MATERIAL
ISSUES

CLIMATE
CHANGE

Buzzi Unicem

CLIMATE CHANGE

Consumption of Thermal Energy

Production of cement, and especially of clinker, is energy intensive. Producing clinker with good properties requires a temperature of around 1,450 degrees Celsius in cement kilns. Energy consumption is therefore influenced by kiln technologies and the continuity of production.

In 2018 the specific consumption was 4,080 MJ/t clinker, down from the value of 4,121 MJ/t clinker in 2017. This improvement is attributable to various interventions in our facilities in Germany, the US, Luxembourg, Poland, Czech Republic, Russia and Ukraine.

In 2018 Buzzi Unicem continued to promote the use of secondary fuels as an alternative to traditional fossil fuels. In particular, these are fuels stemming from waste material, many of which have a significant content of biomass which, it should be noted, is considered neutral for CO2 emissions purposes.

The use of secondary fuels is recognized within the European Union as a BAT (Best Available Techniques) for the cement industry, and is one of the pillars of the circular economy. This generates two main advantages: it reduces CO2 emissions, based on the content of biomass, and avoids disposal of waste in dumps and landfills.

For 2018 we can confirm the excellent heat replacement levels reached in Germany, Poland and Czech Republic, with indices greater than or equal to 60%, while Luxembourg reported levels of 47%, USA 21% and Italy 14%.

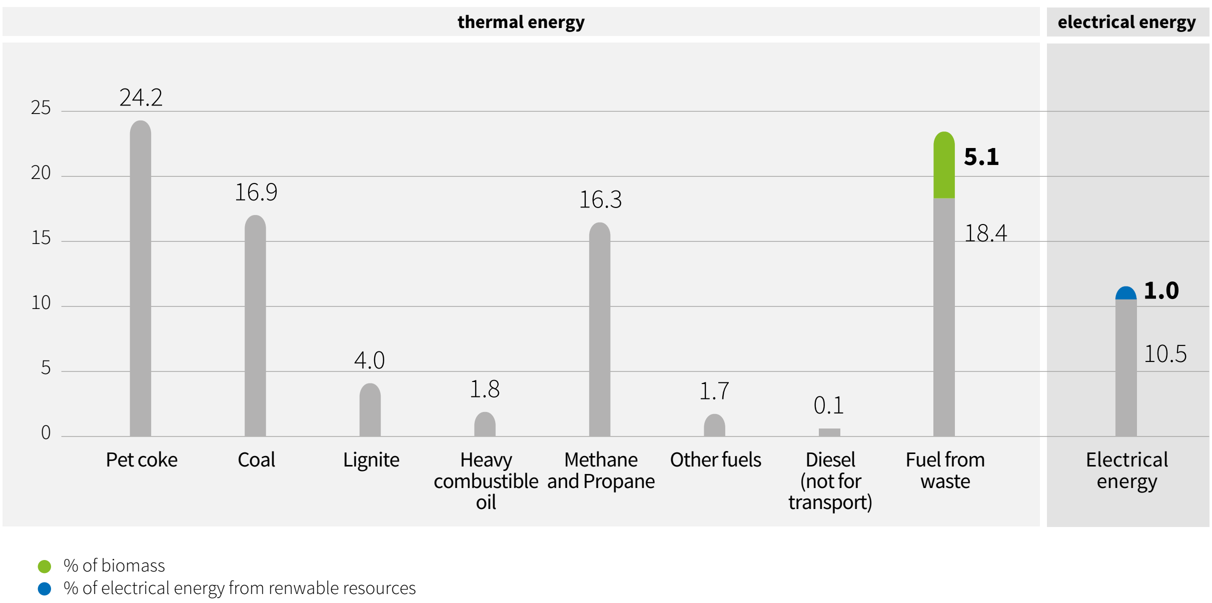
The average figure at Group level is 27%, a slight improvement compared to 2017 (26%) There was also a slight reduction in the content of biomass, which went from 23% in 2017 to 22% in 2018. The improvement in Italy (from 50% to 52%) did not entirely make up for the slight losses in Germany, Luxembourg, Poland and Czech Republic.

Consumption of Electrical Energy

Reducing electrical energy consumption is another priority for Buzzi Unicem.
In binders manufacturing, electricity accounts for around 10% of the total energy requirement.
Specific consumption of electrical energy by the Group in 2018 fell to 122 kWh/t of cementitious material (124 kWh/t cement in 2017).
The improvement is due to numerous activities at all production sites. Energy Certification (ISO 50001) in Germany, Energy Star System in the USA and specific energy audits in Italy are just some examples of the efforts made by Buzzi Unicem around the world.

Percentage breakdown of energy consumption by type and source (2018)

In 2018, the total energy consumption was 104,772 TJ



	Average (2017)	**Average (2018)**
ITA	23%	14%
USA	8%	13%
GER	32%	2%*
LUX	38%	24%
POL	10%	11%
CZE	7%	7%
RUS	0%	0%
UKR	0%	0%

* The variation in the figure for Germany is the result of a better calculation of the sources of energy actually used by Dyckerhoff. In the 2017 Sustainability Report, since this specific figure was not available, we reported a value coinciding with the national average.

For the second year, Buzzi Unicem has published figures on its contribution to the use of electrical energy from renewable sources.

Greenhouse Gas Emissions

In the cement production process, most of the CO_2 is generated during the production of clinker, the basic constituent of cement. Its synthesis takes place within kilns where a mix of dosed and mixed minerals is 'cooked' at a temperature of up to 1,450 degrees Celsius. One of the main components of the mix is limestone, which is 'de-carbonized' and releases CO_2 at temperatures in excess of 950 degrees Celsius. More CO_2 comes from the combustion of gas, coal or other fuels needed to reach the above-mentioned temperatures.

The sum of these two components represents 'direct' CO_2 (Scope 1).

A second source of CO_2 emissions, which is less significant, is linked to the production of the electrical energy used in the cement production process. This emission is known as 'indirect' CO_2 (Scope 2) because it does not derive from the production of cement but rather from the plants which produce the electrical energy.
The balance is attributable to transport (Scope 3) for which Buzzi Unicem will provide details in following Sustainability Reports.

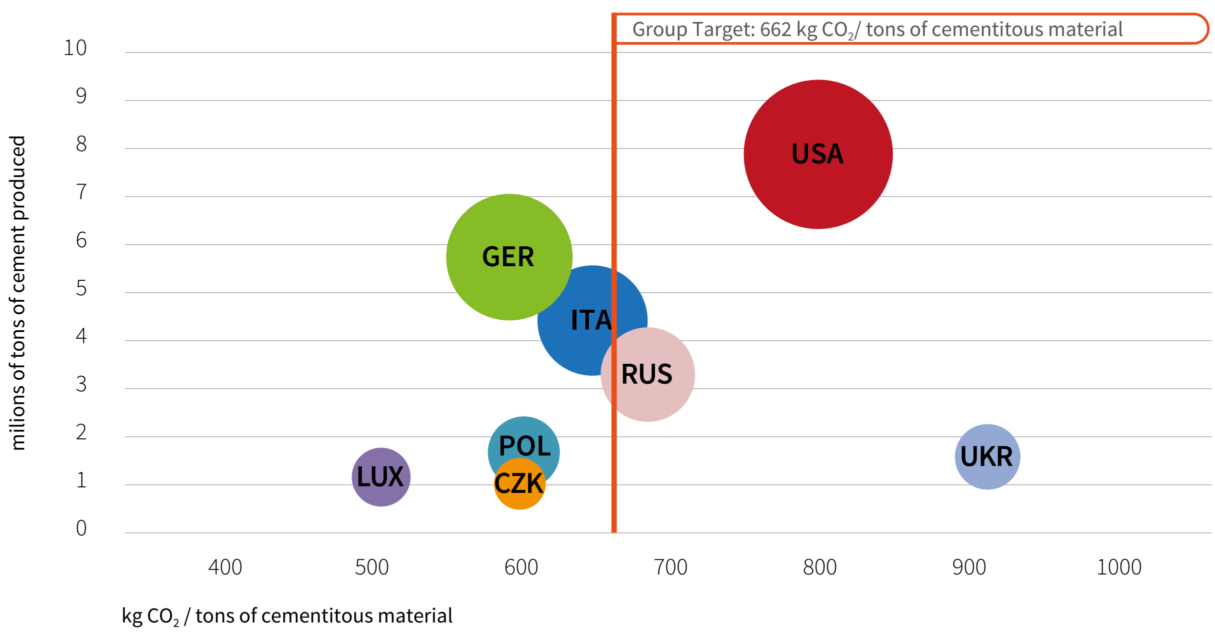
The following table shows the level of CO_2 emitted in 2018 at Group level:

	Tons emitted (2017)	**(2018)**
Direct CO_2 (Scope 1)	18,935,652	18,981,303
Indirect CO_2 (Scope 2)	1,494,019	1,639,497

In line with the objectives that have been established over the years by international climate protocols, Buzzi Unicem is committed to reducing its CO_2 emissions. After the Paris agreement of December 2015, the commitment was extended to all countries in which the Group operates and was formalized in the Climate Change Policy.

2018 CO_2 direct emissions factors by Country

The 'ball' dimension is proportional to cement produced in each Country.



Although there are many factors in play, and not all of these are easy to predict nor under the direct control of Buzzi Unicem, by 2022 we plan to achieve a reduction of CO_2 emissions, based on current production capacity, of at least 5% compared to 2017 levels.

To reach the objective in the specified time frame, Buzzi Unicem is implementing the CO_2 Reduction Plan. The Plan contains the initiatives of every country for optimizing the thermal and electrical efficiency of plants, the use of secondary fuels (with a significant thermal level and content of biomass), non-natural raw materials and optimizations associated to the clinker/cement ratios.

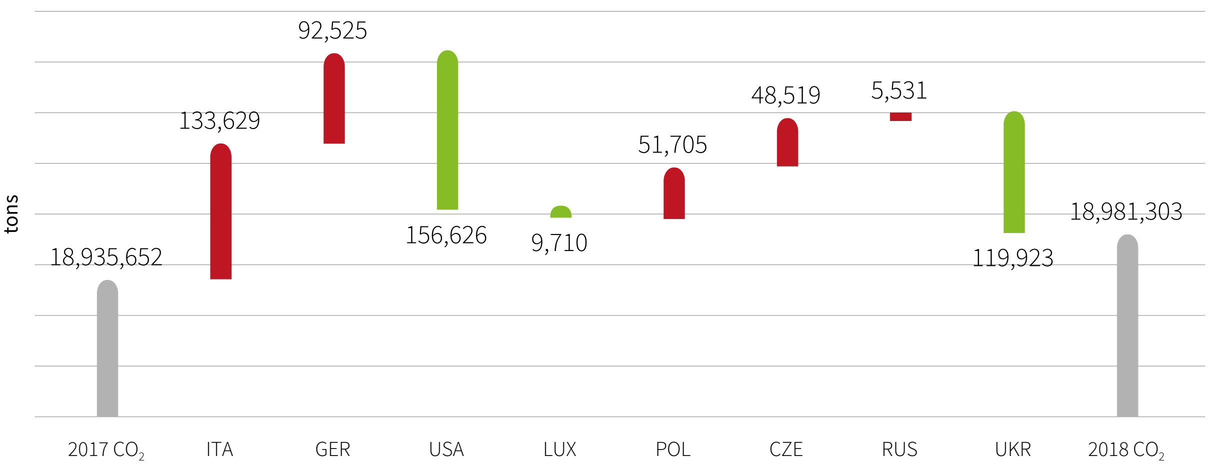
In 2018 the clinker/cement ratio was 80.0% (it was 80.2% in 2017) highlighting a slight improvement in the USA, Czech Republic and Russia. The content of biomass in secondary fuels has allowed us to avoid 389,957 tons of atmospheric emissions of CO_2.

The Group emission factor result was 690 kg of CO_2/t cementitious material (from 696 kg of CO_2/t cementitious material in 2017).

To standardize the calculation methodology for CO_2, Buzzi Unicem has decided to extend the use of the monitoring and reporting procedure of greenhouse gases emissions according to Regulation (EU) 601/2012 which is valid in Countries involved in the Emissions Trading System (ETS) – clinker-based output method B2 - even in non-EU countries not bound by this obligation.
In 2018 Russia and Ukraine joined the scheme. Now, 67.8% of the Group's emissions are calculated with the methodology which requires periodic analyses to be conducted on samples of meal, clinker and dust for the valuation of the calcining component; the remaining 32.2% of the emissions was calculated, for the valuation of the calcining component, using a standard factor (clinker-based output method B1).

Comparison Between Direct CO_2 Emissions 2017- 2018

The diagram and the table also show the net emissions contributions from each individual country in relation to production volumes and efficiency.



* The variation in the efficiency is partly due to the slight worsening of CO_2 emissions from calcining in Italy, Poland and Ukraine, the worsening of CO_2 emissions from combustion in Poland and Ukraine, and to the increase in the clinker/cement ratio in Poland and Ukraine.

	ITA	GER	USA	LUX	POL	CZE	RUS	UKR	BU
2017 CO_2	3,291,308	3,263,710	6,448,827	608,783	904,069	569,140	2,306,234	1,543,582	**18,935,652**
VOLUMES	118,905	117,789	-104,572	-8,805	28,667	54,041	92,986	-177,371	**121,640**
EFFICIENCY	14,724	-25,264	-52,053	-905	23,038	-5,522	-87,455	57,449	**-75,989**
2018 CO_2	3,424,937	3,356,235	6,292,201	599,073	955,774	617,659	2,311,765	1,423,659	**18,981,303**

Photo: The Max van der Stoel memorial in the Max van der Stoel Park in Prague, Czech Republic. Supplier ZAPA Beton

Environmental Performance: Summary table

2016	2017	2018		
80.9	80.2	**80.0**	Clinker/cement ratio	%
			Energy	
27.0	26.0	**27.1**	Thermal substitution	%
4,224	4,121	**4,080**	Specific thermal consumption	MJ / t clk
126	124	**122**	Specific electricity consumption	kWh / t cementitious material
			Raw materials	
10.1	10.1	**9.5**	Non natural raw materials	%
			Air emissions	
104	137	**76**	Dust	g / t clk
1,582	1,438	**1,361**	NO_X	g / t clk
274	204	**188**	SO_2	g / t clk
27	26	**25**	Hg	mg / t clk
705	696	**690**	Direct CO_2 emissions	kg / t cementitious material
			Waste	
3,801	3,655	**4,005**	Waste produced	g / t cementitious material
38	47	**34**	Waste recycled	%
303	308	**301**	**Water consumption**	l / t cementitious material
19	19	**22**	of which from rainwater	%

ITA	GER	USA	LUX	POL	CZE	RUS	UKR
77.8	67.1	91.6	65.0	72.9	76.8	86.2	84.3
13.8	65.7	21.0	47.1	66.9	59.8	0.9	0.2
3,555	4,008	3,942	3,625	3,930	3,639	4,779	5,843
103	117	139	99	105	127	132	130
5.6	14.6	6.4	28.0	13.4	13.5	6.1	8.8
6	3	28	25	6	12	304	410
931	644	1,487	764	662	814	2,709	2,465
40	79	415	24	370	58	14	54
11	26	31	7	119	3	0	30
658	593	792	513	604	614	683	915
1,055	1,196	10,720	1,275	3,288	385	1,213	981
93	64	19	83	100	68	83	88
247	175	274	76	204	156	401	1,224
5	24	61	0	0	100	0	0

Buzzi Unicem

Buzzi Unicem S.p.A.
Via Luigi Buzzi, 6 | Casale Monferrato (AL) | Tel. +39 0142 416 111

buzziunicem.com