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Economia circolare e l’uso razionale delle risorse

Circular Economy: A challenge for Building materials

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www.gbcitalia.org
Circular economy: a challenge for building materials

Our Journey

Stefano Allevi
- Degree in Chemistry;
- EMBA @ MIP (Milan)
- In the group since 2006;
- 10 Y in R&D;
- 4 Y in Global Product Innovation.

 existing Products: some examples

The “green challenge”

The future perspective

HC and Italcementi

FINISH
Content

HeidelbergCement and Italcementi

The green challenge

The circular economy for HC: the future perspective

Existing products: some examples
We are the largest vertically integrated building materials producer in the world

- **54,000** employees
- **Leading market positions** in aggregates, cement, and ready-mixed concrete
- **3,000** production sites in more than **50** countries
- Cement capacity **187 Mt** (incl. joint ventures)
- Aggregates resources and reserves **19.2 bnt**

See more on: [https://www.heidelbergcement.com/en](https://www.heidelbergcement.com/en)
Italcementi is the Italian Subsidiary of HC Group (since 2016).

ITC is one of the Italian leading company supplying cement and concrete (by Calcestruzzi).

- About 1700 employees;
- n. 8 complete cement plants;
- n. 1 cement plant for special products;
- n. 7 grinding plants;
- n. 110 concrete plants;
- n.15 quarries for aggregates.
GPI and GR&D at HeidelbergCement

GPI - Italy

- GPI is driven to find new opportunities and sustainable solutions to improve quality and safety of constructions, to enhance people’s future lives.

- GPI aims at improving HC Group’s positioning on markets, enriching the offer to the Group with sustainable innovative products, advanced concrete solutions and technological applications.

- focus on product innovations, development of high-end concrete applications, and new market opportunities.

GR&D - Germany

- focus on reduction of CO₂ emissions, resource efficiency, decrease in production costs, and value added concrete solutions.
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The starting point

The impact of B&C sector

In 2018, Buildings and Construction (B&C) sector accounted for:

- **36%** of final energy use;
- **39%** of energy and process-related CO2 emissions (11% of which resulted from manufacturing building materials and products such as steel, cement and glass);
- Concrete is the 2nd most produced man-made material after drinking water;
- Cement is responsible for about **7%** total man-made emissions.

Source: **Cembureau, HC elaboration**

Source: 2019 Global status for building and construction, IEA
New Challenges

Megatrends
- 2050 – 10bn
- 2050 – 7bn

Pandemics
Zero emissions in 2050

The real challenge
- Develop high performance materials well responding to new needs
- Develop green products by means of sustainable processes
Sustainability commitments 2030 by HC

- Driving economic strength and innovation
- Achieving excellence in occupational health and safety
- Reducing our environmental footprint
- Enabling the circular economy
- Being a good neighbor
- Ensuring compliance and creating transparency

Boost R&D and Innovation

- New technologies
- Alternative binders and SCMs
- End of life of buildings
- Waste selection and recycling

See more on:
https://www.italcementi.it/it;
https://www.heidelbergcement.com/en;
HeidelbergCement and Italcementi

The green challenge

The circular economy for HC: the future perspective

Existing products: some examples
The circular economy for HC

The Pillars

- **Raw Materials**: use of by-products (rich in Si, Al, etc.) instead of natural calcium carbonate and clay

- **Clinker production**: fossil fuels are replaced by alternative fuels including waste;

- **Cement production**: part of the clinker is replaced with alternative industrial products such as Fly Ash and Slag in the optic to reduce clinker/cement ratio

- **Recycling**: Concrete as a final product is 100% recyclable either as a concrete aggregate or as a road base
The circular economy for HC

Hardened Concrete as a resource

HC strategy covers all its business areas:
1. Cement
2. Aggregates
3. Concrete

HC strategy is focused:
• on CO2 capture and reuse at any level
• reuse of recarbonated materials for a circular economy

Potential reduction of \( \frac{3}{4} \) of current emissions
Selective separation

- Several processing steps are needed to obtain:
  - High purity of the paste
  - High quality of aggregates and sand
- Direct involvement of stakeholders for integrating the entire supply chain

Example of material recovery by separation
Enforced carbonation is a fast and robust process:

- 80% carbonation degree achieved within few minutes at ambient P, T;
- Process little sensitive to CO2 concentration and the cement classes.

\[
\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O} \\
\text{Hydrates}_{\text{CaSiAl}}_n \cdot \text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{Al-Si-gel} + \text{H}_2\text{O}
\]
Low- CO2 cement

Si-Al gel of carbonated recycled concrete paste is highly pozzolanic;

Overall contribution to the strength
Content

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Existing products: some examples
The existing products

eco.build by Calcestruzzi

1. ECO CAM products (concrete with a minimum recycled content of 5%);

2. ECO TM: Tailor Made approach to fit with the desiderata in terms recycled materials;

• Calcestruzzi spa is able to guarantee the LCA (Life Cycle Assessment) and the EPD (Environmental product Declaration) of its products for enabling the CAM (Criteri Ambientali Minimi) requirements in public works, and LEED, ITACA, BREAAM environmental protocols.

See more on:  
https://www.calcestruzzi.it/it/la-gamma-ecobuild;  
https://youtu.be/bLoHmd46CDE;  
https://youtu.be/bLoHmd46CDE;
The existing products

The i.power rigenera by Italcementi

This High Performance Concrete solves the problem of durability and therefore increases the working life of a pillar, ensuring seismic adaptation and restoration of damaged parts, all in a single solution.

The solution is based on casting a very fluid fiber-reinforced concrete that "wraps" the structural element so that a sort of new skin is created with a thickness of a few centimeters.

See more on:
https://www.italcementi.it/it/ipower-RIGENERA;
The existing products

Premix for 3D printing technology

From i.lab to Germany

The 3D printing binder family has been developed in i.lab by Global Product Innovation team, based in Italy, in strict cooperation with Italcementi

See more on:
https://www.italcementi.it/it/tecnologia-3d-printing
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Stay connected!

Italcementi is online:
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Grazie per l’attenzione.

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