

Cement Environmental Directive

April 2020

Content

1. Introduction, scope and objective	2
2. Rules and requirements	2
2.1 <i>Comply with legal requirements and the Holcim Code of Business Conduct</i>	3
2.2 <i>Environmental Management Systems (EMS)</i>	3
2.3 <i>Identification of environmental impacts</i>	3
2.4 <i>Managing environmental impacts</i>	4
2.5 <i>Manage CO2 emissions and non-renewable resources utilization</i>	7
2.6 <i>Proactively engage with relevant stakeholders</i>	7
2.7 <i>Continuous improvement</i>	8
2.8 <i>Environmental Assessments and Audits</i>	8
3. Monitoring and Reporting	8
3.1 <i>Monitoring Progress</i>	8
3.2 <i>Data Reporting</i>	8
3.3 <i>Incident reporting</i>	8
3.4 <i>External Data Verification</i>	8
4. Organization	9
4.1 <i>Group Level</i>	9
4.2 <i>Regional Management</i>	9
4.3 <i>Country Level</i>	9
Annexes	11
Annex 1: Holcim Policies, Directives and Standards related to Cement Environmental Directive ..	11
Annex 2: Holcim Recommendations related to Holcim Water Directive	14
Annex 3: Definitions and Abbreviations	15

1. Introduction, scope and objective

The Cement Environmental Directive (“Directive”) is issued under the Holcim Environmental Policy.

The Environmental Policy Landscape is made up as follows:

- **Principles** are defined in the Environment Policy and are mandatory to be followed.
- **Requirements** as defined in the Environmental Directives are mandatory to comply with, in order to fulfil the Environment Policy principles.
- **Standards** as defined in the Environmental Standards are mandatory to be implemented.

The scope of this Directive covers Holcim Ltd and its “Countries” which are financially consolidated and /or under management control with activities in the cementitious materials segment. The directive applies to the following plants:

- Integrated cement plants including quarry operations and captive power plants (CPP)
- Grinding and blending stations
- Cement terminals
- AFR pre-processing facilities

The requirements of this Directive apply to active plants.

For mothballed and closed plants, the requirements do also apply, except for sections 2.2, 2.4.1, 2.4.2, 2.5, 2.7, 3.1, 3.2 and 3.4. The applicability of individual requirements however needs to be assessed on a case by case basis and agreed with Group (CEM /SD) functions.

In associated companies or joint ventures where Holcim does not have financial or management control, the responsible Group Executive Committee Member will establish that the associated company or joint venture is aware of this Directive and will encourage its adoption or at least essentially equivalent standards by such associated company or joint venture.

Projects for new plants or production lines will be developed in compliance with the Holcim Standard Design Criteria. Direct and indirect impacts of such projects shall be identified by means of an Environmental and Social Impact Assessment (ESIA).

In case of newly acquired plants, this Directive will be implemented within 3 years of the acquisition.

The objective of this Directive is to identify, manage and mitigate environmental impacts and risks to prevent environmental damage, negative health impacts on the local workforce and surrounding communities as well as related reputational damage.

2. Rules and requirements

Relevant requirements are defined below to fulfil the environmental policy principles and to ensure good practice standards in environmental management:

2.1 Comply with legal requirements and the Holcim Code of Business Conduct

Compliance with applicable laws and regulations and the Holcim Code of Business Conduct is mandatory for each plant. Systems and processes must be in place to identify, understand and comply with all environmental legal requirements.

Compliance must be regularly reviewed. Guidance regarding dealings with government officials can be found in the Holcim Anti-Bribery and Corruption Policy (Annex 1).

2.2 Environmental Management Systems (EMS)

All plants must have an environmental management system in place to ensure that all environmental impacts and risks are effectively managed and mitigated.

Integrated cement plants (incl. quarries and related captive power plants), grinding stations and AFR pre-processing plants must have an EMS in place at least equivalent to ISO 14001. All other plants must have an EMS that contains at the minimum the following elements:

- Water withdrawal, including water harvesting;
- Water consumption, including water losses;
- Water discharge; and
- Water recycling/reuse.

All actions related to environmental legal compliance, the management and mitigation of environmental impacts and risks must be covered in an Environmental Management Plan (EMP) integrated into the business planning cycle.

2.3 Identification of environmental impacts

Environmental impacts have to be systematically identified according to the following steps:

- Identify environmental aspects of activities, products and services over which plants have control and/or influence.
- Assess the risks linked to the identified environmental aspects that may have a significant impact.
- Maintain an up-to-date catalogue of significant environmental impacts during normal and abnormal operations

Among others, the main environmental impacts usually include but are not limited to

- Emissions to air
- Water withdrawal and wastewater discharge
- Land use change and biodiversity
- Energy usage
- Waste generation
- Noise, odour and vibrations
- Soil and groundwater pollution
- Management of dangerous goods

2.4 Managing environmental impacts

Environmental impacts must be systematically managed to sustain and further improve the Group's environmental performance, while controlling environmental risks not only to our own operations, but including the supply chain.

The use of AFR must follow the requirements defined in the AFR Framework and AFR Process Safety Framework.

2.4.1 Quality control system

All plants must have appropriate quality control systems in place to monitor and control the characteristics of raw materials and fuels.

2.4.1.1 Qualification of raw materials and fuels in cement plants

In order to prevent critical environmental impacts, it is a requirement that the characteristics of all fuels and raw materials (incl. correctives) are known prior to their acceptance on site. The pre-qualification process for fuels and raw materials must include a chemical characterization including all relevant trace elements (acc. to the AFR Quality Management Protocol and the Quality Assurance Manual). A sampling program, taking into account the specific fuel and material variability, must also be defined for each fuel and material used by the plant. All fuels and materials should be analysed at least annually.

A heavy metal balance on the kiln systems and on captive power plants should be established based on the fuels and material characterization. It should be updated annually or in case of any significant change.

2.4.2 Stack emissions

Various emission components like dust, organic and inorganic compounds, as well as heavy metals, are emitted from plant stacks. In order to manage stack emissions, they must be measured, evaluated and reported correctly and reliably. The EMR Standard is the reference for continuous and periodic emission measurements and related requirements.

2.4.2.1 Emission monitoring and reporting in cement plants

Main kiln stacks must comply with the following requirements:

- Install and sustainably operate continuous emission monitoring equipment for dust, nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), volatile organic compounds (VOC)
- Measure hydrogen chloride (HCl), ammonia (NH₃), benzene (C₆H₆), dioxins/furans (PCDD/PCDF) and heavy metals (HM) once per year
- Calibrate the continuous emission monitoring equipment once per year

Other stacks must comply with the following requirements:

- Separate clinker cooler and bypass stacks as well as coal mill, cement mill and material dryer stacks measure dust emissions at least once per year. Continuous dust measurement at these stacks is recommended, in particular at the clinker cooler stack.
- In case of AFR processing in the coal mill (co-grinding), the impact on VOC emissions must be assessed based on the material characteristics. If an increase of VOC emissions is expected, a spot measurement should be conducted at the coal mill stack during AFR co-grinding to verify the impact. In case of a significant increase of VOC emissions, continuous monitoring is required.

2.4.2.2 Emission monitoring and reporting in captive power plants

Cement Environmental Directive

- Install and operate a continuous emission monitoring (CEM) equipment for dust, nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO)
- • Measure mercury once per year at power plants using solid fuels
- • Calibrate the continuous emission monitoring equipment once a year

2.4.2.3 Mercury

Holcim upholds the requirements of the UNEP Minamata Convention on Mercury and therefore manages and mitigates mercury emissions where necessary.

The primary means of managing mercury emissions from cement kiln stacks is to limit the input of mercury to the kilns systems coming from raw materials and fuels.

To this purpose the mercury content in all raw materials and fuels must be regularly measured and the respective results used to compile a mercury mass balance for each kiln system.

Additionally an emission assessment must be performed in case the sum of all mercury inputs from raw materials and fuels into the kiln system exceeds 60 mg per ton of clinker. This quantification is based on the mercury concentration of all materials and fuels multiplied by their respective daily feed rate.

The aim of a mercury emission assessment is to evaluate the economic and technical possibility to substitute inputs and to judge whether the measures in place to manage or abate mercury are sufficient or whether additional secondary measures (dust shuttling with or without sorbent injection) have to be assessed and evaluated.

2.4.2.4 Total Organic Carbon

The use of AFR shall not lead to a significant increase of volatile organic compound (VOC) emissions. An emission assessment consisting of an expulsion test or a detailed analysis of critical organic compounds must be performed when an alternative raw material with a total organic carbon (TOC) content of > 5000 mg/kg, is not fed to the combustion zone of the kiln.

2.4.2 Stack emissions

Fugitive dust is dust suspended in the air due to material handling, material transfers, vehicular traffic on dirt roads or due to wind action. It should be noted that fugitive dust is not necessarily related to point sources.

Fugitive dust represents a critical impact on the work force as well as on the local communities surrounding our plants. All plants must therefore implement fugitive control measures according to the following steps:

- Identify main fugitive dust sources
- Design abatement measures which are adapted to the respective operating conditions
- Ensure adequate (preventive) maintenance of de-dusting installations
- Monitor dust deposition in order to control effectiveness of fugitive dust control measures
- Carry out respective cleaning activities if fugitive dust has been emitted, despite of all measures implemented

Particular attention to fugitive dust should be paid in plants with internal or external dust related complaints.

2.4.3 Water Management

Water is a precious resource, essential to life. Water is crucial to Holcim operations, which may impact this resource both in terms of quality and availability. Holcim is committed to reducing its water impacts and to supporting sustainability of water resources by

- Quantifying and managing the impact on water resources;
- Evaluating and mitigating water-related risks; and
- Identifying and seizing opportunities to make positive contributions on water resources and ecosystems especially at sites located in water stressed areas.

The Water Directive provides the minimum requirements our sites must comply with to minimize our water impacts and water risk exposure and maximize value creation for nature and the communities.

2.4.5 Quarry rehabilitation and biodiversity management

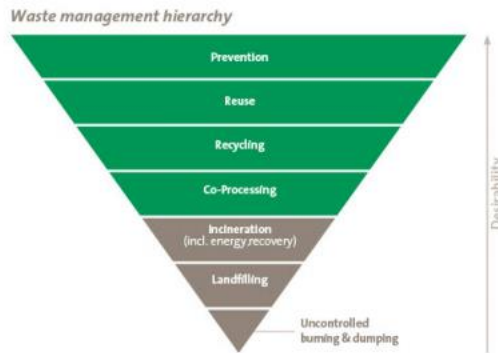
The rehabilitation of quarries must be planned in order to achieve the established objectives and targets related to a defined post-closure use. Therefore, a quarry rehabilitation plan must be developed and implemented for all active and temporarily inactive quarries. The planning has to be closely aligned with the actual extraction plan and the biodiversity management plan.

Holcim's Quarry Rehabilitation and Biodiversity (QBR) Directive defines the rules and requirements to achieve the following:

- Ensure that extraction site operations and rehabilitation, at a minimum, meet all applicable laws and regulations and the QBR Directive;
- Make the exhausted site safe and stable for future land use;
- Manage impacts, risks and future liabilities;
- Promote the evaluation of different options for future uses, balancing the socio-economic and environmental considerations (e.g., potential for employment and income generation, opportunities for biodiversity enhancement);
- Assess likely effects on biodiversity over the different phases of quarry development, from site preparation and development, operation, rehabilitation, and closure;
- To ensure the mitigation hierarchy is applied and where possible, identify opportunities for enhancing biodiversity to achieve viable positive change for biodiversity (e.g. improve existing habitat conditions, create new habitat with a high regional importance); and
- Understand better the financial requirements of the quarry closure, including rehabilitation related activities.

2.4.6 Internal waste management

All plants must have an internal waste management plan defined based on the waste hierarchy:



A waste management plan defines appropriate procedures for all wastes (hazardous and nonhazardous) generated in plant and quarry and must be integrated into the Environmental Management System (EMS). Procedures must be followed in order to have control over the disposal of waste and to ensure the disposal is in accordance with the plan.

Before sending internal waste for treatment off site, co-processing must be evaluated considering the rules of the AFR Framework including the list of "banned waste". Landfilling of production and/or internal waste on site or in a quarry should be the last resort and if required, must be done in an environmentally sound manner with corresponding permit and documentation. Any waste sent off-site for treatment or disposal must be documented to ensure traceability.

2.4.8 Housekeeping

Good housekeeping practices go hand in hand with good safety and environment performance as well as with good reputation. Roles and responsibilities in housekeeping should be defined and procedures must be followed to ensure that a high level of housekeeping is achieved in all plants.

Other requirements on fugitive dust emissions, waste management and the management of dangerous goods included in this directive will support the plants in this activity.

2.5 Manage CO₂ emissions and non-renewable resources utilization

Holcim is committed to preserve the natural resources and to further reduce its environmental and CO₂ footprint through systematic management of the clinker-cement factor of its product portfolio, energy efficiency and fuel mix, including the use of AFR.

The generation of any internal waste including cement kiln dust and bypass dust must be minimized where possible, and recovery options should be explored. Furthermore all plants are requested to recycle and/or recover externally sourced waste materials in their production processes where feasible.

CO₂ emissions, energy consumption and fuel mix from integrated cement plants including their CPPs, grinding and blending stations must be regularly monitored.

2.6 Proactively engage with relevant stakeholders

Stakeholder engagement is fundamental and may play an important role in maintaining our licence to operate and in ensuring a stable environment for further development and investments.

The Communities and Stakeholder Engagement Directive and its related tools is the reference document for planning and implementing stakeholder engagement activities.

Therefore Countries must identify and engage with relevant stakeholders on environmental issues and challenges.

Following key elements should be considered:

- Relevant stakeholders must be identified according to the local conditions (e.g. other land users, representatives of local communities, authorities, NGOs, universities, etc.)
- Engage in a long-term relationship with relevant stakeholders
- A communication concept must be put in place according to local needs and embedded in the overall communications strategy of the Country.

2.7 Continuous improvement

All plants must periodically assess and continuously improve environmental management processes, tools and capabilities. Good practices identified within the Group and in the industry shall be actively promoted.

2.8 Environmental Assessments and Audits

All integrated cement plants, grinding stations and AFR pre-processing plants will be audited following the ISO 14001-aligned EMS.

3. Monitoring and Reporting

3.1 Monitoring Progress

The progress of environmental management activities must be monitored and evaluated as required by the local regulations, or at least on an annual basis.

3.2 Data Reporting

All Countries and operating plants must report environmental data and KPIs according to the environmental reporting tool (iCare@LH) guidelines.

Reporting will be based on environmental KPIs that are material to the cementitious materials segment, commitments based on our membership of the GCCA, or requirements of key stakeholders including non-financial rating schemes in which Holcim participates.

3.3 Incident reporting

A system must be implemented to ensure critical environmental incidents (incl. non-compliances) or any incident with critical environmental impacts and/or damages are reported.

3.4 External Data Verification

Holcim, in accordance with best practice and in compliance with applicable legal requirements and voluntary commitments, will have certain non-financial information externally verified. All Countries and

operating plants are required to participate in the verification process as required by the selected verification provider.

4. Organization

4.1 Group Level

4.1.1 Steering Committee

The committee consists of function heads (Sustainable Development, Cement Excellence Management, Geocycle)

- Reviews and endorse amendments to the Chief Sustainability Office (ExCo).

4.1.2 Sustainable Development Function

- Reviews and proposes amendments to this Directive where and when necessary
- Assists Countries in understanding and applying the Directive
- Provides standards and tools in the implementation of the Directive
- Supports training on the Directive in the Countries
- Monitors compliance of the Countries with this Directive by tracking annual progress
- Provides annual progress reports to ExCo

4.1.3 Other Group Functions (Cement Excellence Management, Geocycle)

- Provide technical support
- • Cooperate with SD in interpretation of the Directive
- • Support experience exchange and share good practice between Countries
- • Cooperate with SD in related training activities
- • Serve as members of the respective Expert Networks

4.2 Regional Management

SD Responsible/Environmental Coordinators/experts at regional level are expected to:

- Facilitate the roll-out of this Directive and its supporting tools,
- Support the implementation of this Directive;
- Share identified good practices within their region

4.3 Country Level

4.3.1 Country CEO

- Is ultimately responsible and accountable for the implementation and compliance of the Country with the Directive
- • Delegates responsibility for the implementation of the individual requirements of the directive to the concerned functions/managers within the organization according to their respective roles

4.3.2 Country Environmental Coordinator/Environment Manager/Quarry Manager

- Ensures that the Country CEO has complete and reliable information on the Country's compliance with this Directive
- • Supports the implementation of the individual requirements of this Directive within the

Cement Environmental Directive

- organization, notably seeking input from Country legal to assess legal requirements
- • Reports annually the status of implementation and compliance to Group Level via the
- functional environmental reports.

This Directive was approved by Group Executive Committee on October 20, 2016.
Responsible Group Executive Committee Member: Chief Sustainability Officer

Annexes

Annex 1: Holcim Policies, Directives and Standards related to Cement Environmental Directive

Link to Cement Environmental Directive	Description	Responsibility	Reference
Quarry Rehabilitation and Biodiversity Directive (under development)	Directive defines the rules and requirements to return the land to a beneficial post-quarrying use, taking into account the economic viability, social factor and environmental aspect, including opportunities to enhance biodiversity.	Chief Sustainability Officer	Environmental Policy / Cement Industrial Framework
Water Directive (under development)	The Directive defines the rules and requirements for sustainable water management in across Holcim's operations.	Chief Sustainability Officer	Environmental Policy
Communities and Stakeholder Engagement Directive	The Directive defines the requirements for the relationship with Communities and Stakeholders, while the manual provides an implementation guidance on how to develop a Stakeholder Engagement Plan in operational sites.	Chief Sustainability Officer	Corporate Citizenship Policy
AFR Process Safety Framework	The framework defines measures to reduce risks related to Design & Engineering of equipment / facilities used in pre & co-processing of AFR to a level that is as low as is reasonably practicable. It further defines measures to reduce risks related to acceptance,	Geocycle	AFR Framework

Cement Environmental Directive

	transport, storage, pre-processing, co-processing, and disposal of AFR to a level that is as low as is reasonably practicable.		
Sustainable Procurement Directive and Supplier Code of Conduct	This directive ensure that business is conducted with suppliers who comply with Holcim Group guidelines summarized in the supplier code of conduct, which includes among others requirements related to environmental management and performance.	Procurement	Procurement Policy
Holcim Code of Business Conduct	The Code specifies how to act with integrity performing tasks, and offer guidance on how to deal with challenging situation	Group CEO	Holcim Code of Business Conduct
ABC Policy	The Policy sets out the relevant principles for appropriate business conduct and related rules when interacting with Third Parties, whether Public Officials or commercial parties.	Group CEO	Anti-Bribery and Corruption Policy

Standards and Tools

Link to Environmental Policy	Description	Responsibility	Reference
Emission Monitoring and Reporting (EMR) Standards and Manual	These EMR Standards under the Cement Industrial Framework define the requirements for continuous and periodic emission monitoring including quality assurance as well as data handling and reporting procedures.	Cement Excellence Manufacturing	Cement Environmental Directive / Cement Industrial Framework
Environmental Reporting Tool and reporting guidelines iCare@LH	Mandatory tool and guidelines with definitions for Group-wide reporting related to the Environmental Reporting Tool.	Chief Sustainability Officer	Cement Environmental Directive
Standard Design Criteria	The Standard Design Criteria provides standard technical specifications for projects based on proven technologies and practical experiences from our plants.	Project Management & Engineering	Cement Environmental Directive
AFR Quality Control Protocol / Guidance	The protocol defines authorization, qualification, acceptance and non-compliance procedures. These procedures define the general process that a pre-processing facility / co-processing unit must follow before qualifying a waste or AFR as material that can potentially be accepted for processing.	Geocycle	AFR Framework

Annex 2: Holcim Recommendations related to Holcim Water Directive

Recommendation	Description	Reference
Quality Assurance Manual	The Quality Assurance Manual contains guidelines for best practices and technologies to carry out quality assurance in the cement manufacturing process.	Cement Industrial Framework
Recommendation	Description	Reference
Quality Assurance Manual	The Quality Assurance Manual contains guidelines for best practices and technologies to carry out quality assurance in the cement manufacturing process.	Cement Industrial Framework
Recommendation	Description	Reference
Quality Assurance Manual	The Quality Assurance Manual contains guidelines for best practices and technologies to carry out quality assurance in the cement manufacturing process.	Cement Industrial Framework

Annex 3: Definitions and Abbreviations

<i>AFR</i>	Alternative Fuels and Resources
<i>Blending Plant</i>	Blending plants receive ground cement, mineral components and additives and blend them onsite according to customer specifications.
<i>CEO</i>	Chief Executive Officer
<i>CPP</i>	Captive power plant. Power plant associated with a cement plant which almost entirely consumes its electrical output.
<i>Emission Assessment</i>	An Emission Assessment is a thorough investigation to understand critical emission drivers and their potential impacts. Depending on the results, respective abatement measures should be assessed as well. This assessment must be submitted for review to Regional and Corporate CIP/SD.
<i>EMP</i>	Environmental Management Plan. This plan includes all the actions related to environmental legal compliance, the management and mitigation of environmental impacts and risks and must be integrated into the business planning cycle.
<i>EMS</i>	Environmental Management System
<i>ESIA</i>	An ESIA is a process helping to: <ul style="list-style-type: none"> - Identify critical environmental and social impacts associated to a project - Consider possible alternatives - Develop effective solutions or mitigation options to deal with expected project impacts
<i>GCCA</i>	Global Cement and Concrete Association GCCA was established in 2018 with Holcim as one of the founding members. It has developed a strategic partnership with the World Business Council for Sustainable Development (WBCSD) to facilitate sustainable development of the cement and concrete sectors and their value chains.
<i>ISO 14001</i>	ISO 14001 is a standard of the International Organization for Standardization that specifies the requirements for an environmental management system that an organization can use to manage its environmental responsibilities in a systematic manner and to enhance its environmental performance.
<i>KPI</i>	Key Performance Indicator
<i>NGO</i>	Non-Governmental Organization
<i>SD</i>	Sustainable Development
<i>UNEP Minamata Convention</i>	United Nations Environment Programme. The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury.
<i>AFR</i>	Alternative Fuels and Resources

Cement Environmental Directive

Blending Plant	Blending plants receive ground cement, mineral components and additives and blend them onsite acc. to customer specifications.
CEO	Chief Executive Officer
CPP	Captive power plant. Power plant associated with a cement plant which almost entirely consumes its electrical output.
Emission Assessment	An Emission Assessment is a thorough investigation to understand critical emission drivers and their potential impacts. Depending on the results, respective abatement measures should be assessed as well. This assessment must be submitted for review to Regional and Corporate CIP/SD.
EMP	Environmental Management Plan. This plan includes all the actions related to environmental legal compliance, the management and mitigation of environmental impacts and risks and must be integrated into the business planning cycle.
EMS	Environmental Management System
ESIA	An ESIA is a process helping to: <ul style="list-style-type: none"> - Identify critical environmental and social impacts associated to a project - Consider possible alternatives - Develop effective solutions or mitigation options to deal with expected project impacts
GCCA	Global Cement and Concrete Association GCCA was established in 2018 with Holcim as one of the founding members. It has developed a strategic partnership with the World Business Council for Sustainable Development (WBCSD) to facilitate sustainable development of the cement and concrete sectors and their value chains.
ISO 14001	ISO 14001 is a standard of the International Organization for Standardization that specifies the requirements for an environmental management system that an organization can use to manage its environmental responsibilities in a systematic manner and to enhance its environmental performance.
KPI	Key Performance Indicator
NGO	Non-Governmental Organization

Cement Environmental Directive

SD	Sustainable Development
UNEP Minamata Convention	United Nations Environment Programme. The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury.