

# Cement Production

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 Climate Mitigation Services  
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**Holcim**

www.holcim.com Zurich

yellow column indicates original reported units

Founded in 1912

## Cement production & emissions data

Year

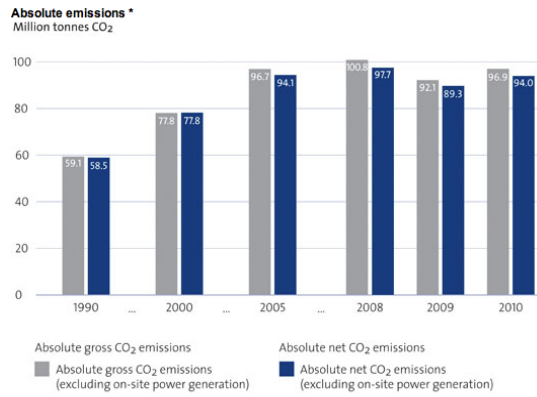
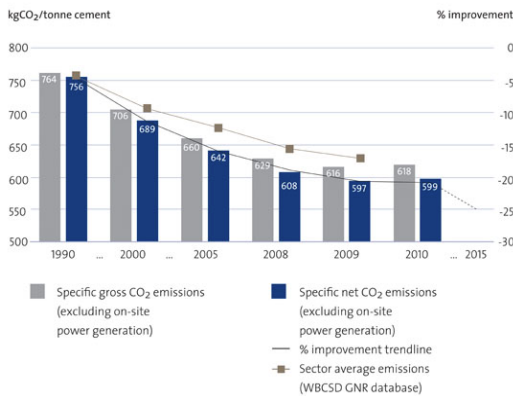
Year	Cement Prod		Energy Use		CO2 emissions	
	Clinker ratio Million tons/yr	Annual production Million tonnes/yr	Gross consumption Billion Btu	Gross consumption Terajoules	Emissions rate kg CO2/tonne	Net emissions Million tonnes/yr

	2005	2006	2007
EN3, EN10, EN11, EN13, EN28			
Number of sites	127	150	148
<b>Energy and CO<sub>2</sub></b>			
Fuel consumption* (specific) MJ/t	3,176	3,057	3,039
Total MJ/a	443	452	474
Power consumption* (specific) kWh/t	105	105	105
Total million kWh/a	14,600	15,500	16,250
Indirect CO <sub>2</sub> from purchased power (million tonnes)	5.7	6.1	6.6

Holcim CSR 2007, page 31.



2007 fuel mix	
coal	52%
petroleum coke	20%
heavy oil	2%
natural gas	12%
shale & lignite	2%
alt fossil fuels	10%
alt biomass	2%



Holcim webpage "CO2 Performance", specific emissions 1990-2010

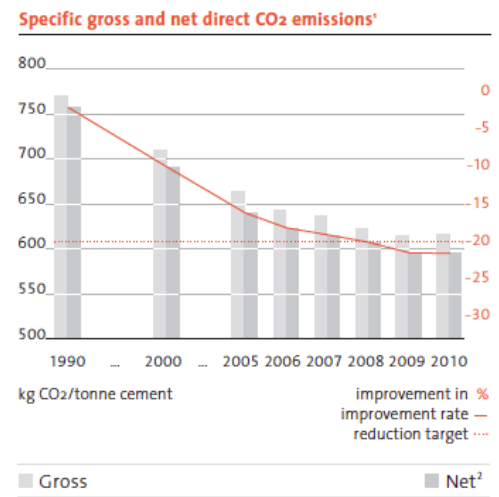
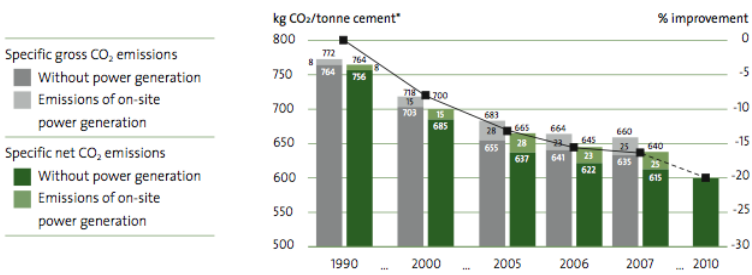
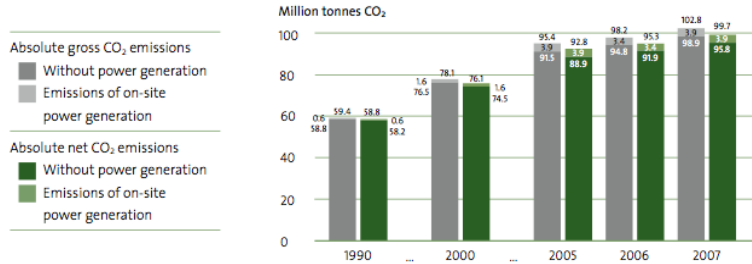
\*Due to ownership changes, the figures for previous years have been restated.

Holcim webpage "CO2 Performance", absolute emissions 1990-2010

Year	Clinker factor percent clinker in cement	Sales of cement million tonnes	Thermal mix percent alt fuels	Thermal efficiency MJ/tonne clinker	Net emissions rate kg CO2/t cementitious	Net emissions million tonnes CO2	Process emissions Mt CO2	Process emissions Mt CO2
1990	82.1%	55.2	3.6%	4,566	756	58.5	27.6	32
1991		56.4	interpolated		765	60.4	28.2	34
1992		59.3	interpolated		750	62.4	29.7	35
1993		60.8	interpolated		755	64.3	30.4	36
1994		64.8	interpolated		730	66.2	32.4	38
1995		66.2	interpolated		735	68.2	33.1	39
1996		69.0	interpolated		725	70.1	34.5	40
1997		71.4	interpolated		720	72.0	35.7	42
1998		68.4	excludes ready-mix		715	73.9	34.2	43
1999		74.6	excludes ready-mix		710	75.9	37.3	44
2000	79.9%	80.6	exc	9.0%	689	77.8	40.3	46
2001		84.3	excludes ready-mix		690	81.1	42.2	48
2002		90.5	excludes ready-mix		675	84.3	45.3	51
2003		94.3	excludes ready-mix		670	87.6	47.2	53
2004		102.1	excludes ready-mix		670	90.8	51.1	56
2005	75.2%	110.6	exc	10.8%	642	94.1	55.3	59
2006	73.6%	140.7	exc	11.0%	645	95.3	70.4	60
2007	72.6%	149.6	exc	11.1%	640	99.7	74.8	64
2008		143.3	exc	11.7%	608	97.7	71.7	64
2009		131.9	exc	12.1%	597	89.3	66.0	59
2010		136.7	exc	12.1%	599	94.0	68.4	63
<b>Total</b>		<b>1,911</b>				<b>1,664</b>	<b>955</b>	<b>1,005</b>

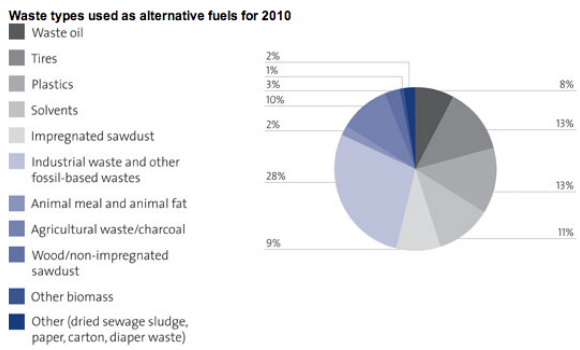
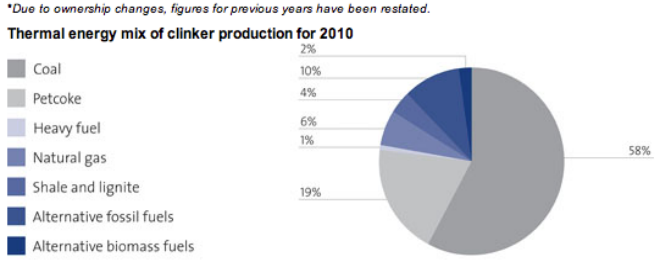
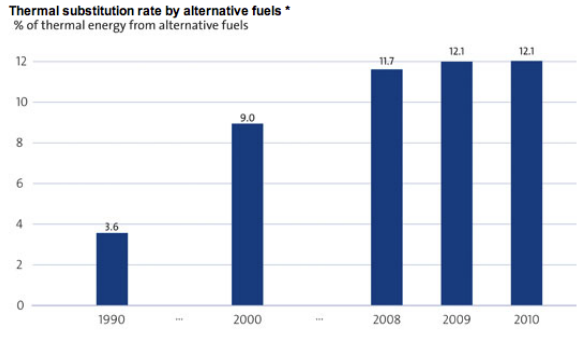
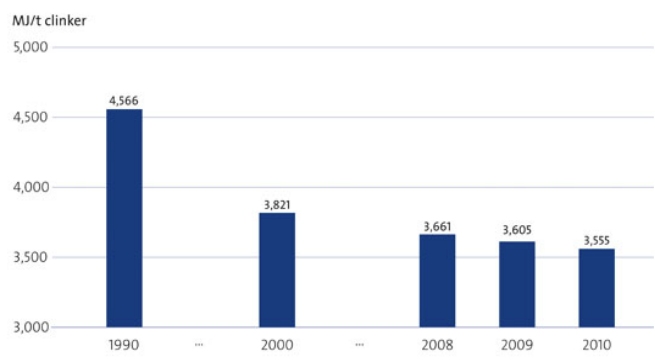
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Holcim CSR 2007, page 28.

Holcim AnnRpt 2010, page 42.



Holcim webpage "Thermal energy efficiency."

Holcim webpage "Thermal substitution rate by alternative fuels."

0.00%

**Cell:** H9

**Comment:** Rick Heede:

"Holcim is a worldwide leading producer of cement and aggregates. Further activities include the provision of ready-mix concrete and asphalt as well as other services. The Group works in more than 70 countries and employs almost 90,000 people."  
Holcim CSR 2007, back cover.

**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:** K17

**Comment:** Rick Heede:

Holcim CSR 2007, page 29.

**Cell:** E57

**Comment:** Rick Heede:

We do not have Holcim data on cement sales prior to 1998, and we interpolate production from published information of Holcim's net CO2 emissions from cement manufacture for 1990 and 2000, along with Holcim's net emissions rate in kg CO2 per tonne of cementitious production.

Note: CMS does not use cement production to estimate process emissions of CO2 from the calcination of limestone -- though this would be preferred -- for the simple reason that most companies do not report sales; more often production capacity is reported, or the cement production data is incomplete. Instead we use the net emissions from cement production, since large producers are also participants in the WBCSD Sustainable Cement Initiative and as such do report net emissions and net emissions rate for 1990 and 2000 and later years.

**Cell:** J57

**Comment:** Rick Heede:

www.holcim.com

Interpreted from a bar chart found at, Sustainable Development, CO2 Emissions Performance.

**Cell:** K57

**Comment:** Rick Heede:

www.holcim.com Holcim webpage on CO2 performance: "Absolute emissions" shows 1990, 2000, 2005, and 2008-2010 gross and net CO2 emissions. CMS interpolates between 1990 and 2000, and 2000 and 2005.

**Cell:** E65

**Comment:** Rick Heede:

Holcim AnnRpt 1999, page 3. Excludes sales of ready-mix (21.8 million m<sup>3</sup> in 1999, and 20.8 million m<sup>3</sup>).

**Cell:** E67

**Comment:** Rick Heede:

www.holcim.com; interpreted from a chart found at Investor Relations, Key Indicators

**Cell:** D72

**Comment:** Rick Heede:

Hoclim CSR 2007, page 30, for 1990, 2000, 2005-2007. "In 2007, we consumed 194.4 million tonnes of natural raw materials (2006: 184.9) and 26.9 million tonnes of alternative raw materials (2006: 24.5) to produce 155.9 million tonnes of cement (2006: 147.8)."

**Cell:** G72

**Comment:** Rick Heede:

Hoclim CSR 2007, page 29, for 1990, 2000, 2005-2007.

**Cell:** E75

**Comment:** Rick Heede (Mar10):

Holcim 2009 operating results worksheet reports "Sales of cement": 143.4 million tonnes in 2008 (131.9 Mt in 2009). This does not equal clinker production, but will suffice until better data is available.

**Cell:** G75

**Comment:** Rick Heede:

Holcim CSR rpt 2007, Performance Summary, "Absolute net CO2 emission, in million tonnes" 2005-2007.

**Cell:** K75

**Comment:** Rick Heede:

Holcim website, "CO2 performance," shows Absolute emissions, gross and net (CMS lists net emissions). Chart reproduced on this page.

**Cell:** E76

**Comment:** Rick Heede:

Holcim AnnRpt 2010 pg 6, sales of cement. Excludes sales of ready-mix concrete: 45.9 million m<sup>3</sup> in 2010, and 41.8 million m<sup>3</sup> in 2009.