EIC Multicorporate Day on ConTech – Holcim's Challenges

As part of the EIC Multicorporate Day on ConTech initiative, Holcim is specifically looking for innovative solutions in the following domains:

Challenge 1 – Cement Manufacturing

Challenge 1.1 – Technologies for Decarbonisation of cement manufacturing process

Possible solutions: e.g., by Carbon Capture, Utilisation and Storage (CCUS) or during clinker manufacture by Oxyfuel or other integrated solutions as well as treatment of 15-20 vol% CO2 containing exhaust gases without prior capturing. Internal production and re-utilisation of potential CO2-based products in the cement manufacturing process. Reduce the carbon footprint of clinker, cement and concrete by use of alternative raw materials, industrial by-products or other by-products.

Challenge 1.2 – New drying technologies

Possible solutions: Traditional drying with fossil fuels consumes lots of energy and emits high volumes of CO2. New approaches to drying with less or no heat would represent a step change in cost-effectiveness and environmental friendliness. Two examples of such technologies are Vortex and Coomtech.

Challenge 2 – Ready-Mix - Green Concrete Acceleration

Challenge 2.1 – Technologies to reduce the Carbon footprint of concrete

Possible solutions: New materials and technologies that support the decarbonisation of Ready Mix concrete mixtures while maintaining performance. Zero Carbon Ready Mix Concrete.

Challenge 2.2 – Tools to assist Architects and Engineers to Design Low Carbon Projects

Possible solutions: Automation to convert existing BIM catalogues files to low carbon alternatives (Plug and Play with existing BIM systems or equivalent; Auto generation of low carbon BIM files; BIM sustainability simulations and modelling, autoCO2 determination/m2

from scan or photo of drawings and specification inputs. Allows for selection of alternatives and comparisons.

Challenge 2.3 – Monitor Durability Performance/End-of-Life Recycling

Possible solutions: Monitor concrete performance characteristics at construction sites using digital technology to measure temperature, humidity, pH, structural resilience, and durability. Traceability of concrete for future recycling to improve segregation of materials by quality.

Challenge 2.4 – Circular Economy Technologies

Possible solutions: Treatments for recycled aggregates to improve mechanical performance and durability. Concrete Aggregates from municipal waste: for example, incinerator ash or solid waste. Sewage Treatment water for concrete production.

Challenge 2.5 – Tools to estimate the remaining life of concrete

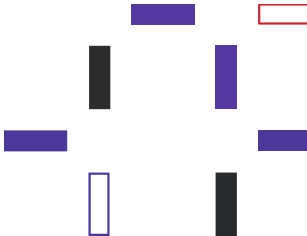
Possible solutions: Predict the remaining life of concrete structures using embedded monitoring systems that could be used in the future. ie. integrated into simulation and modelling within BIM-BLM (Building Lifecycle Management).

Challenge 3 – Aggregates

Challenge 3.1 – Recovering better quality recycled aggregate

Possible solutions:

- Construction & Demolition Waste processing technologies best suited for recovering better quality recycled aggregates (coarse and fine aggregates) that could be used in increasing proportions in concrete
- Economical and feasible treatments for recycled aggregates for enhancing the performance in concrete and other applications
- Identifying alternative industrial waste sources that could be used for making concrete & construction aggregates



Challenge 3.2 – Sorting & decontaminating technologies for Construction & Demolition Waste

Possible solutions:

- Use of robotics for sorting different materials in Construction & Demolition Waste for higher recovering
- Techniques for decontaminating CDW and using it for producing high-value materials

Challenge 4 – Logistics

Challenge 4.1 – Sustainable transportation for Construction Materials

Possible solutions:

Solutions for transporting bulk construction materials with reduced emissions

- How to reduce CO2 Scope 3 transport emissions? (transport, equipment, procurement, behaviour, etc.

- How to improve efficiency for payload and turn-around-times?

- How to optimise inventories (inbound raw material, finished goods, etc.

Challenge 5 – Waste Management Solutions – Geocycle

Challenge 5.1 – Treatments for the beneficiation of industrial and municipal mineral wastes to make them usable as raw materials for the production of Portland clinker

Possible solutions:

- Technologies to remove heavy metals, and in particular chromium, from steel slags, red mud, bottom ashes and ashes, in general.
- For Construction & Demolition Waste (CDW), technologies to:
  - Separate CaO-rich fractions, and especially the hydrated cement paste, from the SiO2-rich fractions
  - Characterise online the chemical composition of CDW or its fractions (main oxides, chlorine, sulphates, TOC,…)

Challenge 6 – Elevate Roofing Solutions - Holcim Building Envelope EMEA

Challenge 6.1 – Technologies for the use of wind, sun and rain in roofing systems

Possible solutions:

- Implementation of wind turbines and solar panels technology on the roof
- Incorporate PV film technologies in the roofing membrane itself to produce energy
- Technologies to use the heat coming from the roof (black membrane); lower thermal emittance reflective membrane
- Rainwater Retention - Water storage aiming to reduce flood risk

Challenge 6.2 – Single-Ply Carbon Capture & Storage roofing membranes

Possible solutions:

- Granules in the formulation help clean the air and store carbon
- CO2/NOx absorbing membranes

Challenge 6.3 – Thermochromic roofing membrane

Possible solutions:

- Develop a membrane which changes "colour" in high heat or low heat conditions – improves building energy efficiency (different behaviour according to the environment)

Challenge 7 – Precast - Solutions & Products

Challenge 7.1 – Carbon Efficient Precast / Prefabricated Solutions

Possible solutions:

Innovative precast concrete or off-site construction solutions aiming at reducing carbon emissions via:

- Innovative designs and design tools for off-site construction systems
- Innovative materials/composites for off-site construction systems

- Innovative technologies for off-site production
- Innovative technologies for on-site assembly of prefabricated solutions