

CIRCULAR ECONOMY BUSINESS CASE STUDIES IN SOUTHEAST ASIA

CEMEX Holdings Philippines, Inc.

- Manilla, Philippines
- Construction material/cement
- www.cemexholdingsphilippines.com
- Analysis period: 2021-2022

Alternative Materials and Fuels for Low Carbon Cement

Business Spotlight

As part of a global cement and construction materials company, CEMEX Holdings Philippines, Inc. (CHP) is committed to achieving net-zero carbon emissions by 2050 through innovation and adoption of best practices and techniques. The company pursues circularity in the construction value chain, and has adopted decarbonisation and energy efficiency in its operations. The process starts in the raw material extraction phase with suppliers, and continues in the production phase where municipal and other solid waste and industrial byproducts are processed as alternative fuel for manufacturing cement using a government-approved co-processing technology, which diverts waste from landfills and significantly reduces emissions.

CHP has achieved 28% substitution of fossil fuels with alternative fuels (i.e. biomass from municipal and other solid waste, and biosolids from sewage treatment). CHP has also increased the use of low-carbon raw materials in cement (with the use of by-products from other industries like blast furnace slag and fly ash) resulting in a 50% reduction of direct CO₂ emissions per metric tonne of cement (relative to the 1990 baseline).¹ It has reduced the clinker factor in cement by approximately 35%, thereby bringing Greenhouse Gas (GHG) emissions closer to

the CEMEX Group's global target of 430 kg CO₂ per metric tonne.

In 2021, CHP introduced eco-friendly blended cement products in its portfolio, with a 25% to more than 40% lower CO₂ footprint than the regular Ordinary Portland Cement (OPC) commonly used in the Philippines. The company has been able to improve the sales of its blended cement products, while improving financial performance towards achieving its Future in Action agenda leading to carbon neutrality.

CHP also operates a waste solutions business, Regenera, which specialises in the recovery, management, recycling, and sustainable disposal and diversion of waste in partnership with more than 30 local government units and various private organisations.

Keywords

Sustainable cement production, Alternative fuels in cement kilns, Blended cement

Innovation

Product/Service design, Manufacturing, End-of-life management, Resource circularity, Resource efficiency, Resource substitution

¹ CEMEX Holding Philippines, Inc., Sustainability Report 2022, p. 25.

Context and baseline

CEMEX Holdings Philippines, Inc. (CHP) began operations in the Philippines in 1997, producing and marketing cement and other building materials with a current annual cement production capacity of 5.7 million metric tonnes. The cement manufacturing subsidiaries include Solid Cement in Antipolo City, Rizal, and APO Cement in Naga City, Cebu. CHP, recognising that cement is a carbon-intensive and highly regulated industry, has thus identified and responded to relevant environmental, social and regulatory issues in its business operations. It has created Future in Action, a programme focused on developing lower-carbon products, technical solutions and business processes to make the company net-zero CO₂ by 2050. Future in Action has 6 pillars: Sustainable products and solutions; Decarbonising operations; Circular economy; Water and biodiversity; Innovation and partnerships; and Green economy.

The Philippines is one of the largest contributors to mismanaged plastics that end up in landfills, waterways, and oceans. With the passage of Republic Act No. 11898 in 2022, or the Extended Producer Responsibility (EPR) Act, companies covered by the Act are required to recover at least 20% of their plastic consumption beginning from December 31, 2023, until reaching an 80% recovery rate within 5 years. The co-processing technology used in cement production is a solution that converts combustible residues and wastes, such as plastics and biomass from municipal and other solid waste, into alternative fuels for cement kilns, and is recognised by the Philippine government as a suitable alternative to landfills.

At the same time, the recently published Philippine Waste Management Report by the Commission on Audit², found that the Philippines has insufficient waste management capacity, as only 39% of the barangays have waste management facilities and the 245 operational sanitary landfills cater to just 29% of them. CHP saw an opportunity to lower input costs while supporting waste reduction efforts in both government and industries.

Innovation

CE Product Innovation: In the late 1990s and early 2000s, European cement makers started to introduce blended cement varieties with lower greenhouse gas (GHG) intensive clinker content, that are mixed with

alternative cementitious materials. In 2021, CHP introduced the Vertua® portfolio of eco-friendly blended cement products with 25% to more than 40% lower CO₂ footprint than the regular Ordinary Portland Cement (OPC) into the Philippines. The Philippine government has authorised the use of CEMEX IT type cement in various infrastructure projects, and the company is only one of three cement manufacturing groups in the Philippines to be given such accreditation. Vertua cement accounted for 68% of the CHP's Philippine cement sales volume in 2022.

Service Innovation: In 2023, the company repackaged its waste management services for local government and industry through its Regenera subsidiary, and began serving the provinces of Cebu, Rizal, Quezon, Cavite, and Laguna. The local government and industry partners segregate their plastic wastes, organic wastes and sludge, and turn these over to Regenera for co-processing at the CHP Solid Cement Plant in Rizal along with the APO Cement Plant in Cebu. Since the intent is to support waste reduction efforts of both government and industries, they do not pay CHP for processing the municipal waste, plastics waste and other residual (non-recyclable) wastes.

Circular Economy impact

CHP is contributing to circular economy transition through the principal strategies of resource circularity (recover and repeat use of resources) and resource substitution (by renewable materials and energy), through the following key initiatives.

Resource Circularity: CHP is using the by-products from other industries – such as blast furnace slag and fly ash – as alternative cementitious material and clinker substitute in its blended cement products. The reduction of the clinker factor in cement by approximately 35% in relative values helped lower GHG emissions, bringing it closer to the global CEMEX Group target of 430 kg CO₂ per metric tonne of cement. CHP is able to produce low carbon cement products that are more sustainable while maintaining strength and quality and optimising compressive strength.

The company commissioned a 4.5MW high-tech heat recovery facility in the APO Cement Plant in Naga City, Cebu to provide clean energy to the cement production process by capturing the excess heat from the kiln and converting it into electricity. The plant is able to self-generate 8% of its power

2 See: <https://www.coa.gov.ph/download/5699/solid-waste-management-program/74286/solid-waste-management-program-pao-2023-01.pdf>

requirements using this technology. The existing heat recovery facility in the Solid Cement Plant in Antipolo City has a rated capacity of 6 megawatts, and is currently able to self-generate 18% of its power requirement.

In 2022, the company set a 20% reduction target for freshwater withdrawal by 2030. The objective is to switch to non-freshwater sources for cement production. By increasing water use from treatment plants, rain, and residual water from other industries, the aim is to access sufficient quantities of water to reduce the pressure on fresh water use that is now aggravated by climate change and competing water demands.

Resource Substitution: Resource substitution involves making use of renewable materials and energy. CHP is deploying co-processing technology, a proven sustainable and government-approved waste disposal solution that reduces pollution and landfill space through waste incineration in the cement kiln with heat recovery, by using biomass from municipal and other solid waste sources, plastics waste and other waste materials. By using wastes as fuel, CHP facilities have reduced the need for fossil fuels, helping to lower GHGs. In 2022 CHP achieved 28% alternative fuel substitution for which 400,000 metric tonnes of refuse derived fuel were used, which is significantly more than the non-recyclable waste generated by the company.

Moreover, the company is working towards using renewable power, including solar, aiming to achieve 65% clean electricity consumption in 2030.

Collectively, these circular economy measures enable the company to further decarbonise its operations and reduce its carbon footprint (in 2022) to an equivalent GHG avoidance of 163,375 tCO_{2e}, the equivalent of approximately 2.7 million tree seedlings grown for 10 years.

Business and market impact

The Department of Public Works and Highways (DPWH) has officially accredited and authorised the use of the company's Type IT blended cement in government infrastructure projects following the ASTM C595 requirements, or the Standard Specification for Blended Hydraulic Cements, as specified in the DPWH *Blue Book*. This authorization is in line with the government's priority agenda of caring for the environment and preparing the Philippines for climate change adaptation and mitigation efforts. CHP is one of only three cement manufacturing groups in the country to be given the accreditation and authorisation to have its Type IT blended hydraulic cement used in public works.

Stakeholders

In addition to the over 40 local government units (LGUs) with which it partners for the processing of municipal and other solid waste into alternative fuel using co-processing technology, CHP and Manila Water Co. also signed a partnership allowing the use of biosolids (organic materials produced during effluent treatment) as alternative fuels, a first in the Philippines.

Raw material suppliers have to comply with CHP's biodiversity plan and are required to practice progressive rehabilitation, with the goal of becoming nature positive. They must formulate quarry rehabilitation plans along with biodiversity action plans to include the replacement of every hectare quarried with an equal amount of rehabilitated land.

In partnership with several socio-civic organisations and the Philippine government, CHP Foundation aims to empower communities and improve people's lives through sustainable programmes for social development and environmental protection. Some of the projects: the Build a Safe and Healthy Citizenry: Kalusugan, Kaligtasan, Kahandaan-Batang Alerto Project; the Build Environment: Tamang Segregasyon at Edukasyon para sa Kalikasan (TSEK) Project; and partnerships with three private institutions, one local government (LGU), and one non-governmental organisation, among others.

Implementation

CHP is on track to meet its ambition of producing less than 430 kg CO₂ per metric tonne of cement by 2030, and to deliver net-zero CO₂ concrete by 2050.

However, the market for blended cement in the Philippines is not growing at the same pace as the growth of new low carbon blended cement products, principally because the government's Department of Public Works and Highways (DPWH), which is potentially the biggest purchaser, still favours OPC, both locally supplied and imported. While lower carbon cement has been approved, the DPWH still requires testing by government contractors, despite its certification to Philippines national standards, which adds to costs and to the reluctance to use this greener cement in government and other major building and construction projects.

Furthermore, despite the potential increase in demand for municipal and other solid waste as alternative fuel for cement plants, collection and proper segregation of non-recyclable wastes are still a challenge for many local governments who are able, on average, to collect only a small percentage of these wastes.

Takeaways

Cement products are essential for building and construction. The cement industry can adopt circular economy practices which can be profitable. The highest production costs, particularly energy, can be reduced to achieve cost savings. Additionally, new market segments and the demand for sustainable smart building solutions and products are growing.

Sustainable and efficient operations not only go together, but also need to get done and be embraced as a way of life. CHP stresses the need to educate and influence the communities around its operations to understand what circular economy is all about, and how it helps the local economy and also promotes green jobs.



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