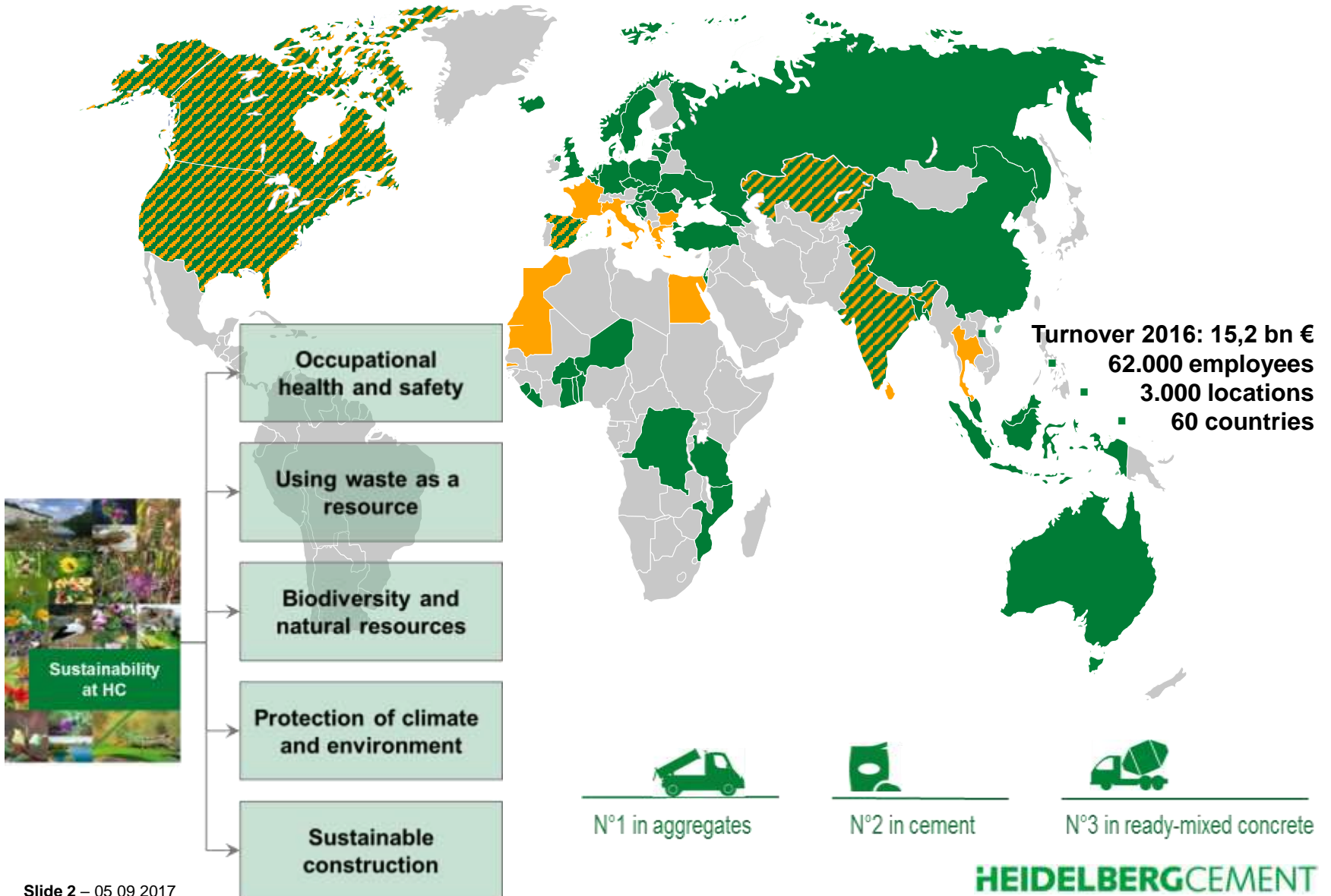


# Innovation in construction materials through LCM: a concrete case

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# HeidelbergCement: a global player with Sustainability Ambitions



# Agenda

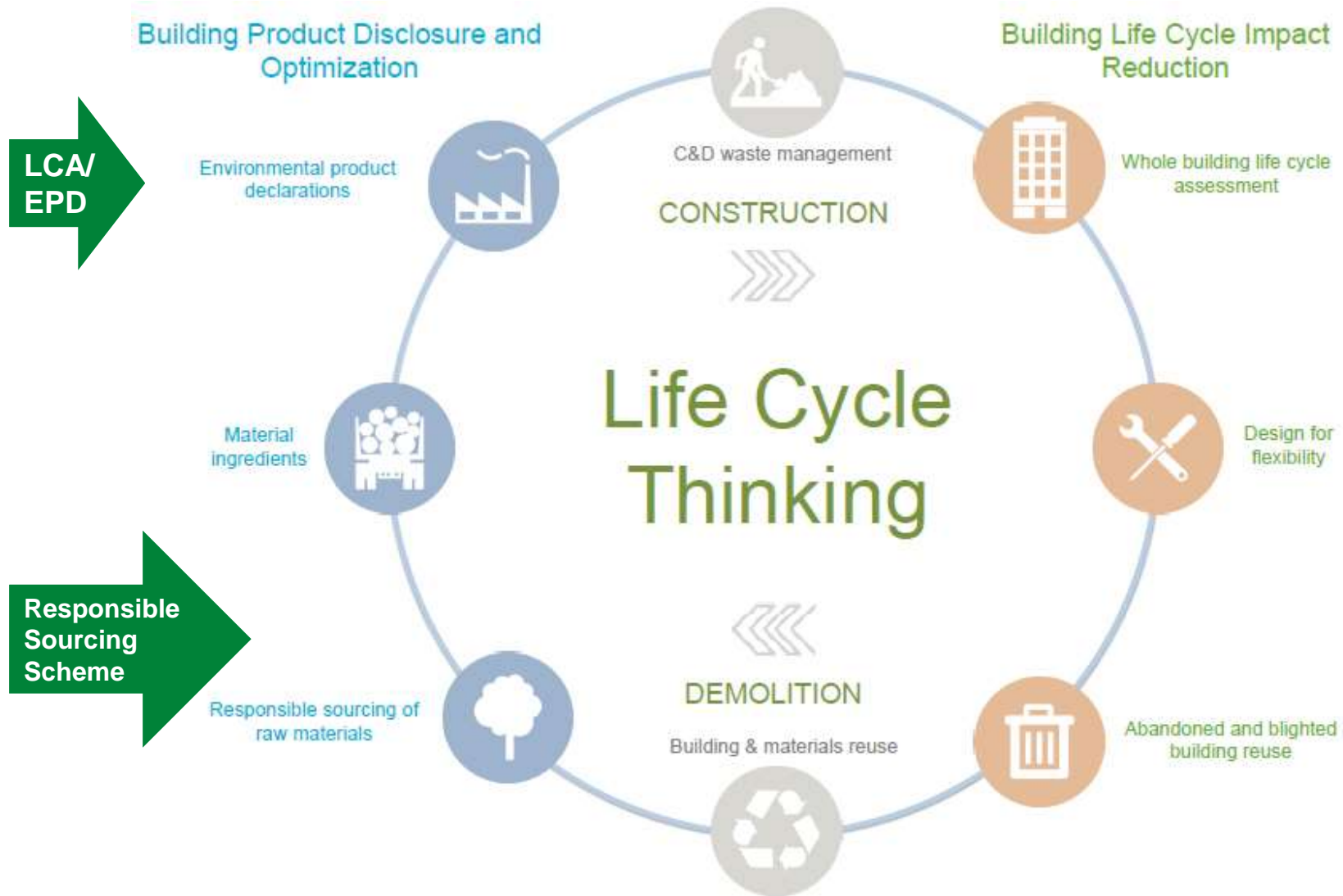
- Innovation at HTC
- LCA and EPD sectoral tool
- Experiences in use of LCM at R&D stages of development:
  - an architectural design application and
  - a high performing product for special applications

# Research and innovation at HeidelbergCement

- R&D and product innovation in the cement, aggregates, and ready-mixed concrete business lines, with focus on:
  - **reduction of CO<sub>2</sub> emissions**, resource efficiency, decrease in production costs, and value added concrete solutions
  - **product innovations, development of high performance concrete applications**, and **new market opportunities**
- High level of awareness and application of “Life cycle thinking”
- Opportunity to test innovative materials in our i.lab R&D center:
  - alternative, recycled, local: concrete with recycled aggregates from construction and demolition waste and blast furnace, and other industrial process waste
  - i.active cement: white concrete based on a photocatalytic active principle developed by our laboratories
  - i.light: “transparent cement”, a precast element that allows light to filter through from the outside inside and vice versa



# High awareness level of our researchers..



# Life-cycle assessment for concrete industry in practice: the benefits of a sectoral approach

- Construction works specific standards (in addition to cornerstone standards ISO14040/ ISO14044):
  - EN15978 LCA standard for construction projects
- EPD standards
  - ISO 14025
  - EN 15804 (EPD data)
  - ISO 21930
- CEN/TC 350 standards: provide a solid base for common and comparable conduct of LCAs
- CO<sub>2</sub> and energy efficiency of cement production: a robust and reliable **database** is available
- In 2013, an international **PCR** for concrete was registered under the Environdec system (EN 15804 complaint)
- A sectoral **software tool** was developed for LCA calculation, sourcing secondary data from the database

**Sectoral standards and tool reduce cost and resources, and improve reliability**

# The Cement Sustainability Initiative EPD tool



## Quantis & CSI solution



Easy-to-use and intuitive online tool to collect data and automatically produce LCA results in EPD format



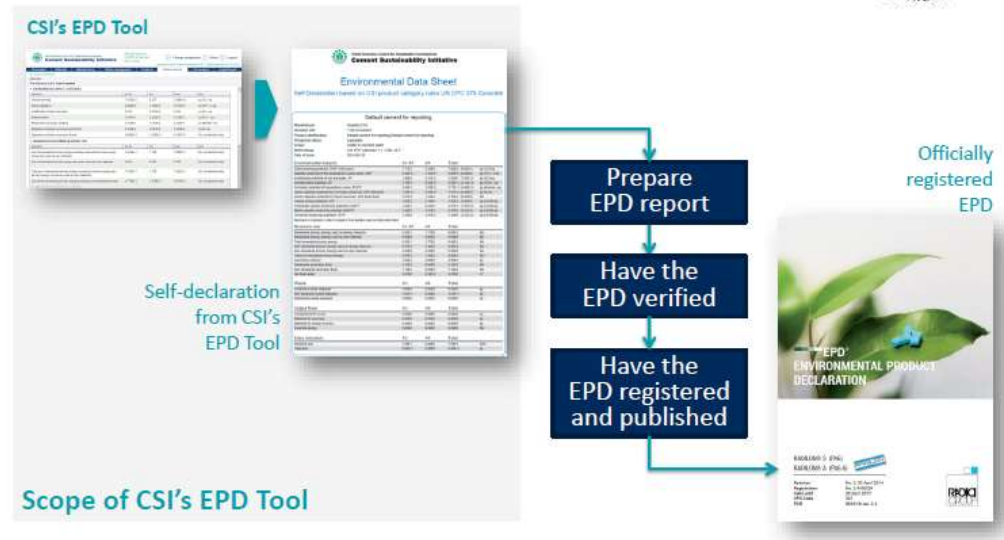
First ever pre-verified solution (calculation engine) accepted by the International EPD® System (Envirodec)



Verification costs reduced by up to 50% thanks to the pre-verification and automated generation of reports



Generation of EPDs of clinker, cement and concrete, but also plaster and lime



- First developed in 2014 and regularly maintained
- International and US Version
- User friendly
  - Automated generation of reports
  - Convenient web based solution
  - Helpdesk, comprehensive supporting documents and on-line training available

# About the tool and how HeidelbergCement is using it

- The CSI tool is used for simplification, ensuring consistency and cost savings
- Full LCA report in table format:
  - From where individual indicators can be singled out (Carbon footprint, recycled content)
  - Usable as input to building LCA
- Two main applications:
  - Issuing self declaration to be the basis for EPDs (average, product specific) (e.g. Sweden, Turkey, Italy)
  - Comparative assessment (LCA) mainly for product innovation research
- Developing EDP based on self-declarations
- Own in-house EPD experts team
- Group rules apply for specific assumptions and data sourcing
- Currently one operator for registration of HC EPDs is recommended, for simplification and efficiency
- Multiple operators to deal with, issue recently overcame in Europe by mutual recognition



Das Detail im Fokus.  
Das Ganze im Blick.



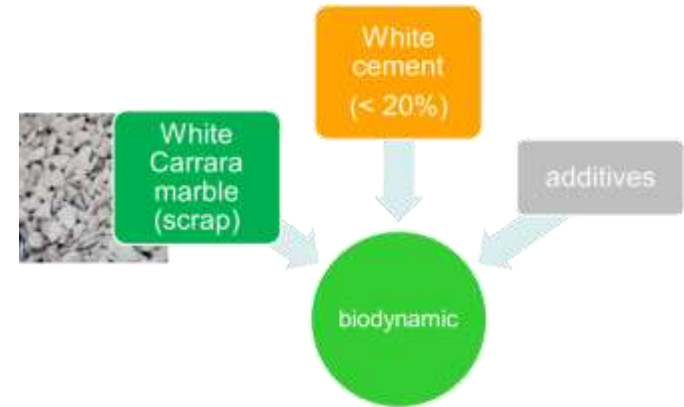


# LCA for reducing the architectural design materials footprint (i.active BIODYNAMIC)

- It is a high performance, highly flowable cement mortar for non-structural architectural precast elements, thin sections and complex shapes
- Surfaces made with it are very smooth, resembling marble or even reflective glass
- it is **fully recyclable** after use as an inert material.
- Use of photocatalytic additives (TX-Active)



Milan EXPO 2015: palazzo ITALIA



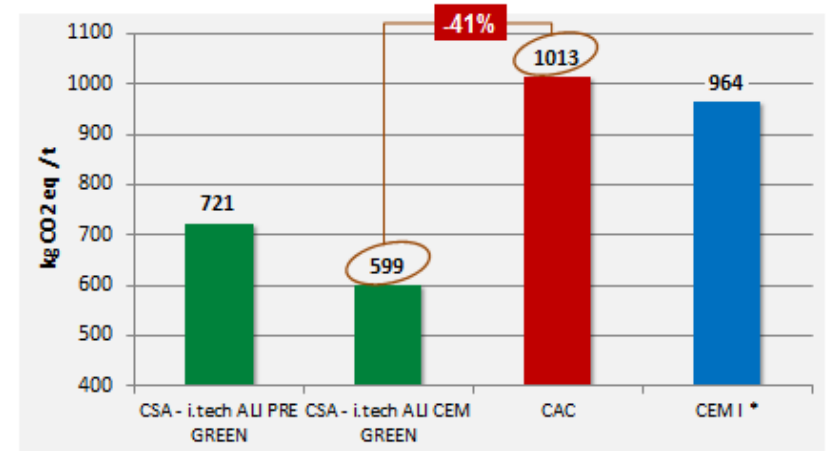
- 80% recycled material aggregates, made of Carrara marble scrap for enhanced brightness
- coating part of the surface area of a large city with TX Active-based products ensures a reduction of air pollution (up to 50%)

# LCA for comparative assessment of high performing products for special applications

## LCA - Calculation



## LCA - Calculation



(\* Italian Average)

The CO2 emissions are remarkably lower for ALI products vs. CAC and OPC

2<sup>nd</sup> International Conference on the Chemistry of Construction Materials  
October 10 – 12, 2016  
Munich, Germany\_

LCA for comparative assessment is relevant if based on same methodology

# Conclusion

- HeidelbergCement, as main global building materials manufacturers, is endorsing circular economy concepts and use of LCA approach as of the research stage of improved or innovative products
- High level of awareness of researchers and marketing people is ensured
- They are supported by an effective organization and software tools
- LCA is useful to ensure a low carbon footprint for all the range of product, from products for very specialized applications to products for architectural design

