

Cement Production

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Climate Mitigation Services
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Taiheiyō Cement

yellow column indicates original reported units

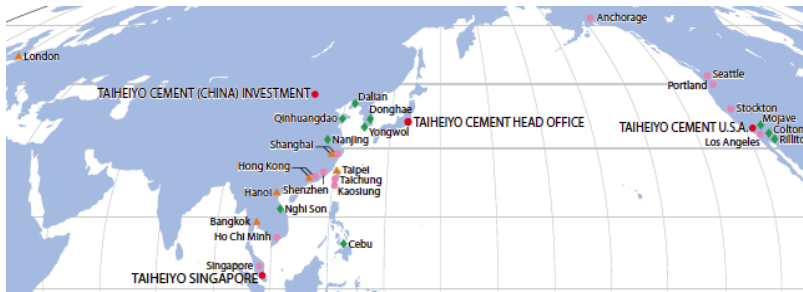
Founded in 1881

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

Cement production & emissions data

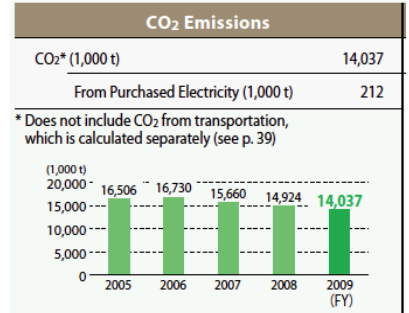
Year	Cement Prod		Energy Use		CO2 emissions	
	Clinker ratio	Annual production	Gross consumption	Gross consumption	Emissions rate	Net emissions
	Million tons/yr	Million tonnes/yr	Billion Btu	Terajoules	kg CO2/tonne	Million tonnes/yr

TAIHEIYO CEMENT CORPORATION



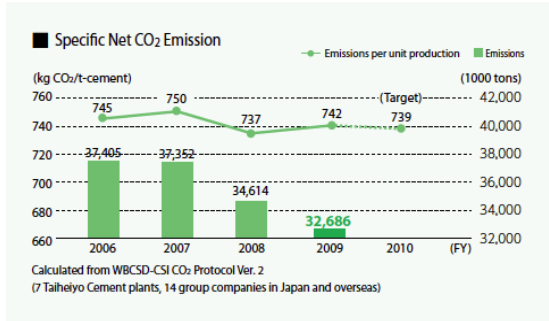
CO₂ is emitted by chemical reactions during the cement manufacturing process

The key component of limestone, which is the main raw material used to make cement, is CaCO₃ (calcium carbonate). During the manufacture of cement, the chemical reaction shown (decarbonation) generates CO₂.



Net emissions rate kg CO₂/t cementitious product | Net emissions million tonnes CO₂

825	17.0
825	18.0
820	21.0
820	23.0
815	24.0
820	22.5
830	22.0
820	21.0
815	20.5
800	20.0
780	18.0
770	17.0
760	18.0
750	19.0
749	21.0
760	20.5
765	22.0
770	22.0
760	22.5
765	23.0
790	24.0
780	22.0
770	20.1
760	18.1
760	18.1
760	18.0
760	17.5
760	16.9
760	16.1
759	16.5
764	16.7
750	15.7
737	14.9
742	14.0
739	14.8



Trends in CO₂ Emissions* from Cement Manufacture

Trend in Specific Net CO₂ Emission*¹ (kg CO₂/t-cement)

	FY2006	FY2007	FY2008	FY2010Target
Domestic & Overseas	745	750	737	734

Trend in Net CO₂*² Emission (1,000tCO₂/year)

	FY2006	FY2007	FY2008
Domestic	18,583	17,671	15,836
Overseas	18,821	19,681	18,779
Total	37,405	37,352	34,614

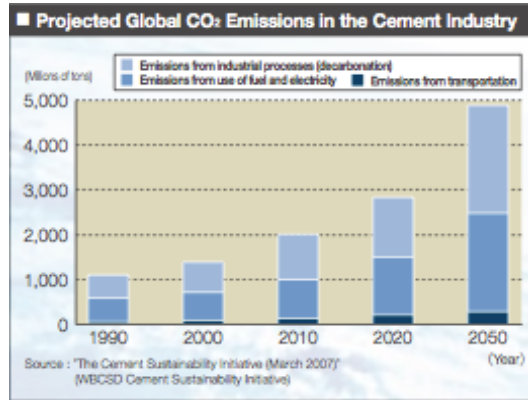
*1: Data for our 7 plants, 6 group companies in Japan and 8 overseas group companies, calculated using WBCSD-CSI CO₂ Protocol Ver. 2
*2: Net CO₂ Emissions: The total CO₂ emissions minus the CO₂ emissions from alternative fuels
* Some figures differ from those in past reports, due to an effort to achieve consistency between past and current input figures.

Emissions / Product	Annual production	Energy input	domestic sales
Tonnes CO ₂ /tonne	million tonnes	MJ/tonne clinker	Million tons
0.642	24.4	3,302	
0.783	19.1	3,231	55.5
0.833	17.3	3,282	50.9
	14.8		42.7

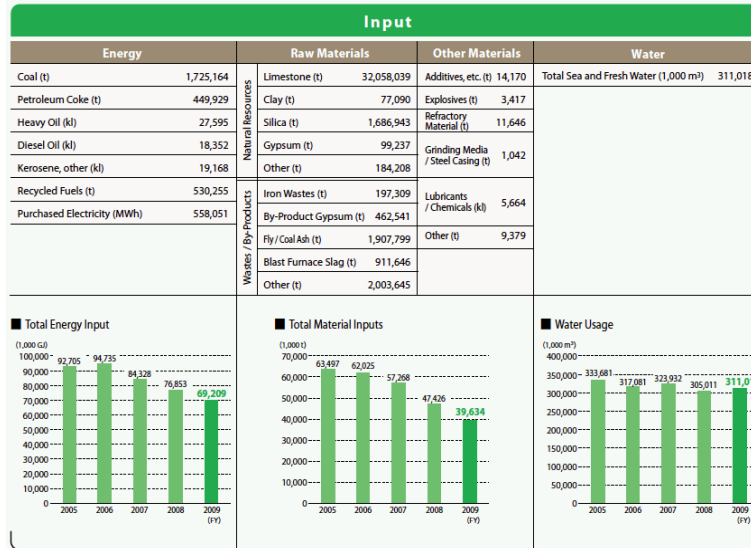
Conflicting data million tonnes CO₂

37.41
37.51
34.61
32.70

Total	0.752	-	-	-	694
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Taiheiyō Cement: "Our CO₂ emissions from fuel combustion accounts for about 40% of our total CO emissions." CSR2008, page 24. Transportation emissions (shipping 47.38 million tonnes) by ship, truck, and rail totaled 0.179 million tonnes CO₂; CSR2008 page 24.



Climate change management		FY2007	FY2008	FY2009
Number of facilities using the CSI CO ₂ Protocol Guidelines for emissions inventory		27	27	27
Percentage of facilities using the CSI CO ₂ Protocol Guidelines for emissions inventory (%)		100	100	100
Company-wide total CO ₂ emissions (gross and net), million tons/year	Gross	38.4	35.6	33.6
	Net*	37.4	34.6	32.7
Company-wide gross and net CO ₂ emissions per ton of cementitious product (kg/ton of cementitious product)	Gross	770	757	763
	Net	750	737	742

Fuels and materials use		FY2007	FY2008	FY2009
Energy use				
Specific heat consumption of clinker production, in MJ per ton of clinker		3,302	3,231	3,282
Alternative fossil fuel rate: consumption of alternative fuels, as a percentage of thermal consumption		9.1	9.5	10.0
Biomass fuel rate: consumption of biomass, as a percentage of thermal consumption		1.4	1.4	1.6
Raw materials use				
Alternative raw materials rate: consumption of alternative raw materials, as a percentage of total raw materials for cement and clinker production (calculated on a dry basis)		13.8	11.6	14.0
Clinker/cement factor: ratio between clinker consumption and cement production calculated according to cement CO ₂ protocol		87.1	86.7	87.1

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 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 emions of CO2.

** World Business Council for Sustainable Development Cement Sustainability Initiative (2009) Cement Industry Energy and CO2 Performance: 'Getting the Numbers Right', wbcscement.org, 44 pp. See GNR Indicator 326, reproduced at the "Cement industry data" worksheet in this portfolio.

Cell: K42

Comment: Rick Heede:

Taiheiyo Cement (2004) Annual Report. Estimated from a bar chart; uncertainty +/- 4 percent.

Cell: K71

Comment: Rick Heede:

CSRpt 2008, page 23 (see column chart above) shows CO2 emissions FY2003-FY2007.

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 "J"): 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:

CSR 2009, page 35. Conflicts with data totaling domestic and overseas emissions, page 36. Both data sets reproduced above.

Cell: E76

Comment: Rick Heede:

2009AR pdf pg 6

Cell: K76

Comment: Rick Heede:

2010CSR pdf pg 36

Cell: M76

Comment: Rick Heede:

Taiheiyo CSR Rpt 2009, page 17. "Company-wide emissions (the company also makes ceramics, construction materials, electronics).

Cell: E77

Comment: Rick Heede:

2010AR pdf pg 7 in text

Cell: AB79

Comment: Rick Heede:

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