

# Cement Production

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 Climate Mitigation Services  
 File started: 26 December 2005  
 Last modified: December 2011

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**Cemex**

www.cemex.com Mexico City

yellow column indicates original reported units

Founded in 1906

## Cement production & emissions data

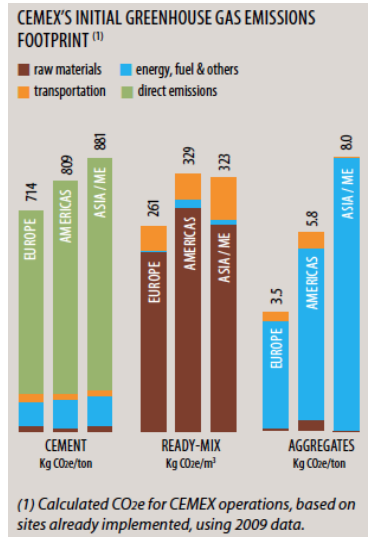
Year	Cement Prod		Energy Use		CO2 emissions	
	Clinker ratio	Annual production	Gross consumption	Gross consumption	Emissions rate	Net emissions

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Global operations (as of December 31, 2008)

	CEMENT PROD. CAPACITY MILLION TONS/YEAR
Mexico	29.2
United States <sup>1</sup>	17.5
Spain	11.4
United Kingdom	2.8
Rest of Europe <sup>2</sup>	11.6
South / Central America and Caribbean <sup>3</sup>	11.2
Africa and Middle East <sup>4</sup>	5.3
Asia <sup>5</sup> and Australia	6.6
<b>Total</b>	<b>95.6</b>



CEMEX Sust Rpt 2010 page 20.

Clinker factor % clinker in cement	Cement sales million tonnes	Biomass rate percent alt fuels	Thermal efficiency MJ/tonne of clinker	Net emissions rate kg CO2/t cementitious product	Net emissions million tonnes CO2
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\*kg CO2e per tonne cementitious product  
excludes other CEMEX emissions

1990	41.9	capacity		803	42.2	
1991	40.9	interpolated		interpolated	42.0	
1992	40.0	interpolated		interpolated	41.8	
1993	39.0	capacity		interpolated	41.6	
1994	45.0	capacity		interpolated	41.4	
1995	47.0	capacity		interpolated	41.2	
1996	50.0	capacity		interpolated	41.0	
1997	51.0	capacity		interpolated	40.8	
1998	57.0	capacity		interpolated	40.6	
1999	65.0	capacity		interpolated	40.4	
2000	85%	77.0	capacity	interpolated	40.2	
2001	86%	80.0	capacity	interpolated	40.0	
2002	84%	81.0	capacity	interpolated	40.0	
2003	84%	82.0	capacity	725	39.8	
2004				interpolated	44.9	
2005	81%		1.3%	3,864	745	50.0
2006	80%		1.8%	3,707	701	53.0
2007	78%		1.9%	3,770	681	53.9
2008	76%	95.6	1.7%	3,741	654	48.2
2009	75%	65.1	3.2%	3,693	627	39.7
2010	76%	65.6	4.6%	3,696	629	41.0

Gross emissions million tonnes CO2	Emissions / Production Tonnes CO2/tonne
53.90	0.505
55.00	0.610
49.57	0.625
41.70	
43.50	

<b>Total</b>	<b>3</b>	<b>1,023</b>	<b>-</b>	<b>-</b>	<b>914</b>
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	2008	2009	2010	2015	Progress	Assurance
<b>Enhance our value creation</b>						
<b>Lead in Sustainable Construction</b>						
Production covered with the CO <sub>2</sub> Footprint Tool (%) <sup>(1)</sup>	--	--	58	100	○	
Cement	--	--	100	100	●	
Aggregates	--	--	50	100	○	
Ready-mix concrete	--	--	32	100	○	
<b>CO<sub>2</sub> footprint - Annual average</b>						
Cement (Kg CO <sub>2</sub> e per ton cement)	--	--	798			
Aggregates (Kg CO <sub>2</sub> e per ton aggregates products)	--	--	5.3			
Ready-mix (Kg CO <sub>2</sub> e per m <sup>3</sup> )	--	--	298			
<b>Manage our footprint</b>						
<b>Enhance our Carbon Strategy</b>						
Absolute net CO <sub>2</sub> emissions (million metric tons) <sup>(2)</sup>	48.2	39.7	41.0			✓
Specific net CO <sub>2</sub> emissions (kg CO <sub>2</sub> /metric ton of cementitious product) <sup>(2)</sup>	654	627	629	602	○	✓
Reduction in CO <sub>2</sub> emissions per ton of cementitious product from 1990 baseline (%)	17.4	20.7	20.5	25	○	
Thermal energy efficiency of clinker production (MJ/ton clinker) <sup>(2)</sup>	3,741	3,693	3,696			
Alternative fuels rate (%) <sup>(2)</sup>	10.3	16.4	20.3	35 <sup>(2)</sup>	○	✓
Alternative fossil fuels rate (%)	8.6	13.2	15.7			✓
Biomass fuels rate (%)	1.7	3.2	4.6			✓
Alternative raw material rate (%) <sup>(2)</sup>	12.0	12.2	11.8	12	○	
Clinker / cement factor (%) <sup>(2)</sup>	75.4	75.2	75.9			

● We have achieved our target   ○ We are currently on track to achieve our target   ● Extra effort required to achieve target

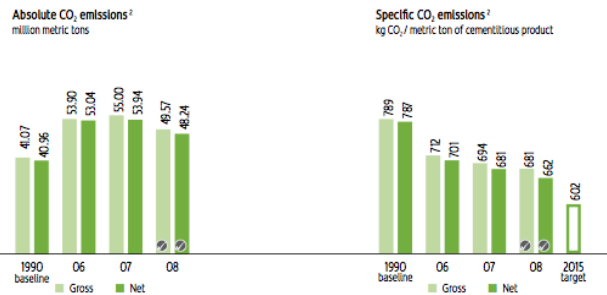
CEMEX Sust Rpt 2010 page 10. Note 2: Only cement operations

	2008	2009	2010	Assurance
<b>Manage Our Footprint</b>				
<b>Carbon Strategy <sup>(1)</sup></b>				
Absolute gross CO <sub>2</sub> emissions (million metric tons)	49.6	41.7	43.5	✓
Absolute net CO <sub>2</sub> emissions (million metric tons)	48.2	39.7	41.0	✓
Specific gross CO <sub>2</sub> emissions (kg CO <sub>2</sub> /metric ton of cementitious product)	672	658	667	✓
Specific net CO <sub>2</sub> emissions (kg CO <sub>2</sub> /metric ton of cementitious product)	654	627	629	✓
Thermal energy efficiency of clinker production (MJ/ton clinker)	3,741	3,693	3,696	
<b>Fuel mix (%) <sup>(1)</sup></b>				
Total alternative fuels	10.3	16.4	20.3	
Coal	34.3	26.1	25.4	
Petroleum coke	46.1	46.8	45.0	
Fuel oil	8.7	10.1	8.8	
Natural gas	0.6	0.6	0.6	

CEMEX Sust Rpt 2010 page 74.

Most important, thanks to these and other global eco-friendly initiatives, we are on track to achieve our goal of a 25% reduction in specific CO<sub>2</sub> emissions per ton of cement by 2015 from 1990 levels. Indeed, by year-end 2010, we had achieved a reduction of more than 20% since 1990, avoiding 7 million metric tons of CO<sub>2</sub> emissions, an amount equal to the CO<sub>2</sub> produced by 1.2 million cars annually.

2010 Annual Report pg 13



Cemex CSR Rpt 2008, page 41.

**Cell: H9****Comment:** Rick Heede:

Cemex CSR Rpt 2008, page 6: "Since starting business as a local cement producer in Mexico in 1906, we have grown to become one of the largest building materials suppliers in the world. We produce, distribute and market cement, ready-mix concrete, aggregates, and related building materials to customers in more than 50 countries and employ approximately 57,000 people worldwide. In 2008, our net sales were US\$21.7 billion. Our annual production capacity was close to 96 million metric tons of cement, while our annual production levels of ready-mix concrete and aggregates were approximately 77 million cubic meters and more than 240 million metric tons, respectively. Our global operations include 64 cement plants (with minority participation in a further 15), over 2,200 ready-mix concrete plants, 493 aggregate quarries, 253 land-distribution centers and 88 marine terminals. We sold our assets in the Canary Islands and ceased operations in Venezuela, following the nationalization of the cement industry."

**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 CO<sub>2</sub> 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 CO<sub>2</sub> 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 CO<sub>2</sub> emissions intensity have declined 16.5 percent from 1990 to 2009 -- from 758 net kg CO<sub>2</sub> per tonne of cementitious product in 1990 to 633 kg CO<sub>2</sub>/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 emissions of CO<sub>2</sub>.

\*\* World Business Council for Sustainable Development Cement Sustainability Initiative (2009) Cement Industry Energy and CO<sub>2</sub> Performance: 'Getting the Numbers Right', wbcscement.org, 44 pp. See GNR Indicator 326, reproduced at the "Cement industry data" worksheet in this portfolio.

**Cell: K57****Comment:** Rick Heede:

Cemex CSR Rpt 2005, shows "total CO<sub>2</sub> emissions, million tonnes, net," for 1990: 42.21 MtCO<sub>2</sub> net.

**Cell: E60****Comment:** Rick Heede:

Cemex CSR Rpt 2003, chart on production capacity (production not shown), for 1993-2003.

**Cell: B64****Comment:** Rick Heede:

Cemex EHS Rpt 1997 contains no emission or production data. Fluff piece.

**Cell: D67****Comment:** Rick Heede:

Cemex CSR Rpt 2003, page 20, percent clinker in cement production, 2000-2003.

**Cell: B68****Comment:** Rick Heede:

Cemex 2001 CSR Rpt also fluff.

**Cell: K71****Comment:** Rick Heede:

CEMEX CSR Rpt 2005, "total CO<sub>2</sub> emissions, net, million tonnes," 2004 and 2005. Gross emissions not reported.

**Cell: K73****Comment:** Rick Heede:

Cemex CSR Rpt 2008, page 41, shows "absolute CO<sub>2</sub> emissions, million tonnes, net and gross," for 2006-2008. Gross emissions shown in column "M".

**Cell: E75****Comment:** Rick Heede:

CSR Rpt 2008, page 6, reports cement production capacity of 96 Mt; actual prodn not reported.

**Cell: J75****Comment:** Rick Heede:

CSR Rpt 2008, page 4: 662 kg CO<sub>2</sub>/tonne of cementitious product, 15.8 percent reduction compared to 1990.

Note: Corrected to 654 kg CO<sub>2</sub>e per tonne cementitious product in the 2010 SustRpt.

**Cell: E76****Comment:** Rick Heede:

Cemex2010\_20F.pdf. Text page 87 (pdf pg 95): "On a consolidated basis, our cement sales volumes increased approximately 1%, from 65.1 million tons in 2009 to 65.6 million tons in 2010, and our ready-mix concrete sales volumes decreased approximately 5%, from 54 million cubic meters in 2009 to 51 million cubic meters in 2010."

CEMEX capacity is ~96 million tonnes per year.

**Cell: K76****Comment:** Rick Heede:

Cemex 2010 Sust Report pg 10

**Cell: D77****Comment:** Rick Heede:

CEMEX SustRpt 2010 page 34.

**Cell:** J77

**Comment:** Rick Heede:

CEMEX Sustainability rpt 2010, pdf page 10: "Specific net CO2 emissions (kg CO2 /metric ton of cementitious product) (2) 2008: 654, 2009: 627; 2010: 629; target 2015: 602 kg CO2e/tonne."  
Unclear precisely what the overall CO2 emission rate for cement production -- 798 kg CO2 per tonne cement -- includes.  
CEMEX also shows "Specific gross CO2 emissions (kg CO2 /metric ton of cementitious product) for 2008: 672 kg CO2; 2009: 658 kg CO2; 2010: 667 kg CO2/tonne.

**Cell:** M77

**Comment:** Rick Heede:

CEMEX Sust Rpt 2010, page 74.