### Cement Production

**Richard Heede**  
*Climate Mitigation Services*  
File started: 26 December 2005  
Last modified: January 2020

#### Taiheiyo Cement

www.taiheiyo-cement.co.jp/english/  
Tokyo

#### Cement production & emissions data

<table>
<thead>
<tr>
<th>Year</th>
<th>Cement Prod</th>
<th>Energy Use</th>
<th>CO2 emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clinker ratio</td>
<td>Annual production</td>
<td>Gross consumption</td>
</tr>
<tr>
<td></td>
<td>Million tons/yr</td>
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<td>Billion Btu</td>
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#### Key Performance Indicators of the CEM I and GCCA for Fiscal 2018

- **CO2 and Climate Protection (CO2 emissions, energy consumption)**
  - Number of facilities using CO2 and GCCA: The Cement CEM I and Energy Protocol guidelines for emissions inventory
  - Percentage of total using CO2 and GCCA: The Cement CEM I and Energy Protocol guidelines for emissions inventory

- **Total CO2 emissions (million tonnes/year)**
  - Gross: 22.7, 23.3, 23.5
  - Specific: 3,801, 3,803, 3,268

- **CO2 emissions per tonne of cementitious product (kg CO2/tonne of cementitious)**
  - Specif. gaseous CO2 emissions: 708, 703, 696
  - Specif. gaseous CO2 emissions: 0.866, 0.859, 0.853

- **Alternative Raw Materials Use**
  - Alternative raw material: % of thermal energy consumption of kiln
  - Clinker cement ratio (%)


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#### Taiheiyo SustRpt 2019, page 70.

<table>
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<tr>
<th>Year</th>
<th>Emissions / Product</th>
<th>Annual production</th>
<th>Energy input</th>
<th>domestic sales</th>
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<tr>
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<td>Tonne CO2/tonne</td>
<td>Million tons</td>
<td>MJ/tonne clinker</td>
<td>Million tons</td>
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</table>

**Taiheiyo SustRpt 2017, page 64.**
Taiheiyo CSR Rpt 2018, page 49.
Taiheiyo

Cell: H9
Comment: Rick Heede:
"Chichibu Onoda Cement Corp. merged with Nihon Cement Co. to form Taiheiyo Cement Corporationent Co. to form Taiheiyo Cement Corporation." Taiheiyo CSR 2008.

Cell: K11
Comment: Rick Heede:
Emissions from cement fabrication are of two main types: Calcining process of calcium carbonate into clinker liberates carbon dioxide, and emissions from the energy used in the manufacturing process. Typically not included in the emissions estimates are transportation energy, the burning of wastes, or plant construction.

Cell: E12
Comment: Rick Heede:
The industry calcination factor ranges from 525 to 900 kg CO2 per tonne of clinker (net), but of course varies from company to company, and will tend to decrease over time as process efficiencies improve. WBCSD (2002) "Toward a Sustainable Cement Industry: Key Performance Indicators," by Joseph Fiksel, Battelle, for WBCSD. "Each tonne of Ordinary Portland Cement generates ~900 kg of net CO2 emissions ... and consumes roughly 3,000 MJ of total electrical and thermal energy," p. 8.

Cell: H12
Comment: Rick Heede:
Most cement companies will aggregate emissions from energy use with emissions from cement fabrication. This column is provided for companies that provide both data.

Cell: K12
Comment: Rick Heede:
Average CO2 emissions intensity have declined 16.5 percent from 1990 to 2009 -- from 758 net kg CO2 per tonne of cementitious product in 1990 to 633 kg CO2/t in 2009, according to WBCSD data.** This project estimates process emissions from calcining limestone and thus excludes emissions from fuel and electricity inputs to cement manufacturing. The emission rates and net total company emissions both include process and energy-related emission; a subsequent worksheet (SumCement.xls) estimates process emissions of CO2.

Cell: K42
Comment: Rick Heede:

Cell: K71
Comment: Rick Heede:

Cell: M74
Comment: Rick Heede:
CSR 2008, page 17. Taiheiyo company-wide emissions total 37.51 million tonnes CO2 (net) and 38.41 MtCO2 (gross). "Net CO2 emissions: The total CO2 emissions minus the CO2 emissions from alternative fuels." Also (column 3): 753 net kgCO2 per tonne of cementitious product (772 kgCO2/tonne gross). Unclear why CO2 emissions in table on page 19 shows 16.506 MtCO2 in FY2005, 16.730 MtCO2 in FY2006, and 15.660 MtCO2 in FY2007. Again, in table on page 24, "Trends in Net CO2 emissions," neither domestic (17.829 MtCO2) nor overseas (19.681 MtCO2) for FY2007 match the data above. Total (37.509 MtCO2) does equal "company-wide emissions" above. It is unclear whether this data includes non-cement operations, or whether the smaller data is for calcining operations only (excluding fuel inputs). CMS cites the lower data sets as a conservatism until unambiguous data is at hand.

Cell: K75
Comment: Rick Heede:

Cell: E66
Comment: Rick Heede:
2009AR pdf pg 6

Cell: K76
Comment: Rick Heede:

Cell: M76
Comment: Rick Heede:

Cell: E77
Comment: Rick Heede:
2010AR pdf pg 7 in text

Cell: J78
Comment: Rick Heede:
Apparently, WBCSD modified the protocol (shifting from V2.0 to V3.1). In the overlap dual-reporting year of 2010, V2 was 733 kgCO2/tonne cementitious, whereas V3.1 was 707 kgCO2/tonne cementitious.


Cell: G80
Comment: Rick Heede:
AR 2010 pdf pg 4

Cell: K81
Comment: Rick Heede:

Cell: G84
Comment: Rick Heede:

Cell: K84
Comment: Rick Heede:

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Cell: K85
Comment: Rick Heede:
Taiheiyo Sust Rpt 2019, Key Performance Indicators, p. 70. Indicators table shown below. Gross emissions total 23.5 MtCO2; net emissions 22.6 MtCO2. (defined as: "Net CO2 emissions: gross CO2 emissions minus the CO2 emissions from alternative-derived fuels.") Clinker / cement ratio: 82.8%. Emissions from purchased electricity 0.963 MtCO2. Alternative fuel rate: 12% of thermal energy input.