actual Emissions Factor for the actual rail transport used is **known** then this value should be used preferentially.

If the Emissions Factor is **not known** then the DEFRA default factors appropriate for rail transport should be obtained from Appendix B2 of this Guide.

The factor is 0.0335 kg CO₂e per t. km

Therefore, Total Rail CO₂e = 400 x 1,500 x 0.0335 = **20,100 kg**

- **Rail CO₂e per tonne** = Total rail CO₂e / Total tonnes
= 20,100/3,000 = **6.7 kg/tonne**

Water Transport:

- No water transport to account for.

Total for all Transport:

- Total Transport CO₂e (kg) = Total road CO₂e + Total rail CO₂e + Total water CO₂e
= 116,712 + 20,100 + 0 = **136,821 kg**
-
- Transport CO₂e per tonne = Total transport CO₂e / Total tonnes
= 136,821 / 58,000 = **2.36 kg/tonne**

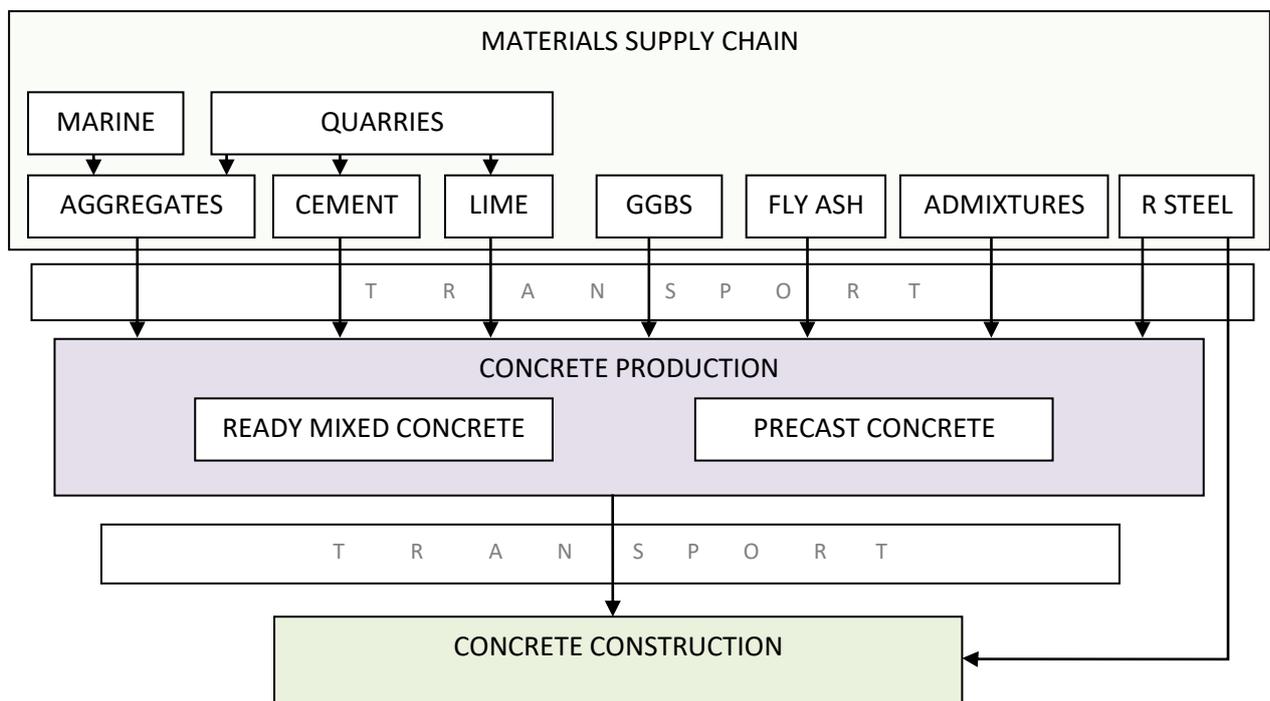
Appendix C: An overview of Sustainable Concrete Forum Performance Indicator data collection process

Performance indicator data is essentially collected at two levels:

1. Materials Supply Chain Level (including transport to the concrete producer)
2. Concrete Production Level (including transport to customer)

Figure 1 provides a schematic representing the scope of concrete supply chain covered by the SCF and indicates the relationship of these two levels.

FIGURE 1: Schematic representing the scope of the SCF concrete supply chain



Data is collected via annual surveys sent out early in each year to its member companies by the relevant trade associations for each level. This survey requests data relating to each of the performance indicators for the previous year.

The company data is aggregated within the trade association by a confidential process into several types of summary data depending on the PI in question. **An essential requirement of the process to comply with Competition Law is that no company can see or in any way identify values supplied by another company.**

The relevant trade associations for each level of the supply chain are:

Materials Supply Chain

- MPA Aggregates (quarried and marine aggregates)
- MPA Cement (UK factory produced cement and cement blends)
- British Lime Association (lime products)
- Cementitious Slag Manufacturers Association (ground granulated blastfurnace slag- GGBS)
- UK Quality Ash Association (fly ash and furnace bottom ash from coal burning power stations)
- British Association of Reinforcement (steel reinforcing products)
- Cement Admixtures Association

Concrete Production

- MPA British Ready Mixed Concrete Association
- British Precast Concrete Federation(MPA affiliated)

Data from the two levels of the supply chain are then aggregated further by a confidential process controlled by MPA The Concrete Centre. Again an essential part of this process is to maintain confidentiality of data to protect commercially sensitive data and ensure compliance with Competition Law.

The final aggregated PI data is then reviewed and approved by the Sustainable Concrete Forum for inclusion in its annual Sustainability Performance Report.

The performance indicators (PIs) to support the SCF strategy were developed to give an indication where possible in relation to concrete supplied to the construction market including impacts and contribution from its supply chain.

For some indicators it is possible to provide a measure that includes directly a proportional contribution from the materials. In other cases it is more appropriate to adopt overall figures as the raw materials are also supplied into other construction products so that it would be difficult to assign the contribution to concrete.

This note is aimed at providing clarity on which approach has been adopted for each indicator included in the CSF report.

As noted above, the methodology used in the aggregation process varies to a degree for each of the PIs depending on the exact nature of what is being reported.

The following tables illustrate the materials supplier and concrete producer inputs and the calculation basis for each indicator, grouped where the method is similar across a number of indicators.

- A more detailed definition has been provided following stakeholder queries in relation to the Net Waste Ratio (PI 1.2b).
- The basis of the Rolling Mix and Average Base Mix for reporting CO2 emissions is also given in more detail (PI 2.2).

PI Methodology Summary

Indicators	Material Supply Input	Concrete Production Input	Indicator Calculation Basis	Units
Management Systems EMS (1.1), QMS (1.5), HSMS (4.1c)	<ul style="list-style-type: none"> - Total no. of sites - Total no. sites certified 	<ul style="list-style-type: none"> - Total no. of sites - Total no. sites certified 	Overall proportion of all sites certified at both materials and concrete levels	%
Convictions (1.3)	<ul style="list-style-type: none"> - Total no. of convictions 	<ul style="list-style-type: none"> - Total no. of convictions 	Sum of all convictions at both materials and concrete levels	Number
Responsible sourcing (1.6)	<ul style="list-style-type: none"> - Proportion of production tonnage certified to BES 6001 (not used in PI) 	<ul style="list-style-type: none"> - Proportion of production tonnage certified to BES 6001 	Overall proportion of production tonnage of concrete only certified to BES 6001	%
Site stewardship + biodiversity (3.3)	<ul style="list-style-type: none"> - Total no. of sites classified as 'relevant' - Total no. of relevant sites with specific action plans 	<ul style="list-style-type: none"> - Total no. of sites classified as 'relevant' - Total no. of relevant sites with specific action plans - 	Overall proportion of all 'relevant' sites with specific action plans at both materials and concrete levels	%
Local Community liaison (4.3)	<ul style="list-style-type: none"> - Total no. of sites classified as 'relevant' - Total no. of relevant sites with community liaison activities 	<ul style="list-style-type: none"> - Total no. of sites classified as 'relevant' - Total no. of relevant sites with community liaison activities 	Overall proportion of all 'relevant' sites with community liaison activities at both materials and concrete levels	%

Indicators	Material Supply Input	Concrete Production Input	Indicator Calculation Basis	Units
Energy Efficiency (2.1)	<ul style="list-style-type: none"> Energy consumption in kWh per tonne of production for each material type (a) 	<ul style="list-style-type: none"> Tonnage of each material type used (b) Total kWh consumed in production for concrete (c) total tonnage of concrete produced (d) 	<p>[Total kWh of energy consumed from the use of materials (Tot a x b) + Total kWh used in concrete production(c)]</p> <p>Divided by</p> <p>[Total concrete production tonnage (d)]</p>	Average kWh/t of concrete
Carbon dioxide (CO ₂) (2.2)	<ul style="list-style-type: none"> (CO₂) emissions in kg/tonne of production for each material type (a) 	<ul style="list-style-type: none"> Tonnage of each material type used (b) Total (CO₂) emitted for of production (c) Total tonnage of concrete produced (d) 	<p>Rolling Mix for the year: (see later more detailed example)</p> <p>[Total kg of CO₂ emitted from the use of materials for the reporting year (Tot a x b) + Total kg of CO₂ emitted in concrete production for the reporting year(c)]</p> <p>Divided by</p> <p>[Total concrete production tonnage for the reporting year (d)]</p>	Average kg of CO ₂ /t of concrete
			<p>Baseline Average Mix: (see later more detailed example)</p> <p>[Total kg of CO₂ emitted from the use of materials based on a baseline proportion per tonne from 2008 (Tot a x %2008) + Total kg of CO₂ emitted from concrete production for the reporting year(c)]</p> <p>Divided by</p> <p>[Total concrete production tonnage for the reporting year(d)]</p>	Average kg of CO ₂ /t of concrete
% of energy consumption in concrete from waste derived fuels (WDF) (3.1a)	<ul style="list-style-type: none"> Energy consumption in kWh per tonne of production for each material type (a) % of energy consumption that is derived from WDF for each material (b) 	<ul style="list-style-type: none"> Tonnage of each material type used (c) kwh of energy from WDF used in concrete production (d) total tonnage of concrete (e) 	<p>[Total kWh of energy obtained from WDF associated with the use of materials Tot (a x b x c) + Total kWh of energy from WDF in concrete production (d)]</p> <p>Divided by</p> <p>[Total kWh of energy use from concrete and materials production (e)]</p>	%

Indicators	Material Supply Input	Concrete Production Input	Indicator Calculation Basis	Units
Waste to landfill (1.2)	– Waste to landfill in kg per tonne of production for each material type (a)	– Tonnage of each material type used (b) – Waste to landfill in kg from concrete production (c) – total tonnage of concrete (d)	[Total kg of waste to landfill from the consumption of materials (Tot a x b) + Total kg waste to landfill from concrete production (c)] Divided by [Total concrete production tonnage (d)]	Average kg/t of waste to landfill for concrete
% of additional cementitious materials (3.1b)		– Tonnage of each cementitious material type used	[Total consumption of GGBS + Fly Ash in blended cements and added at the mixer + other cementitious materials added at the mixer not included within cement production] Divided by [Total consumption of all cementitious materials]	%
% recycled aggregates as a proportion of total aggregates (3.1c)		– Tonnage of primary aggregates used (a) – Tonnage of secondary/recycled aggregates used (b)	[Total consumption of recycled aggregates in concrete (a)] Divided by [Total consumption of all aggregates (a+b)]	%
% of recycled scrap as a proportion of total materials used in reinforcing bar production (3.1e)	– % of recycled scrap as a proportion of total materials used in reinforcing bar production		% of recycled scrap as a proportion of total materials used in reinforcing bar production	%
Mains water consumption (3.2a)	– Mains water used in litres per tonne of production for each material type (a)	– Tonnage of each material type used (b) – Mains water used in litres per tonne of concrete production (c) – total tonnage of concrete (d)	[Total litres of mains water used through the consumption of materials (Tot a x b) + Total litres of mains water in concrete production (c)] Divided by [Total concrete production tonnage (d)]	Average litres/t of mains water

Indicators	Material Supply Input	Concrete Production Input	Indicator Calculation Basis	Units
Health and Safety – Reportable injuries (4.1a)	<ul style="list-style-type: none"> – Number of reportable injuries per 100,000 direct employees for each material type – Number of direct employees for each material type 	<ul style="list-style-type: none"> – Number of reportable injuries per 100,000 direct employees for in concrete production – Number of direct employees in concrete production 	Overall number of reportable injuries per 100,000 direct employees at both materials and concrete levels	Number
Health and Safety – Lost Time Injuries (LTIs) (4.1b)	<ul style="list-style-type: none"> – Number of Lost Time injuries for direct employees per 1 million hours worked for each material type – Number of direct employees for each material type – Number of hours worked by direct employees 	<ul style="list-style-type: none"> – Number of Lost Time injuries for direct employees per 1 million hours worked for each material type – Number of direct employees for each material type – Number of hours worked by direct employees 	Overall number of LTIs for all direct employees per 1 million hours worked at both materials and concrete levels	Number
Diversity (4.2c)	<ul style="list-style-type: none"> – Number of direct male and female employees in each of the age ranges: <ul style="list-style-type: none"> < 30 years 30-50 years >50 years for each material type – Total number of employees 	<ul style="list-style-type: none"> – Number of direct male and female employees in each of the age ranges: <ul style="list-style-type: none"> < 30 years 30-50 years >50 years for concrete production – Total number of employees 	Overall proportion of male and female employees in the age ranges <ul style="list-style-type: none"> – < 30 years – 30-50 years – >50 years at both materials and concrete levels	%

Net Waste Ratio(1.2b)

The SCF Sustainability report includes a value for the ratio of 'Waste and secondary materials' used in concrete production divided by the waste landfilled due to concrete production. This demonstrates the extent to which the industry is a net user of waste.

For clarity and consistency of reporting the definition of this ratio is given in more detail here:

**The Net Waste Ratio = Material included in the 'waste and secondary material' consumed value
Material included in the 'waste to landfill' value**

Material included in the 'waste and secondary material' consumed value = the sum of:

1. [Usage of PFA + GGBS + recycled aggregates + additional cementitious materials reported by the BRMCA and BPCF]
+
2. [Waste/secondary material used in cement production obtained by multiplying cement consumption in concrete by the proportion of waste usage in cement reported directly by MPA Cement (this includes a proportion for the GGBS and PFA included in factory produced blended cements)]
+
3. [The tonnage of waste derived fuel used]

Material included in the 'waste to landfill' value = the sum of

1. [Waste reported as sent for licensed disposal from Ready Mix + Precast concrete production]
+
2. [The sum for waste to landfill in kg/tonne from each of the raw materials aggregates, cement, GGBS, other cementitious multiplied by the kg/tonne of landfill reported for each]
+
3. [All admixture waste to landfill reported by CAA]

Carbon Dioxide (CO₂) Emissions for the 'Rolling' and 'Standardised Baseline Average' Mixes

Several questions have been received in relation to the difference between these two methods of reporting CO₂. Therefore the methodology for each is described in more detail below.

Rolling Mix

Total CO₂ Emission = the sum of:	
1.	[Aggregate CO ₂ content kg/tonne for the reporting year x tonnes Aggregate usage in concrete for the same year]
	+
2.	[Cement CO ₂ content kg/tonne for the reporting year x tonnes Cement usage in concrete for the same year]
	+
3.	[Fly Ash CO ₂ content kg/tonne for the reporting year x tonnes Fly Ash usage in concrete for the same year]
	+
4.	[GGBS CO ₂ content kg/tonne for the reporting year x tonnes GGBS usage in concrete for the same year]
	+
5.	[Lime CO ₂ content kg/tonne for the reporting year x tonnes Lime usage in concrete for the same year]
	+
6.	[Other cementitious CO ₂ content kg/tonne for the reporting year x tonnes other cementitious usage in concrete for the same year]
	+
7.	Total CO ₂ from admixture production for the reporting year
	+
8.	[CO ₂ kg/tonne from the production of RMC for the reporting year x tonnes RMC produced]
	+
9.	[CO ₂ kg/tonne from the production of Precast for the reporting year x tonnes Precast produced]

Divided by

[Total tonnes of Concrete (RMC + Precast) produced]

This therefore represents the kg of CO₂/tonne for the average mix proportions of concrete across the scope of the SCF for the reporting year. As well as reflecting changes in the emissions controlled by the concrete producers and the materials supply chain, trends in this value will be influenced by the types of concrete specified by the market which to an extent is not controlled by the concrete supply industry.

Standardised Baseline Average Mix (2008)

Total CO₂ Emission = the sum of:

1. [Aggregate CO₂ content kg/tonne for the reporting year x **Aggregate tonnage used in concrete in 2008**]
+
2. [Cement CO₂ content kg/tonne for the reporting year x **Cement tonnage used in concrete in 2008**]
+
3. [Fly Ash CO₂ content kg/tonne for the reporting year x **Flyash tonnage used in concrete in 2008**]
+
4. [GGBS CO₂ content kg/tonne for the reporting year x **GGBS tonnage used in concrete in 2008**]
+
5. [Lime CO₂ content kg/tonne for the reporting year x **Lime tonnage used in concrete in 2008**]
+
6. [Other cementitious CO₂ content kg/tonne for the reporting year x **Other Cementitious tonnage usage in concrete in 2008**]
+
7. **Total CO₂ from admixture production in 2008**
+
8. [CO₂kg/tonne from the production of RMC for the reporting year x tonnes RMC produced in 2008]
+
9. [CO₂kg/tonne from the production of Precast for the reporting year x tonnes Precast produced in 2008]

Divided by

[Total tonnes of Concrete (RMC + Precast) produced in 2008]

This represents the kg of CO₂/tonne for the year of reporting but at a fixed set of materials proportions (%) and concrete production based on the average for 2008, the launch year for the SCF strategy. Using this as an additional basis for reporting gives a clearer indication of changes in emissions more directly under the control of the concrete suppliers.