
Concrete and its devastating impact on the environment

When people consider what is the most consumed product on earth, few would consider concrete. In fact, concrete is the second most consumed product on Earth, second to water¹. It is used as the foundation for most of our modern building infrastructure – houses, tower blocks, roads and bridges. As a material, it is cheap to produce, incredibly strong and very versatile. In the world today, concrete is used in 80% of modern construction.

However, the use of this versatile material has a big impact on the environment. The environmental toll is a result of its production. During concrete production, carbon dioxide is produced as a result of burning fossil fuels to produce the heat needed for the cement producing process and also from the thermal decomposition of calcium carbonate in the process of producing cement clinker. As a result, it is thought that concrete production is responsible for approximately 8% of all the worlds' carbon dioxide emissions².

As part of moving forward to a more sustainable way of living, one of the biggest challenges we face is finding an alternative to this sturdy, inexpensive material that modern day society relies upon.

In recent years, a number of studies have looked into what alternatives are available and also how the current concrete production process can be improved to produce less CO₂. These include reducing the amount of binder, as disclosed in this US patent application **US 2022/017419**, or substituting some of the concrete with more environmentally friendly additives such as agricultural waste products, as disclosed in this Chinese patent application **CN 104478361**. Other alternatives include utilising co-products or by-products of cement as partial replacements of cement, as disclosed in **US 2012/111236**, and recycling discarded water that is used in the concrete production process³, such as in **CN 211513726**. However, there is still a lot more work that needs to be done to improve the process and, ideally, identify a replacement material that is as versatile and hard-wearing as concrete.

Intellectual Property offices around the world realise the need to encourage the innovation of new products and processes related to clean technology, as well the need for improvements to current materials and methods of production, including concrete production. A number patent offices around the world have launched **schemes** which allow applicants who file patent applications directed to green technology, or environmental improvements to current processes, to request fast-tracked prosecution.

If you would like further advice on how to patent your technology, please contact Lucy O'Brien (lco@aathornton.com).

References:

¹ Makul, N., “Advanced smart concrete – A review of current progress, benefits and challenges”, *Journal of Cleaner Production*, ISSN: 0959-6526, Vol: 274, Article Number: 122899 (2020).

² Ellis, L. D., Badel, A. F., Chiang, M. L., Park, R. J.-Y. & Chiang, Y.-M., “Toward electrochemical synthesis of cement—An electrolyzer-based process for decarbonating CaCO₃ while producing useful gas streams”; *Proc. Natl Acad. Sci. USA*, Vol: **117**, Page; 12584–12591 (2020).

³ De Brito, J., Kurda, R., “The past and future of sustainable concrete: A critical review and new strategies on cement-based materials”, *Journal of Cleaner Production*, ISSN: 0959-6526, Vol: 281, Article Number: 123558 (2021).