Introduction

CEMEX agrees with the vast majority of the scientific community that man-made climate change is one of the biggest challenges of our time and that the benefits of mitigating global warming will by far outweigh any costs to reach this goal. Therefore, we welcome the scope and pragmatic approach of the Paris Agreement at COP21.

CEMEX particularly supports the:

- Ambition to limit global warming to well below 2° C and potentially even 1.5° C.
- Bottom-up structure that builds on Nationally Determined Contributions (NDCs).
- Importance given to climate resilience.
- Role that finance flows and carbon markets play.
- Recognition of sinks such as biological sequestration of carbon dioxide (CO_2).

CEMEX has supported international agreements, such as the Paris Accord and the Kyoto Protocol, in a number of ways. We have publicly called for a global carbon market for almost a decade. In the run-up to COP21, we played a leading role in the LCTPi (Low-Carbon Technology Partnerships initiative), an effort to determine the potential greenhouse gas emissions reduction of different business sectors. We also signed the Paris Pledge for Action, by which we commit our full support to the Paris Agreement. In the future, we will work with governments to implement the Paris Agreement at the local level.

However, CEMEX recognizes that the Paris Agreement is only the first step. Making significant cuts in absolute emission levels given the expected growth of the global population will only be possible with compelling efforts by all sectors of society. It will require a transformation of our infrastructure that is both more carbon-efficient and resilient to the inevitable consequences of climate change. For CEMEX, this implies both a challenge and an opportunity to create a competitive advantage. We must not only reduce emissions from our own operations, but also deliver innovative products that will build the foundation for the mitigation of and adaptation to climate change.

In the rest of this paper, we will describe how CEMEX will meet these challenges and where we need the support from policy makers, as well as legislative and regulatory regimes, in order to achieve their full potential.

Our Contribution

Role of our Products

Our products' biggest contribution is in the in-use phase. Whether as foundations for wind power plants, durable pavements, which reduce rolling resistance, or elements for energy-efficient, long-lasting, and resilient buildings, cement and concrete are irreplaceable building blocks for transitioning society into a low-carbon, sustainable future. Over the full life cycle of a building or structure our products often offer a lower carbon footprint than other materials, and we continue developing innovative solutions that offer enhanced sustainability characteristics.

Enhanced Sustainable Products

Our Global Center for Technology and Innovation in Switzerland—the CEMEX Research Group AG—coordinates the work of our laboratories to develop products and construction solutions that increasingly generate and address sustainable practices in the industry. As a result, CEMEX's innovation continuously leads to improvements in CO_2 emissions and energy efficiency, just to name a few. Examples include:

- **Thermal insulating concrete:** The use of these products enables reduction of energy consumption in buildings and housing, combined with acoustic insulation and the fire resistance of a solution that is 100% concrete.

- **Self-compacting concrete with low CO_2 footprint**: A highly self-leveling concrete that can spread into place and achieve excellent consolidation without vibration and without exhibiting defects due to segregation and blocking. CEMEX has developed a tailored design solution that allows self-compacting concrete with a reduced CO_2 footprint.

- **Ultra high performance concrete:** Fiber-reinforced concrete with maximum strength that can replace steel reinforcements in concrete. In-house development that allows building optimization by creating thinner elements leading to reduced CO_2 emissions.

- **Recycled concrete:** In-house technology used to transform returned concrete into artificial aggregates that can be used as a raw material for new concrete. This approach enables the optimal use of scarce materials and reduces landfilled materials at the same time.

Energy Efficiency in Buildings

According to the Energy Efficiency in Buildings project of the World Business Council for Sustainable Development, buildings account for around 40% of final energy used globally. Typically, almost 90% of the energy used in a building during its life span is for operation, maintenance, and renovation, while only a little more than 10% represents the manufacturing and transportation of its materials, as well as construction and demolition.

A number of studies (e.g., Hacker et al.) have proven the role of the thermal mass of concrete in reducing energy consumption in buildings. In the future, the active use of this thermal mass will play a crucial role in storing and buffering the unpredictable and often intermittent supply of renewable sources of energy. CEMEX is collaborating with stakeholders along the value chain to promote these low- or even zero-cost options for reducing energy consumption.

Sustainable Urban Development

The rapid increase in the world's population—coupled with the significant pace of urbanization which, the UN predicts, will mean that about two thirds of people will live in towns and cities by 2050—poses great demands and challenges for all stakeholders involved in the planning and development of cities that are truly sustainable. These will not only need to be less carbon-intensive and more resilient to the potential consequences of climate change, but also affordable, accessible, and attractive. CEMEX engages regularly with local governments, NGO's, and distinguished academics, becoming increasingly involved at the early stages of infrastructure definition and design.

Operations Footprint

Although the major contribution of our products is in the in-use phase, the production of cement and concrete accounts for around 5% of global CO_2 emissions. Reducing these emissions is not just a question of corporate citizenship, but rather of long-term competitiveness.

How we Reduce Direct Emissions

Around 80 to 90% of our CO_2 footprint originates from the kilns where we produce clinker, the main ingredient of cement. The second largest contributor is the electric power consumed by our plants. Emission reductions from our operations can be achieved through the following actions:

Alternative fuels: With 26.6% of all of our kilns' energy coming from biomass or waste-derived fuels in 2015, CEMEX is the industry leader in the use of alternative fuels. These not only reduce

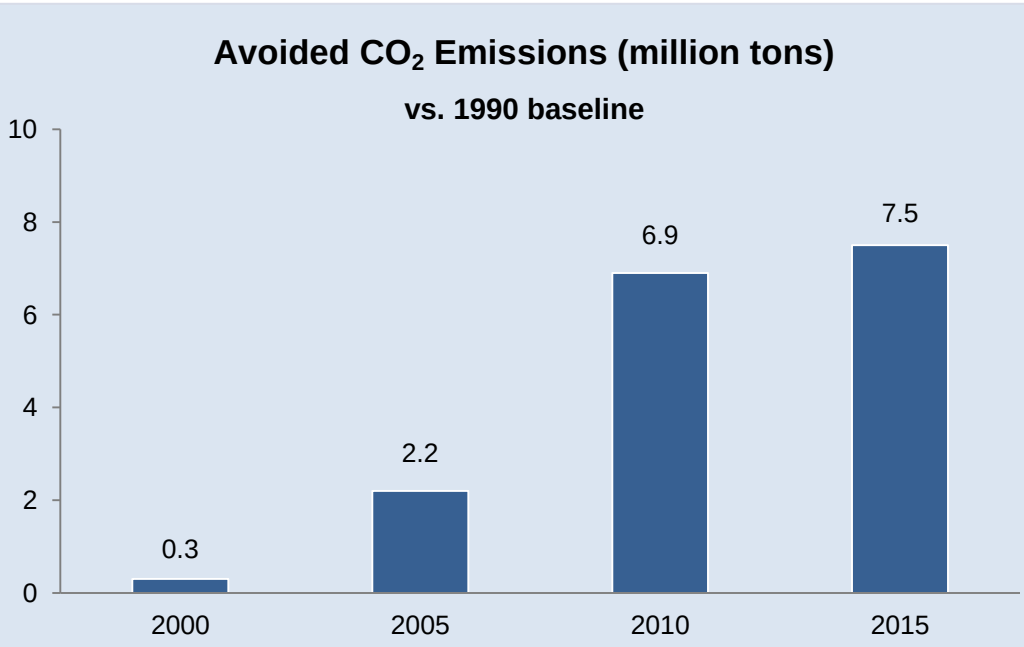
our CO_2 footprint, but also offer additional benefits to society by reducing landfilling and saving fossil fuels.

Clinker substitutes: Replacing clinker with substitutes such as blast furnace slag, fly ash, and pozzolanic minerals is an effective way of reducing the CO_2 footprint of our cementitious products. The average clinker content in all of our cementitious products now stands at 78.6%, down from 85.5% in 1990.

Energy efficiency: Energy has always been a main cost driver for the cement industry, and therefore, energy efficiency is a top priority. As a result, the energy efficiency of new kilns is close to their technical limits. However, the use of the unavoidable waste heat from the clinker production process for the generation of power presents an opportunity. In 2015, CEMEX began operating its first such installation, which provides around 30% of the power consumed by our solid cement plant in the Philippines. We are working to implement this technology in other plants.

New types of clinker: In recent years, the development of new types of clinker with a smaller CO_2 footprint and / or higher reactivity (i.e., the same effect can be achieved with a lower content of cementitious material) has received increased attention. CEMEX has successfully introduced FraguaRapid, a new clinker type with lower energy demand and higher reactivity in a number of its cement plants and continues work in this area.

Carbon Capture and Storage or Utilization (CCS/U): CCS/U is often seen as a key technology for reducing greenhouse gas emissions in a number of sectors, including cement. CEMEX is monitoring research in this area. However, given the significant challenges, including high cost, know-how gaps in both technology and business models, and societal acceptance, we consider that commercial application of this technology in our sector is still decades away.
As a result of our reduction efforts, CEMEX has decreased its direct CO_2 emissions per ton of cementitious product from 1990 to 2015 by 21.6%, with a target of 25% by 2020—a significant achievement considering the technical limitations to the potential reduction. As shown in the following graph, this translates into 7.5 million tons of CO2 avoided in 2015 – the equivalent of offsetting the average annual carbon emissions of 1.4 million passenger vehicles.



Note: 2010 and 2015 numbers include emission reductions from the EURUS wind farm in Mexico.

In addition, CEMEX has led the sector in terms of transparency concerning the carbon performance of our products. Among other innovations, in 2011 CEMEX was the first company in the sector to voluntarily calculate the carbon footprint of all of its cement, concrete, and aggregate products, and has communicated this information to its clients in a number of key markets such as the UK.

Our Commitment to Clean Power

In order to reduce emissions in its supply chain, CEMEX has also become the industry leader in Clean Electricity. The sum of all renewable power capacity operated or contracted by CEMEX exceeds 300 MW and represents 16.5% of our total power consumption and includes wind, solar, and hydro power, as well as waste-to-energy.

CEMEX Energia, a new energy business dedicated to the development of energy projects in Mexico with a focus on clean power, has been created to leverage our experience beyond our

traditional value chain. The Ventikas wind farms with a combined capacity of 252 MW are the first projects of this new entity.

The Role of Carbon Sinks

CEMEX's operation of El Carmen, a 140,000 ha (350,000 acres, more than 8 times the size of all of our quarries globally) wildlife reserve on the U.S.-Mexican border is also worth noting. According to a recent study, this site stores around 3 million metric tones of biologically sequestered CO_2. This is complemented by efforts to enhance biodiversity and carbon sequestration in our more than 350 quarries around the world.

The Way Forward

CEMEX is committed and well prepared to contribute its fair share to the mitigation of climate change and the adaptation to its consequences. However, in order to maximize this contribution, an adequate political, legislative, and regulatory framework is crucial. Such a framework should foster and reward innovation in low-carbon solutions and overcome current barriers to the implementation of existing solutions.

CEMEX Supports a Global Price on Carbon

CEMEX has long supported carbon pricing as a key policy instrument. Consequently, we joined the Carbon Pricing Leadership Coalition (CPLC) and were selected as co-chairs of one of its three working groups. Our experience and analysis have shown us that the successful introduction of carbon pricing depends on a number of conditions:

- A stable framework and long-term visibility are crucial for confidence among market players.
- Linking of markets and access to offsets (essentially credits for voluntary reduction projects) can provide liquidity and flexibility.
- Additional instruments to buffer market shocks should be designed well in advance and function in a predictable way. Ad-hoc solutions will undermine confidence and, therefore, do more harm than good.
- Effective prevention of carbon leakage is necessary until the carbon market is truly global.
- Carbon pricing needs to be complemented by robust yet pragmatic frameworks for monitoring and disclosure of emissions.

- The decision to adopt a carbon-pricing instrument must consider local readiness. A smooth transition should be guaranteed in order to minimize frictional losses.
- CEMEX believes that, in general, a carbon market is preferable to a tax as it provides adequate incentives to achieve the required overall emission levels.

Removal of Non-Financial Barriers

Other elements of an effective framework to mitigate climate change and adapt to its consequences include:

- Ambitious building codes that address both energy efficiency and resilience.
- Adoption of decision-supporting methodologies that systematically consider in-use characteristics of materials such as durability, maintenance demand, and their impact on energy efficiency; for instance Life-cycle Cost Assessment (LCCA) for the evaluation of infrastructure projects.
- Regulations that promote energy recovery from waste streams that cannot be reduced, reused, or recycled, including fair access to those waste streams.
- Product standards that allow the implementation of all technically proven reduction levers.
- Improved and expanded mechanisms for green financing.
- Long-term urban planning to ensure sustainable development of cities.

For a more extensive discussion of barriers that limit our ability to reach the full mitigation potential in our sector, see the LCTPi Cement report.

CEMEX will continue to work with its stakeholders, including governments, academia, industry organizations, and civil society in order to develop a framework that will ensure effective and efficient responses to the global challenge of climate change.

Carbon Leakage:
One of the biggest challenges for an environmentally effective, economically efficient, and equitable climate change program is to avoid changing the competitive landscape in such a way that covered entities within the program are economically harmed without any net reduction in global GHG emissions. Carbon leakage occurs when GHG reductions from producers within the scope of the climate change program are offset by a shift in production and emissions to producers outside the scope of the program who gain an unfair competitive advantage since they do not have any carbon compliance costs. For example, the production of a carbon-intensive good could be moved to a country without carbon pricing. This would result in no net reduction of emissions, but rather trigger an increase due to a longer transportation distance. Legislators around the world (the EU for instance) have realized the existence and relevance of carbon leakage and enacted provisions in their carbon pricing instruments to help reduce it.

CEMEX Position on Internal Carbon Pricing and Science-Based Targets:
In recent discussions about business' contributions to emission reductions, two instruments have gained significant attention: Internal carbon pricing and science-based targets.
Internal carbon pricing is a company-wide mechanism to establish a price on CO_2 emissions. This can be in the form of a shadow price for appraisal of investments or as a form to raise internal funds for reduction projects. While some companies have reported positive experiences with this instrument, our analysis indicates that in sectors like cement, which are characterized by a limited and particularly costly reduction potential, only an external price on carbon will lead to the intended results.
Science-based targets are company-wide targets that are consistent with a global emissions pathway that avoids the most dangerous consequences of climate change. While they provide important guidance, it is important to note that, for many heavy emitters (including cement companies), the achievement of those ambitious targets will be dependent on the right regulatory framework and is therefore beyond the control of the company.
Based on these thoughts, CEMEX has decided not to implement an internal carbon price or science-based targets for the time being. However, we are open to continued discussion with our interested stakeholders in order to better understand the potential and limitations of these instruments.