

# Cement Production

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 Climate Mitigation Services  
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yellow column indicates original reported units

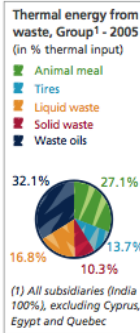
Founded in 1864

## 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



Italcementi Group



Cement: environmental performance					
CO <sub>2</sub> gross emissions		1990	2006	2007	2008
Mature markets		658	700	704	708
Emerging markets	kg/t <sub>cement</sub>	820	775	762	747
Group		725	737	733	728
Mature markets		22,030	21,662	21,756	20,459
Emerging markets	million t	16,053	23,393	24,108	23,120
Group		38,083	45,055	45,864	43,579
CO <sub>2</sub> net emissions					
Mature markets		635	687	690	695
Emerging markets	kg/t <sub>cement</sub>	820	774	762	746
Group		704	730	726	742
Mature markets		20,938	21,261	21,337	20,068
Emerging markets	million t	16,053	23,393	24,108	23,101
Group		36,991	44,654	45,445	43,168

Cement				
		2006	2007	2008
<b>Raw materials</b>				
Mature markets		43.0	45.0	42.2
Emerging markets	million t	45.2	45.6	46.3
Group		88.2	90.6	88.5
Mature markets		5.7%	7.2%	7.3%
Emerging markets	% <sub>thermal</sub>	2.9%	4.6%	4.7%
Group		4.3%	5.9%	5.9%
<b>Clinker/cement ratio</b>				
Mature markets		78.4%	78.3%	78.2%
Emerging markets	% <sub>cement</sub>	86.2%	85.0%	83.5%
Group		82.0%	81.5%	80.9%
<b>Thermal energy consumption</b>				
Mature markets		4,080	4,057	4,058
Emerging markets	MJ/t <sub>cement</sub>	4,093	4,158	4,117
Group		4,087	4,110	4,089
Mature markets		97,470	97,723	91,360
Emerging markets	million MJ	105,219	107,610	106,881
Group		202,688	205,333	198,240
Mature markets		6.7%	7.7%	7.8%
Emerging markets	% <sub>thermal</sub>	0.5%	0.9%	1.8%
Group		4.4%	4.2%	4.5%
<b>Power consumption and indirect CO<sub>2</sub></b>				
Mature markets		129.6	129.9	131.3
Emerging markets	kWh/t <sub>cement</sub>	113.6	112.5	109.9
Group		122.3	121.6	120.5
Mature markets		4,126	4,034	3,804
Emerging markets	million kWh	3,281	3,327	3,351
Group		7,407	7,361	7,155
Group	million t CO <sub>2</sub> equivalent			3,210
<b>Water consumption</b>				
Mature markets		0.45	0.50	0.58
Emerging markets	m <sup>3</sup> /t <sub>cement</sub>	0.45	0.47	0.47
Group		0.45	0.49	0.52
Mature markets		15	16	17
Emerging markets	million m <sup>3</sup>	12	13	14
Group		27	29	31

Italcementi Group Sust Dev Rpt 2008, pp. 20-21.

Clinker factor	Cement sales	Thermal mix	Thermal efficiency	Net emissions rate	Net emissions	Gross emissions
% clinker in cement	million tonnes	percent alt fuels	MJ/tonne clinker	kg CO <sub>2</sub> /t cementitious product	million tonnes CO <sub>2</sub>	million tonnes CO <sub>2</sub>
79%		2.0%	4,276	722	36.99	38.1
					36.64	interpolated
					36.29	interpolated
					35.94	interpolated
					35.59	interpolated
					35.24	interpolated
					34.89	int
					34.54	interpolated
					34.19	interpolated
					33.84	interpolated
					33.49	interpolated
		6.1%	3,932		33.14	interpolated
		6.5%	3,952		32.79	CSR 2003
		6.6%	3,913	733	33.09	CSR 2005
79.6%		6.0%	4,042	740	34.96	CSR 2005
80.2%		5.5%	4,011	730	40.30	CSR 2005
81.8%		4.4%	4,087		44.65	CS
82.0%		4.2%	4,110		45.45	CS
81.5%	65	4.5%	4,089		43.17	CS
80.9%	63				36.30	CS
	56			717	36.30	CS
	55			723	36.70	CS
						45.1
						45.9
						43.6
						36.7
						37.8
						0.704
						0.690
						0.652
						0.673
<b>Total</b>	<b>2</b>	<b>-</b>	<b>0</b>	<b>32,136</b>	<b>2,925</b>	<b>768</b>

CSR Rpt 2005, page 28.

Emissions / Production  
 Tonnes CO<sub>2</sub>/tonne

**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 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:

Italcementi CSR Rpt 2008 reports 36.99 Mt CO<sub>2</sub> in 1990 under its 2008 boundary and plant ownership.

**Cell: M63****Comment:** Rick Heede:

The 2008 CSR Rpt shows 36.99 Mt CO<sub>2</sub> for its then-boundary, but reported as 29.17 Mt CO<sub>2</sub> for 1990 in the 2003 CSR Rpt.

**Cell: J70****Comment:** Rick Heede:

CSR Rpt 2005, group emission rates; for EU-plants, 653 kgCO<sub>2</sub>/tonne (730 for Group) in 2005, 668 vs 740 in 2004, 661 vs 733 in 2003, and 657 vs 722 in 1990.

**Cell: K70****Comment:** Rick Heede:

Italcementi CSR Rpt 2005, page 27. 2005 boundary for 2005, 2004 boundary for 2003 and 2004

**Cell: G72****Comment:** Rick Heede:

94.5 percent conventional fuel, 5.5 percent alt fuel (of which 1.5 % biomass).

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

Italcementi CSR Rpt 2008

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

Italcementi Group AnnRpt 2008, page 34: "Cement and clinker (million tonnes)"; 2007: 3.1 percent higher.

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

2010 AR pdf pg 20

**Cell: J76****Comment:** Rick Heede:

2010 CSR pdf pg 5

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

2010CSR pdf pg39