



Horizon2020 Information Days on Public-Private Partnerships

Brokerage event
21 October 2014

**DEVELOPMENT OF CHARACTERIZATION METHODS
FOR MINERAL RAW MATERIALS TO IMPROVE
ENERGY AND RESOURCE MANAGEMENT SYSTEMS**

CTMNC - Marie Anne Bruneaux - ma.bruneaux@ctmnc.fr

(Technical Center for Natural Building Materials)

- French Industrial Technical Center
 - To promote technical innovation and to participate in the improvement of industrial efficiency and in the development of product quality
 - Via joint research and development studies and project
 - In 2 industrial sectors:
 - fired clay building products (including earth bricks)
 - natural stone
 - Turnover : ~7,5M€
 - 65 employees (50% engineers and PhD)
- Areas of expertise
 - Raw materials characterization, process evaluation and simulation, products testing
 - Certification of products
 - Building-scale simulations (mechanical, thermal and acoustical behaviour)
 - Life-cycle assessment and environmental atmospheric measurements
 - Training



DEVELOPMENT OF CHARACTERIZATION METHODS FOR MINERAL RAW MATERIALS TO IMPROVE ENERGY AND RESOURCE MANAGEMENT SYSTEMS

➤ SPIRE Roadmap

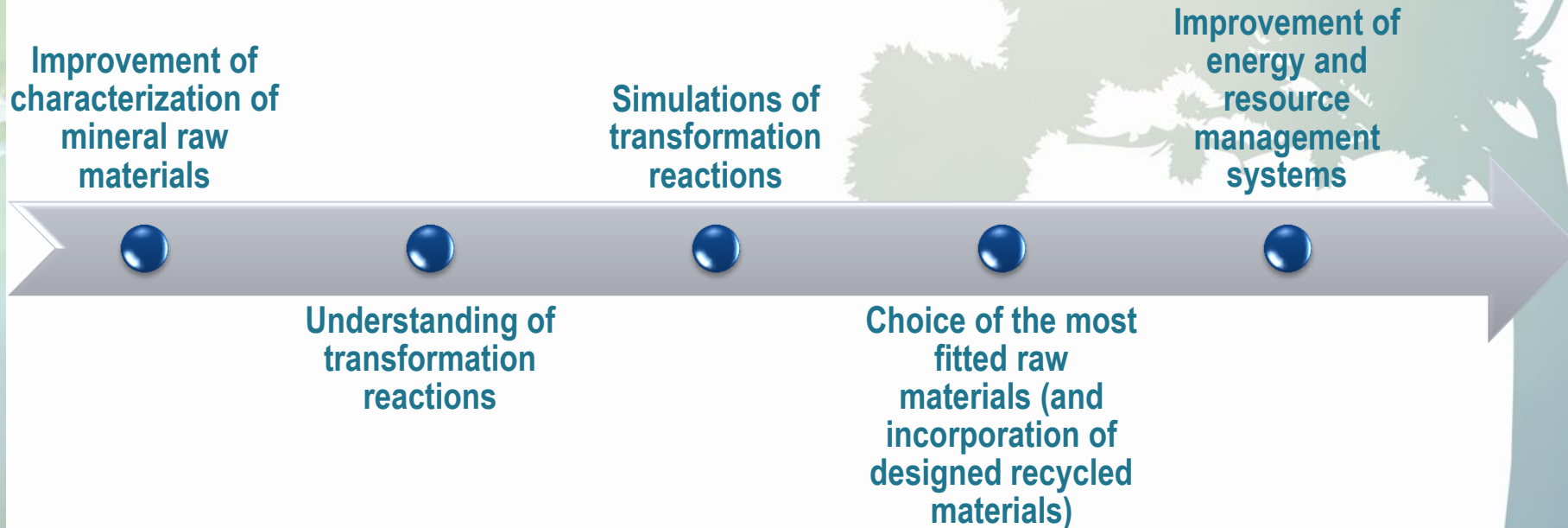
- FEED: KA1.1. and KA1.2:

⇒ to improve the quality of raw materials and the use of secondary raw materials

- PROCESS: KA2.3 and KA2.4

⇒ to improve process monitoring and control for more efficient production systems

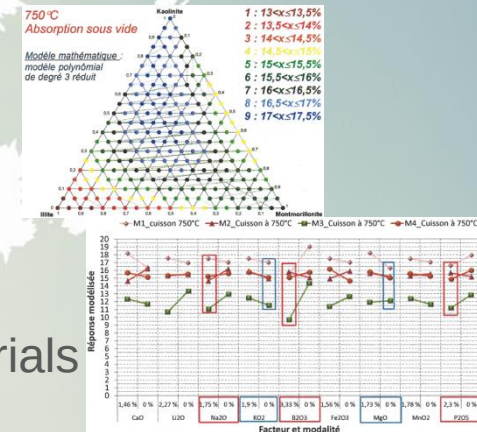
➤ SPIRE-06-2015: Energy and resource management systems for improved efficiency in the process industries



DEVELOPMENT OF CHARACTERIZATION METHODS FOR MINERAL RAW MATERIALS TO IMPROVE ENERGY AND RESOURCE MANAGEMENT SYSTEMS

➤ Characterization of mineral raw materials

- Methods:
 - Adaptated pretreatments according to the designated target
 - Quantitative XRD, DSC, chemical analysis
- Understanding of interactions
 - Experimental designs
- Proposal / selection of recycled materials as raw materials



➤ Characterization of mineral raw materials transformations (example of fired clay industry)

- Shaping
 - Plasticity measurements
 - Density mapping
- Drying
 - Water vapor permeability
 - Sorption/desorption behaviour
 - Young's modulus
 - Thermal conductivity
 - Porosity measurements
- Firing
 - Shrinkage
 - Sintering temperature



EXPECTED IMPACT

➤ In relation to the call topic

- *“New approaches that perform cost-saving optimisation of energy and resources supply and demand, in order to reduce the residues and costs in intensive industries, taking into consideration both economical and sustainability constraints”*
 - Resource consumption optimisation
 - Introduction of recycled materials will be facilitated
 - Energy savings as processes will no longer have to compensate for discrepancies in raw materials
 - Diminution of production residues

EXPECTED IMPACT

➤ In relation to the SPIRE Roadmap

- Use, Re-use and Replace
- 1.1: Enhancing the availability and quality of existing resources
 - Securing the quantities and quality of primary resources for materials and metals
- 1.2: Optimal valorisation of waste and side streams as feed
 - Valorisation of inorganic waste and residue streams: Developing in-depth understanding of the reaction mechanisms will be required as a first step allowing maximum inorganic waste/residue uptake at similar product performances as state of the art technologies. Quality concepts, test procedures and product standards will be developed in parallel.
- 2.3: Process monitoring, control and optimization
 - Simulation methods for the analysis, characterisation and study of systems, material, equipment and processes
- 2.4: More efficient systems and equipment
 - Process understanding to enable rapid process design and precisely defined product quality

➤ Cross sectoral

- The same characterization tools and methods can be used for different mineral raw materials
- Actors from R&D labs, measurement tools designers, industrials

EXISTING PROJECT CONSORTIUM...

- No existing consortium for the time being
- CTMNC ready to join any existing consortium to share R&D efforts on the subject of mineral raw materials characterization

LOOKING FOR PARTNERS!

- To validate the characterization methods:
 - Industrials from minerals transformation industries
 - Industrials from other sectors having similar characterization needs
- To implement in energy and resource management systems
 - Laboratories with capabilities in modelization and simulation
 - Measurement equipment designers/producers
 - Industrials for pilot scale validation

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CTMNC / Limoges