AMANAC CLUSTER

AMANAC WORKSHOP

BRUSSELS, BELGIUM | 03.07.2019

WHAT KIND OF BUILT ENVIRONMENT FOR FUTURE GENERATIONS?

EnDurCrete

New Environmental friendly and Durable conCrete, integrating industrial by-products and hybrid systems, for civil, industrial and offshore applications

Francesca Tittarelli

Università Politecnica delle Marche, Ancona, Italy

The projects have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760639 (EnDurCrete), 760824 (ReSHEALience) and 761072 (DACOMAT)

SPECIFIC CHALLENGE OF THE TOPIC NMBP-06-2017

- Costs may be reduced in the **production phase** (raw materials, energy, transport, formability), in the installation phase, and the materials may be more appropriate for end of life reuse/recycling.
- **Longer performing materials** can strongly **reduce overall life time costs**, such as lower usage costs through reduced maintenance and shorter service interruptions.
- **Durability** is a key criterion for materials in many applications and environments.
- Typical **applications requiring excellent long term durability** and high reliability are buildings, marine applications and infrastructures including offshore.
- In many applications, operational durability needs to be better understood, particularly for **innovative products** which have not demonstrated long term performance.
- Durability has to be evaluated both **theoretically** and in **real installation conditions** (including challenging environments) as these may influence final product performance.

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NEED

- **Concrete** is the world's most consumed man-made material.
- **Portland cement** is a cost-effective standard material for the manufacture of concrete building components. However, its manufacture consumes significant mineral resources (good-quality limestone and clay), energy and fuel, and creates greenhouse gas emissions. Ordinary Portland cement has essentially reached its technical limit in terms of CO_2 reduction.
- **Durability problems** in concrete are often related to external causes: chemical attack, cracking, scaling via freeze/thaw, spalling, carbonation and steel corrosion. These impact on the durability of concrete buildings and infrastructures.

There is need for innovative, durable & sustainable concrete especially in harsh environment where the cost-effectiveness, easy installation and durability of concrete is real added value.

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ENDURCRETE PROJECT

New Environmental friendly and Durable conCrete, integrating industrial by-products and hybrid systems, for civil, industrial and offshore application

The main goal of EnDurCrete Project is to develop **a new cost-effective sustainable reinforced concrete** for long lasting and added value applications.

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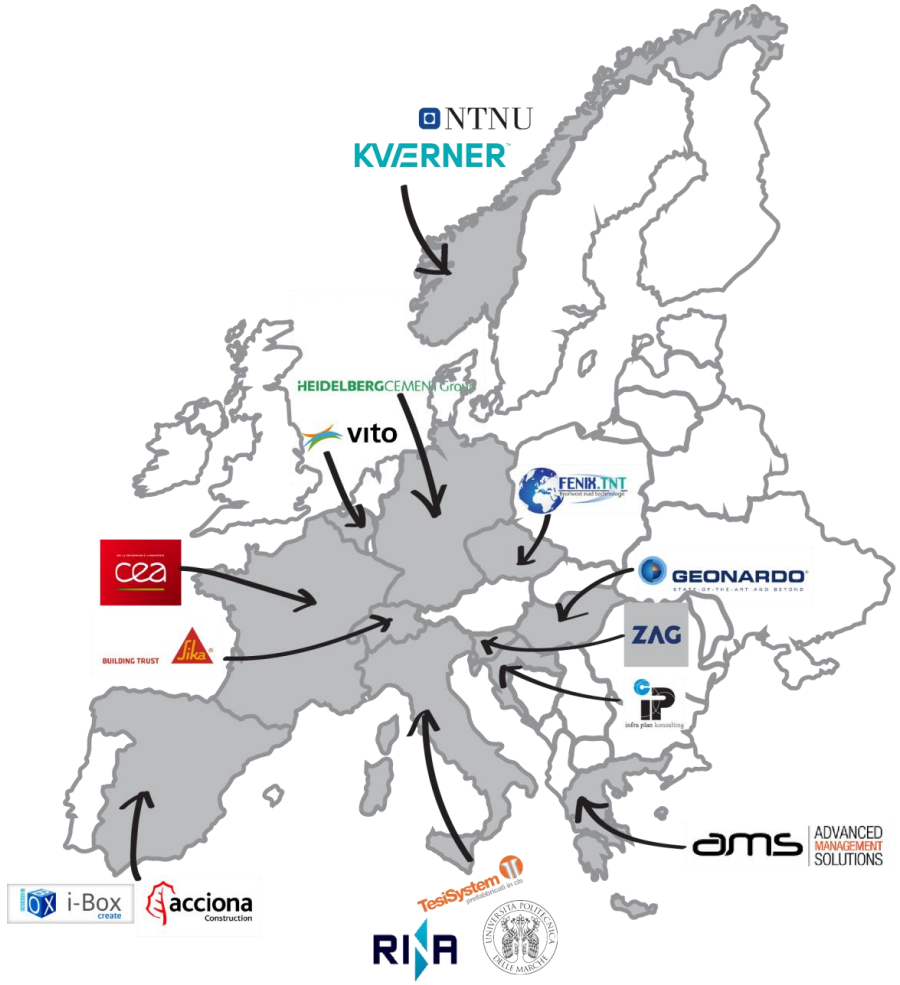
PARTNERS

16 partners
from
12 countries



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PROJECT OBJECTIVE

The **concept** is based on the integration of novel low-clinker cement including high-value industrial by-products, new nano and micro technologies and hybrid systems ensuring enhanced durability of sustainable concrete structures with high mechanical properties, self-healing and self-monitoring capacities.

The key EnDurCrete technologies:

- Novel cement (CEM II/C and CEM VI)
- Nano-enabled smart corrosion inhibitors
- Self-sensing carbon-based micro fillers/fibers
- Multifunctional coatings with self-healing properties
- Sensorised non-metallic reinforcement systems

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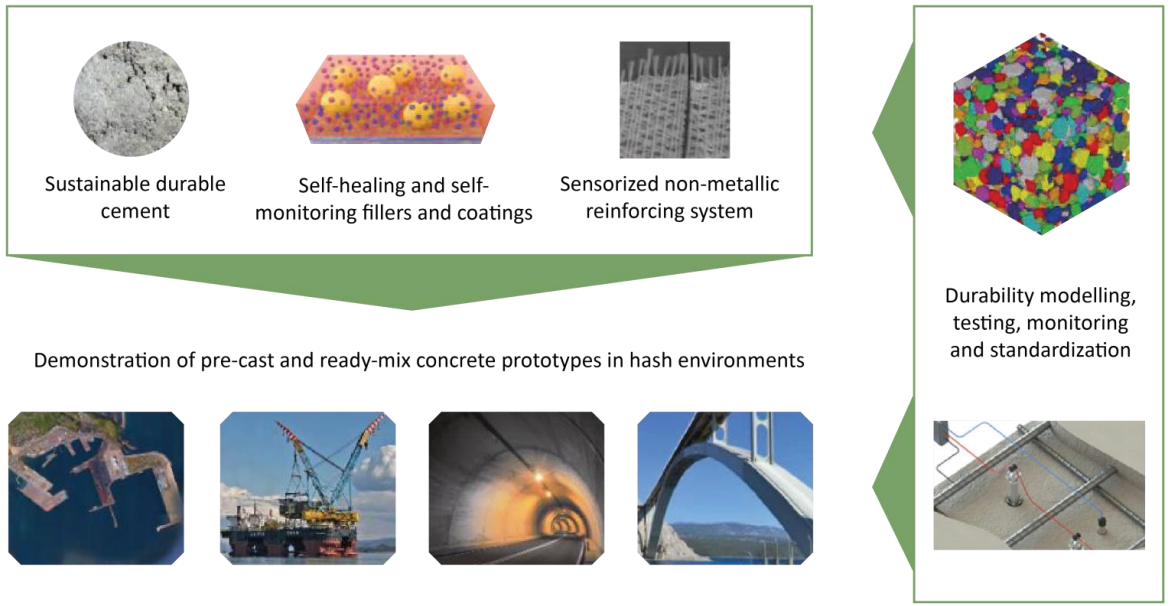
OVERALL CONCEPT AT A GLANCE

EnDurCrete concept is based on the following novel technologies and tools

- Novel CEM II/C and CEM VI cements
- Novel low cost smart fillers
- Advanced non-destructive continuous and testing tools and procedures
- New multifunctional coatings
- Concrete non-metallic multifunctional reinforcing systems
- Coupled experimental and computational approach for theoretical and experimental understanding of factors affecting durability



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OBJECTIVES

- To develop **new more durable** reinforced concrete systems.
- To develop **experimental tools to measure the durability** of concrete, by using different techniques including structural health monitoring and other non-destructive inspection procedures and tools.
- To develop **numerical tools** to theoretical understand and model (at macro, meso, micro level) the factors affecting the durability of concrete and to capture the multiscale evolution of damage.
- To develop **models for service life prediction**.
- To promote **novel standards** in the field of durability monitoring and testing as well as new sustainable concrete materials and systems.
- To obtain **safe and sustainable products** by addressing **social, environmental and safety aspects**.
- To perform **market assessment** and **business modelling** in order to promote future market uptake of the developed technologies, products and services.
- To test functionality of new concrete technologies under severe operating conditions in **4 demo-sites**.

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DEMOSITES

- **Demonstrators** will be tested in working sites of **tunnels, ports, and offshore structures**, in order to prove the enhanced durability and decreased cost of the new concrete systems in such critical applications. Innovation aspects such standardization, life cycle assessments, health and safety and training activities will be addressed.

1. **Port of Gijón "El Musel" in Spain**
2. **Mining tunnel facility in Leon, Spain**
3. **Ship Yard in Norway**
4. **Krk Bridge in Croatia**

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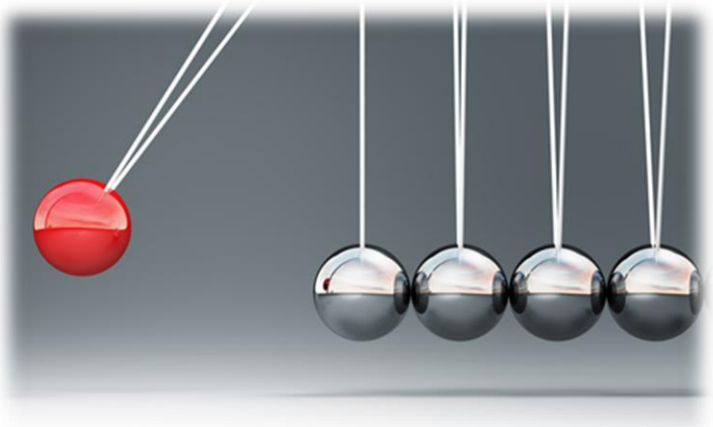
EXPECTED IMPACT



- Strengthening **competitiveness of the European industry**, including in the field of “green” technologies
- Positive **LCA balance**
- At least **30% improved durability**
- At least **30% lower cost**

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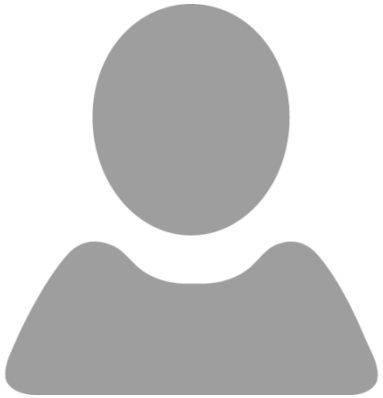
CONTACT INFO

- **For further project information please contact:**



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