

A B C D E F G H I J K L M N O P

Cement Production

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 Climate Mitigation Services
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Cemex

www.cemex.com Mexico City

yellow column indicates original reported units

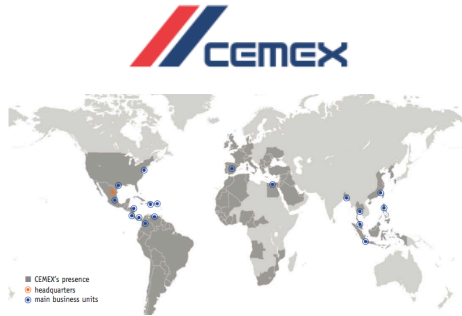
Investor-owned

Founded in 1906

Cement production & emissions data

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

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- 81 2014
- 82 2015
- 83 2016
- 84 2017
- 85 2018



CARBON STRATEGY AND ENERGY			
	2016	2017	2018
Absolute gross CO ₂ emissions (million ton) ^a	43.8	42.5	43.0
Absolute net CO ₂ emissions (million ton) ^a	41.4	39.7	40.0
Specific gross CO ₂ emissions (kg CO ₂ /ton of cementitious product) ^b	678	677	674
Specific net CO ₂ emissions (kg CO ₂ /ton of cementitious product) ^b	642	636	630
Reduction in CO ₂ emissions per ton of cementitious product from 1990 baseline (%)	20.1	20.7	21.6

Cemex (2019) Cemex 2018 Integrated Report, p. 200

CARBON STRATEGY AND ENERGY			
	2016	2017	2018
Scope 1 CO ₂ emissions (million ton)	44.2	42.9	43.4
Scope 2 CO ₂ emissions (million ton)	3.6	3.6	3.6
Clinker Factor (Cementitious) (%)	78.4	78.4	78.6
Alternative raw material rate (%)	6.1	6.6	7.4
Specific heat consumption (MJ/ton clinker)	3,905	3,913	3,987
Specific power consumption (kWh/ton cem)	120	120	121
Fuel Consumption (TJ)	206,343	201,681	208,154
Power Consumption (GWh)	7,779	7,542	7,761
Total Energy Consumption (GWh)	65,097	63,564	65,582
Fuel Mix (%)			
Primary Fuels	76.7	73.8	72.9
Petroleum coke	45.4	39.0	37.0
Coal	25.0	28.0	25.8
Fuel oil + Diesel	2.0	3.8	4.4
Natural gas	4.3	3.0	5.8
Alternative Fuels	23.3	26.2	27.1
Fossil-based waste	13.7	15.9	16.4
Biomass waste	9.6	10.3	10.7
Power consumption from renewable energy in cement (%) ^a	25	26	26

Cemex (2019) Cemex 2018 Integrated Report, p. 200

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 ^a	Net emissions million tonnes CO2
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41.9	capacity			803	42.2	
40.9	interpolated			interpolated	42.0	
40.0	interpolated			interpolated	41.8	
39.0	capacity			interpolated	41.6	
45.0	capacity			interpolated	41.4	
47.0	capacity			interpolated	41.2	
50.0	capacity			interpolated	41.0	
51.0	capacity			interpolated	40.8	
57.0	capacity			interpolated	40.6	
65.0	capacity			interpolated	40.4	
77.0	capacity			interpolated	40.2	
85.0%	capacity			interpolated	40.0	
86.0%	capacity			interpolated	40.0	
84.0%	capacity			interpolated	40.0	
84.0%	capacity			interpolated	40.0	
				725	39.8	
				interpolated	44.9	
				745	50.0	
81.4%		1.3%	3,864	695	50.0	
79.8%		1.8%	3,707	701	53.0	
78.1%		1.9%	3,770	681	53.9	
75.5%	95.6 cap:	1.7%	3,741	654	48.2	
75.2%	65.1 sale	3.2%	3,693	627	39.7	
75.9%	65.6 sale	4.6%	3,696	629	41.0	
75.1%		4.6%	3,757	612	40.0	
76.5%		6.4%	3,876	612	39.4	
76.9%		12.3%	3,812	607	37.6	
76.5%		11.4%	3,854	613	40.1	
78.6%	92.9 cap:	10.9%	3,897	630	40.8	
78.4%		9.6%	3,905	642	41.4	
78.4%		10.3%	3,913	636	39.7	
78.6%		10.7%	3,987	630	40.0	
				to 602 by 2015	43.00	

Total	3	1,116	-	-	1,233
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Q R S T U V W X Y Z AA AB AC AD AE

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2

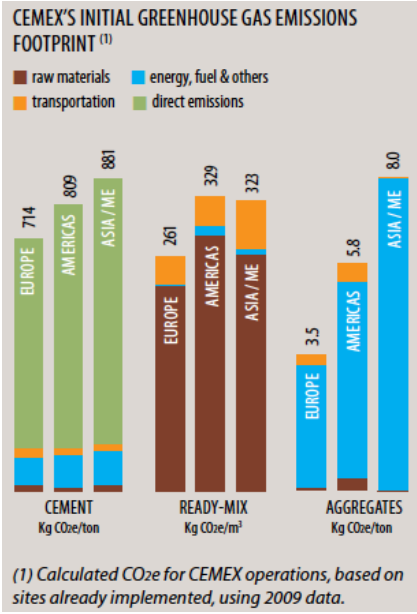
CARBON STRATEGY ⁽¹⁾			
	2015	2016	2017
Absolute gross CO ₂ emissions (million ton)	43.7	43.8	42.5
Absolute net CO ₂ emissions (million ton)	40.8	41.4	39.7
Specific gross CO ₂ emissions (kg CO ₂ /ton of cementitious product)	672	678	677
Specific net CO ₂ emissions (kg CO ₂ /ton of cementitious product)	630	642	636
Reduction in CO ₂ emissions per ton of cementitious product from 1990 baseline (%)	21.6	20.1	20.7
Thermal energy efficiency of clinker production (MJ/ton clinker)	3,897	3,905	3,913

OTHER CARBON STRATEGY INDICATORS ⁽¹⁾			
	2015	2016	2017
Alternative raw material rate (%) ⁽¹⁾	6.0	6.1	6.6
Sustainable raw material rate (%) ⁽¹⁾	12.7	12.9	13.5
Clinker/Cement factor (%)	78.6	78.4	78.4
Direct energy consumption (TJ)	202,598	202,255	197,071
Indirect energy consumption (GWh)	7,643	7,698	7,483

OTHER CARBON STRATEGY INDICATORS ⁽¹⁾			
	2015	2016	2017
Specific energy consumption, cement (kWh/ton)	119	120	120
Specific energy consumption, ready-mix (kWh/m ³)	3.2	3.2	3.1
Specific energy consumption, aggregates (kWh/ton)	4.6	4.3	4.5
Power from renewable energy sources, cement (%) ⁽¹⁾		25	26

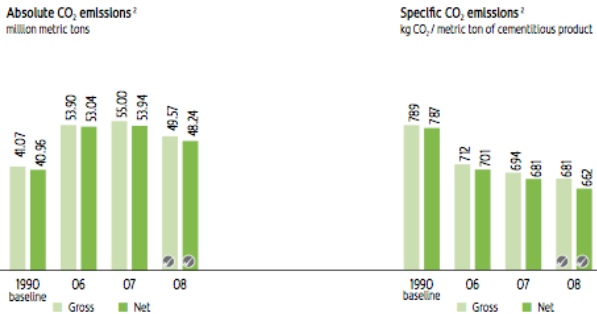
FUEL MIX (%) ⁽¹⁾			
	2015	2016	2017
Primary Fuels	73.4	76.7	73.8
Petroleum coke	39.0	45.4	39.0
Coal	23.8	25.0	28.0
Fuel oil + Diesel	7.0	2.0	3.8
Natural gas	3.7	4.3	3.0
Alternative Fuels	26.6	23.3	26.2
Fossil based waste	15.7	13.7	15.9
Biomass	10.9	9.6	10.3

Cemex (2018) Cemex 2017 Integrated Report, pages 181-183.



(1) Calculated CO₂e for CEMEX operations, based on sites already implemented, using 2009 data.

CEMEX Sust Rpt 2010 page 20.



Cemex CSR Rpt 2008, page 41.

Manage Our Footprint	2008	2009	2010	Assurance
Carbon Strategy⁽¹⁾				
Absolute gross CO ₂ emissions (million metric tons)	49.6	41.7	43.5	✓
Absolute net CO ₂ emissions (million metric tons)	48.2	39.7	41.0	✓
Specific gross CO ₂ emissions (kg CO ₂ /metric ton of cementitious product)	672	658	667	✓
Specific net CO ₂ emissions (kg CO ₂ /metric ton of cementitious product)	654	627	629	✓
Thermal energy efficiency of clinker production (MJ/ton clinker)	3,741	3,693	3,696	
Fuel mix (%)⁽¹⁾				
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 CO₂ 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 CO₂ emissions, an amount equal to the CO₂ produced by 1.2 million cars annually.

2010 Annual Report pg 13

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 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.

** 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: K57

Comment: Rick Heede:

Cemex CSR Rpt 2005, shows "total CO2 emissions, million tonnes, net," for 1990: 42.21 MtCO2 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 CO2 emissions, net, million tonnes," 2004 and 2005. Gross emissions not reported.

Cell: K73

Comment: Rick Heede:

Cemex CSR Rpt 2008, page 41, shows "absolute CO2 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 CO2/tonne of cementitious product, 15.8 percent reduction compared to 1990. Note: Corrected to 654 kg CO2e 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.

Cell: K78

Comment: Rick Heede:

Cemex SustRpt 2013, page 83. "Absolute net CO2 emissions (million metric tons)" for 2011-2013.

Cell: K81

Comment: Rick Heede:

Cemex Sustainability report 2015.

Cell: K82

Comment: Rick Heede:
Cemex (2018) Cemex 2017 Integrated Report, pages 181-183, data for 2015-2017.

Cell: K85

Comment: Rick Heede:
Cemex (2019) Cemex 2018 Integrated Report, p. 200, "Carbon Strategy" table of 2016-2018, "Absolute net CO2 emissions (Mt)"