

CO2 emission from cement industry, what's the best estimate?

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Claude Lorea

Executive Director at the Global Cement and Concrete Association (GCCA)

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With estimates in the public domain ranging from 5% to as much as 10% of how much cement production contributes to global CO₂ emissions, we believe it is important to try and provide greater accuracy and consistency.

We conclude that 7% is a good estimate of cement industry emission share of total CO₂ emission.

The aim of this article is to provide a better estimate of the cement industry's contribution to global CO₂ emissions. It follows a [previous article](#) posted shortly after I joined the GCCA in which I highlighted some of the important and exciting work ahead on our sustainability journey.

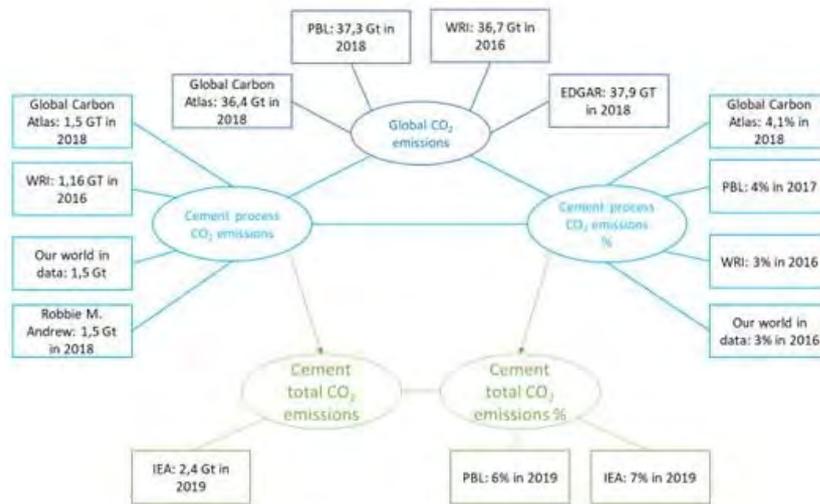
Providing a more reliable figure is not a straightforward exercise because of the wide diversity of numbers reported, and sometimes onpart of the cement industry emission (the so-called process emissions) is accounted for. Even more challenging, many reports do not specify what is accounted for. It is therefore of utmost importance to deal with data with great care when making assessments.

The first step is obviously to understand the total amount of CO_2 that is emitted per year in the world and secondly, quantify what the CO_2 emissions related to cement are. The direct CO_2 emissions associated with cement manufacture arise from both the decarbonation of the limestone and the combustion of the fuels in the kiln.

There are several sources providing total global CO_2 emission. Global Carbon Atlas [1] estimates in 2018 that 36.4 Gt of CO_2 were emitted. This estimate clearly specifies it is accounting for fossil fuel burning (coal, gas and oil), cement and gas flaring whilst the coverage is not as clearly outlined for the three further references. The PBL Netherlands Environmental Assessment Agency [2], in 2018, reports the total greenhouse gases emission were about 51.8 Gt CO_2e . The CO_2 alone is responsible of 72% of these emissions leading to 37.3 Gt which is slightly higher than the previous estimates. For the same year, EDGAR reported that 37.9 Gt were emitted [3]. Finally, in 2016, 36.7 Gt of CO_2 were emitted according to WRI [4].

As far as the CO_2 emission from the cement industry are concerned, Global Carbon Atlas [1] reports 1.5 Gt in 2016. This number only relates to emission from the calcination process and corresponds to 4.1% of the total emissions. PBL states that, in 2018, 4% of CO_2 were due to calcination process in cement production [2] and that the entire cement industry is responsible for 6% [5]. In 2016, calcination process emission is estimated to be 3% of the total CO_2 emission which means 1.2 Gt by WRI [4] and 1.5 Gt by 'Our world in data' [6]. This last estimate is also reported by Robbie M. Andrew for the year 2018 [7]. Finally, IEA reports that the cement industry emits 2.4 Gt of CO_2 corresponding to 7% of total emission [8].

One shortcoming of most of those estimates is that they report only a part of the cement industry emission, the one related to the calcination work process. However, IEA estimates the proportion of the process emission to be two third [8] while Ecofys [9] estimates it at 55%. Data from our GNR database [10] confirms the 2/3. On that basis, total emission from the cement industry can be estimated between 6-7% of world emission.



Another way to estimate is to start from the specific gross *CO₂* emissions (e.g. kg of *CO₂* emitted per tonne of cement produced) and multiply by the total cement production which gives us an absolute number (e.g. kg of *CO₂* emitted). IEA [8] indicates that 0.5-0.6 ton of *CO₂* is emitted per ton of cement, reports from cement companies rather indicate a value around 0.6-0.7 t *CO₂*/ t cement (GNR average of 0.654 t*CO₂*/t cement). By multiplying the average value (0.6) by the total cement production (4.1 Gt) we obtain total *CO₂* emission from the cement industry (2.5 Gt) which is about 7% of the total *CO₂* emission in the world.

By combining all these references, we can conclude that 7% is a good estimate of cement industry emission share in total *CO₂* emission

References

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