LafargeHolcim

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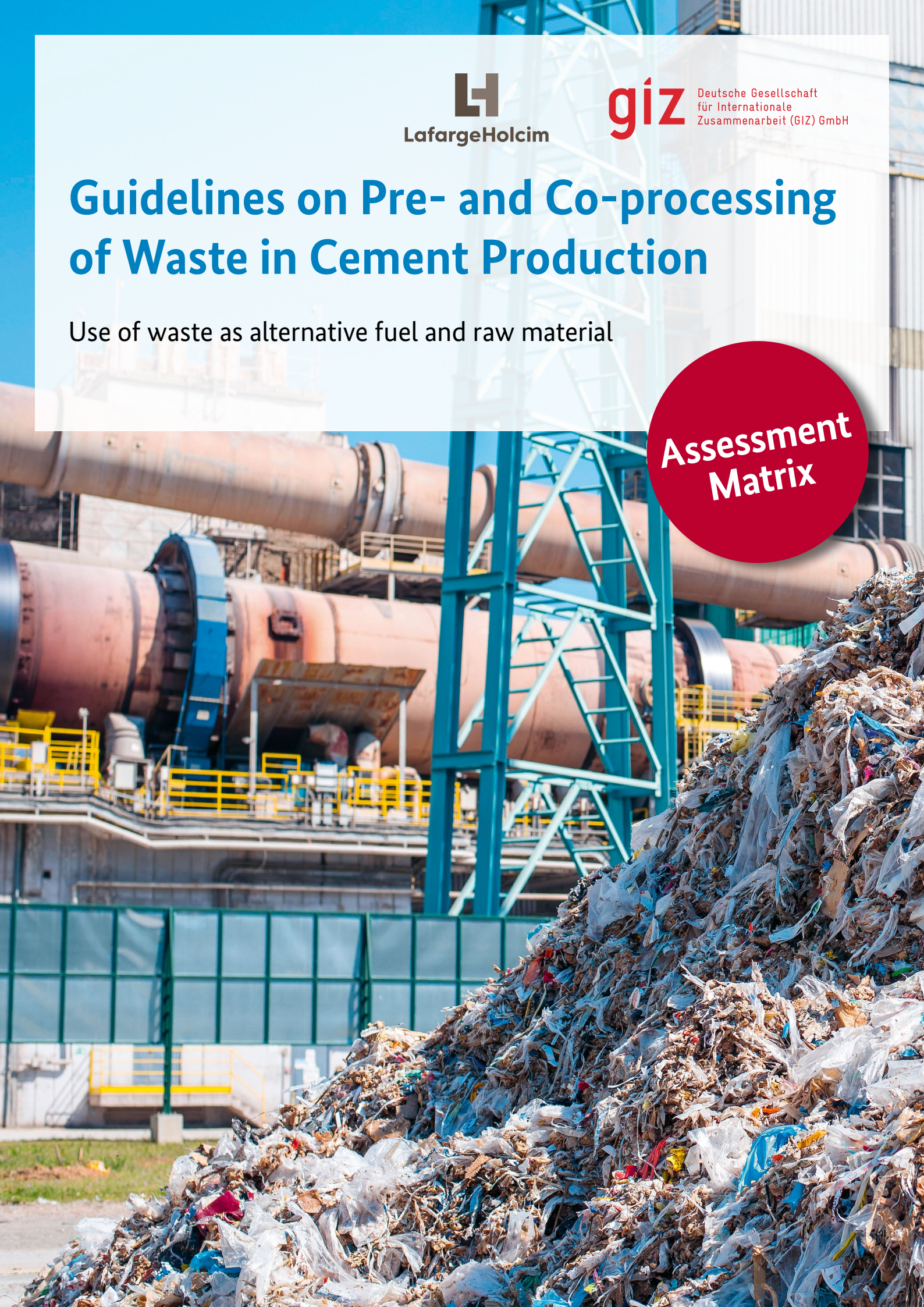
Guidelines on Pre- and Co-processing of Waste in Cement Production

Use of waste as alternative fuel and raw material

Assessment Matrix



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Assessment Matrix Guidelines on Pre- and Co-processing of Waste in Cement Production

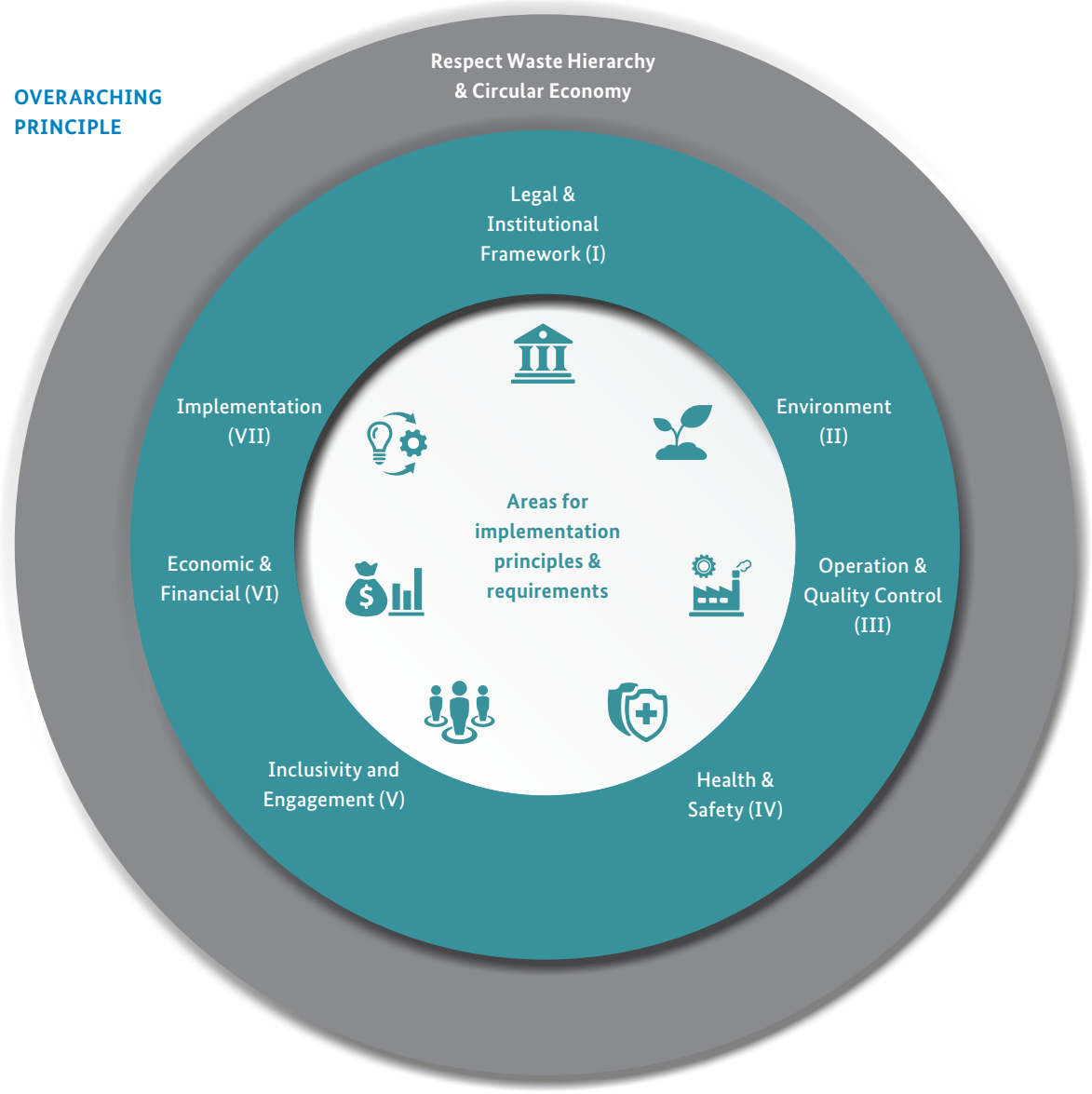
Use of waste as alternative fuel and raw material

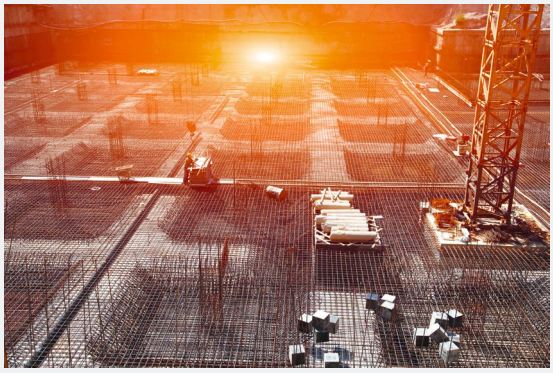
In 2020, GIZ, LafargeHolcim and University of Applied Sciences and Arts Northwestern Switzerland published updated guidelines on pre- and co-processing of waste in cement production. Originally published in 2006, the Holcim-GIZ guidelines became a key reference document for the waste and cement sector. The updated guidelines provide further practical guidance and detailed principles for applying pre- and co-processing in an environmentally sound and safe way. These can be downloaded in full in multiple languages at *www.geocycle.com/guidelines* and *https://mia.giz.de/qlink/ID=247254000*. This document provides an assessment matrix of the principles and requirements from the guidelines.

Any pre- and co-processing project is a complex undertaking and should be accompanied by a professional and thorough feasibility assessment. The assessment matrix presented here seeks to assist in getting a first idea of the readiness in a local situation and specific context. It provides an overview of the preconditions and areas of required improvements for a co-processing application. It is based on the principles and requirements laid out in the *GIZ-LafargeHolcim, Guidelines on Pre- and Co-processing of Waste in Cement Production – Use of waste as alternative fuel and raw material*.

How to use the Assessment Matrix
For each of the eight principles and related requirements below, the readers should assess their local conditions according to the options from left (high readiness) to right (low readiness) in the matrix.

Principles of the guidelines





Self-assessment for safe pre- and co-processing

The overarching principle is complemented with seven thematic areas and implementation principles. These are complemented with requirements for responsible pre- and co-processing:

Readiness		Low	Medium	High
Overarching principle 	**Respect Waste Hierarchy & Circular Economy**			
	• Pre- and co-processing shall respect the waste hierarchy and therefore don't hamper waste reduction, reuse and recycling.	☐	☐	☐

Readiness		Low	Medium	High
Principle area I 	**Legal & Institutional Framework**			
	• Compliance with all relevant laws and regulations has to be assured.	☐	☐	☐
	• Pre- and co-processing shall be in line with relevant international agreements (e.g. Basel and Stockholm Conventions).	☐	☐	☐
	• Effective monitoring by a qualified environmental regulator, that has sufficient institutional capacity shall be ensured.	☐	☐	☐
	• Country-specific requirements and needs shall be reflected in regulations and procedures.	☐	☐	☐
	• If a local legal framework for pre- and co-processing is not existent and/or inconsistent, international best practices shall be applied and build-up of the required capacity and the set-up of institutional arrangements ensured.	☐	☐	☐
Requirement 1	**An appropriate legal framework needs to be established**			
	• Pre- and co-processing shall be integrated as a viable waste management solution into the legislation concerning environmental protection, public health and waste management.	☐	☐	☐
	• Clearly defined legally binding regulations and standards are necessary to guarantee legal security and to assure a high level of environmental protection.	☐	☐	☐
	• Competent and empowered authorities shall ensure fair and consistent law enforcement.	☐	☐	☐
Requirement 2	**All relevant stakeholders shall be involved during the permitting process**			
	• Environmental and Social Impact Assessments shall be used to identify and quantify potential impacts of waste and AFR on the environment, human health and local value chains prior to operations. This data will also be used to develop a baseline, which shall be regularly re-assessed as the process develops.	☐	☐	☐
	• Best Available Technology (BAT) should be considered and applied.	☐	☐	☐
	• Operators of waste treatment facilities and cement plants shall provide all information to enable the stakeholders to evaluate the pre- and co-processing activities.	☐	☐	☐

Readiness		Low	Medium	High
Principle area II 	**Environmental Aspects** • Prevent or keep additional emissions and other negative effects on the environment from pre- and co-processing at a minimum.	☐	☐	☐
	• Emissions to air and water from co-processing shall not be higher than from cement production without co-processing.	☐	☐	☐
	• The cement products (concrete, mortar) shall not be abused as a sink for potentially toxic elements (e.g. heavy metals).	☐	☐	☐
Requirement 3	**Pre- and co-processing shall not have negative impacts on emissions**			
	• All AFs shall be fed into the high-temperature zones of the kiln system (i.e. main firing, secondary firing, precalciner firing). The same is true for alternative raw materials with elevated amounts of volatile organic matter.	☐	☐	☐
	• Pollutants in alternative fuels or raw materials for which the cement process has insufficient retention capability (e.g. Hg) should be limited.	☐	☐	☐
Requirement 4	**Emission monitoring is obligatory**			
	Emissions must be monitored regularly in order to demonstrate:			
	I. compliance with the national regulations and agreements	☐	☐	☐
	II. compliance with company policies and directives	☐	☐	☐
	III. the reliability of the quality control of the input materials.	☐	☐	☐
Requirement 5	**The environmental performance of the cement products (concrete, mortar) shall not deteriorate**			
	• The heavy metal concentration of the final products shall not have any negative impacts, as e.g. demonstrated with leaching tests.	☐	☐	☐
	• The quality of concrete shall allow end-of-life recycling.	☐	☐	☐

Readiness		Low	Medium	High
Principle area III	**Operation & Quality Control**			
	• Only appropriate waste streams shall be selected. These shall be pre-processed to ensure quality control, proper handling and stable kiln operation during co-processing.	☐	☐	☐
	• Companies engaged in pre- and co-processing must be qualified. They shall control and monitor inputs and relevant parameters of their production processes on a regular basis.	☐	☐	☐
	• The quality of the cement products (concrete, mortar) remains unchanged.	☐	☐	☐
Requirement 6	**Suitability of waste/AFR shall be ensured so that it can be accepted for pre- or co-processing**			
	• Newly identified waste and AFR sources shall be subject to a pre-acceptance (source qualification) procedure prior to considering them for pre- or co-processing.	☐	☐	☐
	• Pre- and co-processing shall not prevent the development of local and global recycling systems, and pre-processors shall divert recyclable materials to recycling where possible.	☐	☐	☐
	• Traceability shall be ensured at the pre- and co-processing facility from reception up to final treatment.	☐	☐	☐
	• Service level agreements between waste generators and pre-processing facilities as well as between cement plants and pre-processing facilities shall include quality specifications.	☐	☐	☐
	• Waste categories unsuitable for pre-processing or AFR not meeting the quality specifications for co-processing shall be refused.	☐	☐	☐
Requirement 7	**Transport, storage, treatment and handling shall be regulated and monitored**			
	• Waste and AFR transportation, storage, treatment and handling shall comply with regulatory requirements.	☐	☐	☐
	• Adequate procedures, equipment and infrastructure for transport, storage, treatment and handling of wastes and AFR shall be provided and maintained regularly according to the nature of the materials.	☐	☐	☐
	• Waste and AFR treatment and handling systems shall be designed to minimize fugitive dust, to prevent spills, to mitigate fire and explosion risks and to avoid release of toxic or harmful vapors.	☐	☐	☐
Requirement 8	**Standard operating procedures shall be clearly defined and known by operators**			
	• AFR shall be fed to the kiln system only at appropriate feeding points depending on the AFR characteristics.	☐	☐	☐
	• AFR feeding shall be avoided during kiln start-up and shut-down.	☐	☐	☐
	• The technical conditions of the plant that influence emissions, product quality, and capacity shall be carefully controlled and monitored.	☐	☐	☐
Requirement 9	**A quality control system shall be implemented**			
	• Documented quality control plans shall be developed and implemented at each pre- and co-processing site.	☐	☐	☐
	• Procedures, adequate equipment and trained personnel for the quality control shall be provided.	☐	☐	☐
	• Appropriate protocols in case of non-compliance with defined specifications shall be implemented.	☐	☐	☐

Readiness		Low	Medium	High
Principle area IV 	**Health & Safety**			
	• Companies active in pre- and co-processing shall establish appropriate risk controls to provide healthy and safe working conditions for employees and contractors.	☐	☐	☐
	• Have good environmental and safety compliance records in place as well as personnel, processes, and systems committed to protecting the environment, health, and safety.	☐	☐	☐
Requirement 10	**Health & Safety management system shall be implemented at all sites**			
	• Identifying risks and mitigating them shall be the basis of the H&S management system.	☐	☐	☐
	• Documentation and information on H&S shall be shared with all employees and the basis for openness and transparency about health & safety measures.	☐	☐	☐
	• Pre- and co-processing facilities shall be designed and built in a way to protect the H&S of workers, the community and the environment.	☐	☐	☐
	• Proper location, good infrastructure and properly trained employees can all minimize risks.	☐	☐	☐
Requirement 11	**Emergency response plans shall be implemented for each site**			
	• Adequate emergency response plans shall be implemented for all pre- and co-processing sites.	☐	☐	☐
	• An on-site emergency response group shall be available.	☐	☐	☐
	• Emergency response drills shall be executed regularly, including neighboring public intervention organizations.	☐	☐	☐

Readiness		Low	Medium	High
Principle area V 	**Inclusivity & Engagement**			
	• Companies active in pre- and co-processing shall engage regularly and communicate transparently with the public, relevant authorities and other stakeholders.	☐	☐	☐
	• Country specific or local needs and different cultural environments shall be taken into account when implementing pre- and co-processing.	☐	☐	☐
	• Companies engaged in pre- and co-processing shall consult and collaborate with actors in the existing local waste management value chain, including informal waste workers.	☐	☐	☐
Requirement 12	**Mutual benefit of involved stakeholders shall be achieved**			
	• Stakeholders in the existing local waste management value chain, including informal waste workers, shall be consulted and considered for collaborations.	☐	☐	☐
	• Cement plants, including grinding stations and pre-processing stations should have at least one Community Advisory Panel in place at plant level.	☐	☐	☐
	• Integration into the local value chain requires baseline and regular re-assessment also of social dimension focussing on problems, needs, and potential benefits.	☐	☐	☐
Requirement 13	**Openness and transparency are the guiding principles in communication and engagement with all stakeholders**			
	• Provide relevant information proactively to allow all stakeholders to understand the purpose of co-processing, the context, the function of parties involved and decision-making procedures.	☐	☐	☐
	• Build credibility by being open, honest and consistent. Words should match with demonstrated facts and good performance. Gaps between what you say and what you currently do should be avoided.	☐	☐	☐
	• Cultivate stakeholder dialogue based on mutual respect and trust. Participants in stakeholder engagement activities should be able to express their views without fear of restriction.	☐	☐	☐
	• Different cultural environments should be taken into consideration.	☐	☐	☐
	• Ensure continuity in communication; once you start, never stop.	☐	☐	☐

Readiness		Low	Medium	High
Principle area VI	**Economic & Financial Aspects**			
	• Pre- and co-processing projects are based on a financially sustainable business model, which brings value to all involved stakeholders and local communities.	☐	☐	☐
	• Financial mechanisms shall be in place to ensure that interventions have financing covered in the medium to long term.	☐	☐	☐
Requirement 14	**Pre- and Co-processing projects should be based on a financially sustainable business model**			
	• A common understanding about the financial implications of pre- and co-processing shall be developed since transforming waste to suitable AFR requires investment and operating costs.	☐	☐	☐
	• The polluter-pays principle should be applied using a mix of realistic financing instruments (tariffs, gate fee, incentives and EPR schemes).	☐	☐	☐
	• The financing framework of waste management shall be guided by the waste management hierarchy, incentivising more environmentally friendly options.	☐	☐	☐
	• Financing needs to be agreed upon within a specified and sufficient contract period considering a long term perspective allowing for a fair depreciation period and return of investments.	☐	☐	☐

Readiness		Low	Medium	High
Principle area VII	**Implementation**			
	• Monitoring and auditing systems need to be in place to enable successful implementation	☐	☐	☐
	• Capacity building and training at all levels is essential.	☐	☐	☐

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