



# University of Liège

## Department of Chemical Engineering



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University of Liège  
Chemical Engineering – Processes & Sustainable Development

# Life Cycle Assessment:

a useful tool to help  
sustainable material choices  
and building eco design

**LG<sup>+</sup>C** PROCÉDÉS ET  
DÉVELOPPEMENT DURABLE  
GÉNIE CHIMIQUE



University of Liège  
Chemical Engineering – Processes & Sustainable Development

## University of Liège, Belgium

- 9 faculties, 1 institute, 1 school



Philosophy & Letters



Applied Sciences



Law and Criminology school



Veterinary Medicine



Sciences



Psychology and Education



Medicine



Architecture



- ✓ 38 bachelors
- ✓ 194 masters
- ✓ 68 complementary masters

Human and Social Sciences



## Faculty of Applied Sciences

- 4 departments
  - Aerospace and Mechanical Engineering
  - ArGEnCO = Architectural, Geological, Environmental and Civil Engineering
  - Electrical Engineering and Computer Science
  - Applied Chemistry

3 research groups – 60 people

Analysis and Synthesis of Chemical Systems – Cryotechnology laboratory

Catalytic and electrochemical engineering - Nanomaterials

Chemical Engineering: energy, environment, (bio-)reactors, separations



## LCA: a standardized methodology

- General framework: ISO 14040 - 14044
- « studies all the environmental aspects and potential impacts associated with all the stages of a product's life from cradle to grave, i.e. from raw material extraction to end of life»
- Product = product, activity, system or process





## LCA and sustainable material choices



Life Cycle Tools for Sustainable Material Choices, Louis Brimacombe, Corus RD&T, Tata Steel Group



## LCA and sustainable material choices

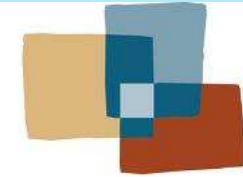
- EPD = Environmental Product Declarations
  - « Type III labels » - ISO 14025
  - Verification by independent third parties
  - Example: French FDES (NF P01-010)
- Specific PCR = Product Category Rules
  - Set of rules, requirements and guidelines
  - EPDs of buildings products – ISO 21930
  - « Federation » projects: Plastic Europe
- prEN 15804/ CEN/TC 350 – Sustainability of Construction Works



## LCA and sustainable material choices

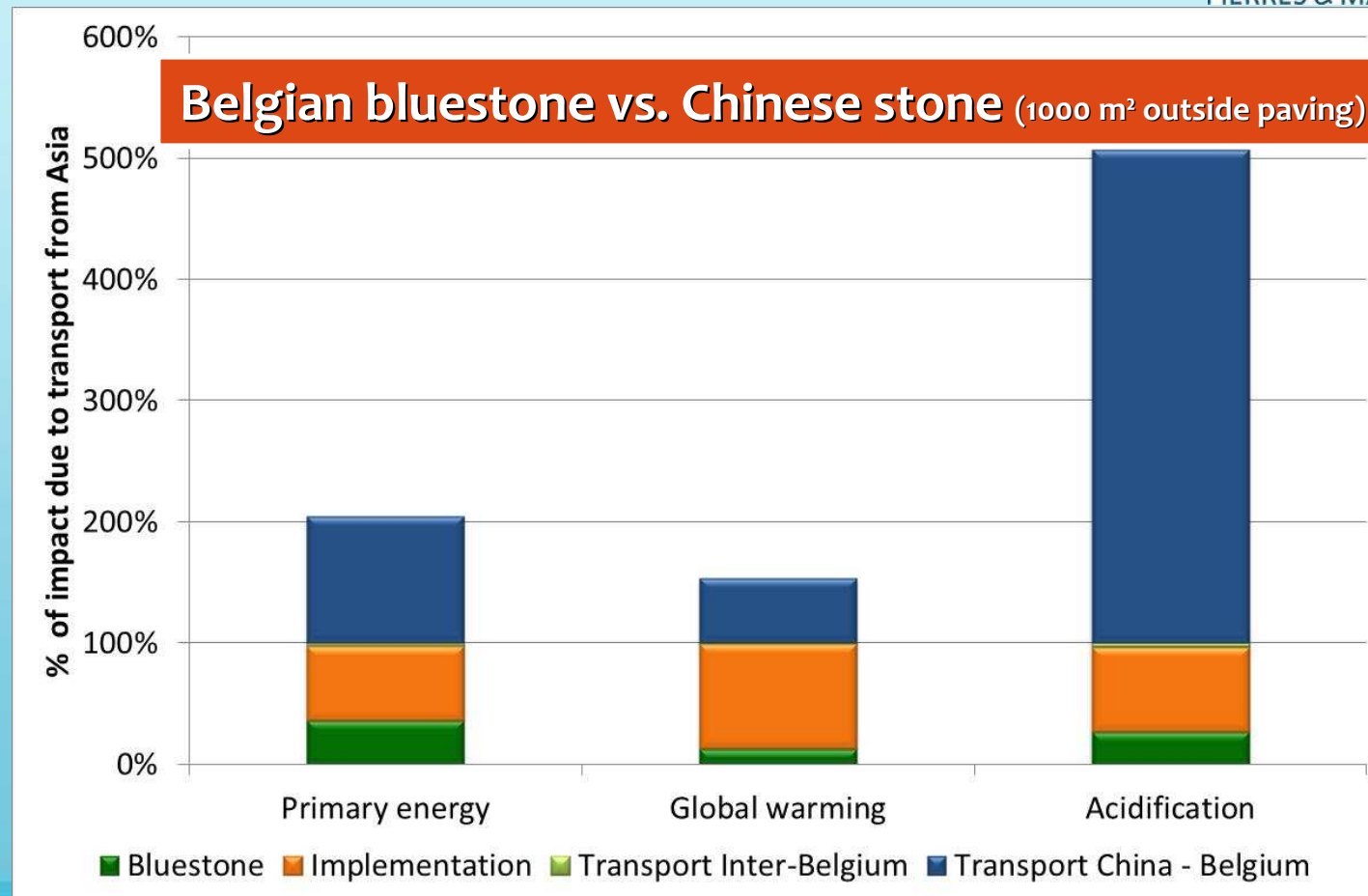
- FDES: 10 environmental impact indicators
  - Energetic resources consumptions
  - Resources depletion
  - Water consumptions
  - Solid waste
  - Global warming
  - Acidification
  - Air pollution
  - Water pollution
  - Ozone layer depletion
  - Photochemicals formation





PIERRES & MARBRES WALLONIE

## LCA and sustainable material choices

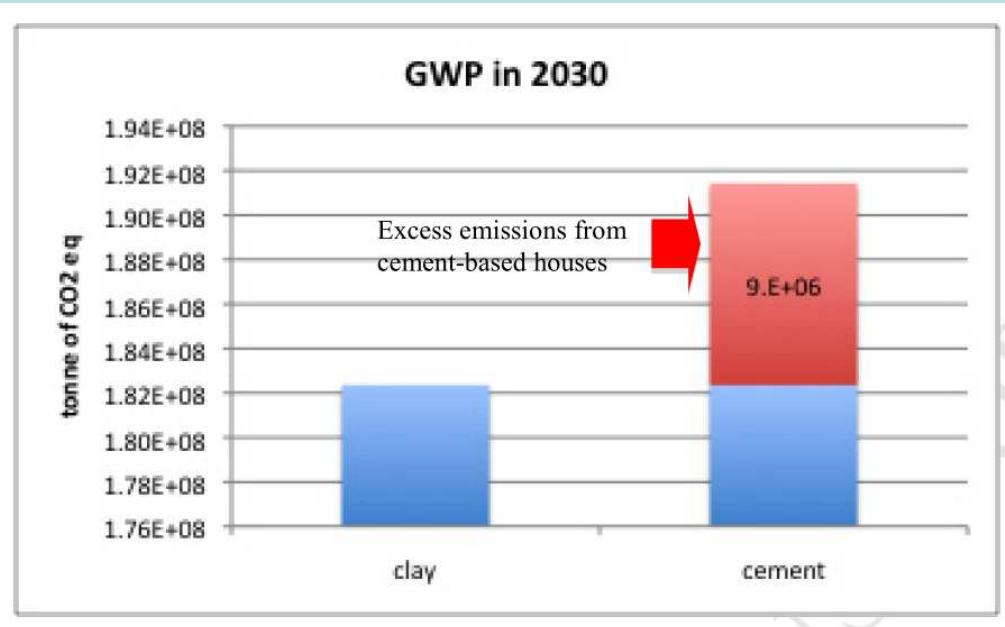


LCA as decision tool for sustainable choices in mineral materials field: environmental declarations of Belgian products and their foreign equivalents, S. Belboom et al. Congrès ACV, Lille, 3-4 novembre 2011



## LCA and building eco design

- Assessment of Environmental Performance
  - prEN 15978 (WI00350002) (CEN/TC 350)
- Dedicated tools
  - ELODIE
  - TEAM Batiment
  - ECO-BAT
  - EQUER
  - Gabi Built-it
  - ...



Utama A, McLellan BC, Gheewala SH, Ishihara KN, Embodied impacts of traditional clay versus modern concrete houses in a tropical regime, *Building and Environment* (2012), doi: 10.1016/j.buildenv.2012.06.006



## Our expertise

- Evaluation of the environmental impact of processes
- Redaction of environmental declarations
- Development of databases
- Academic research + external studies
- Participation to several regional and European projects
- Formation (Greenwin, master degree, ...)
- ...



## Some projects

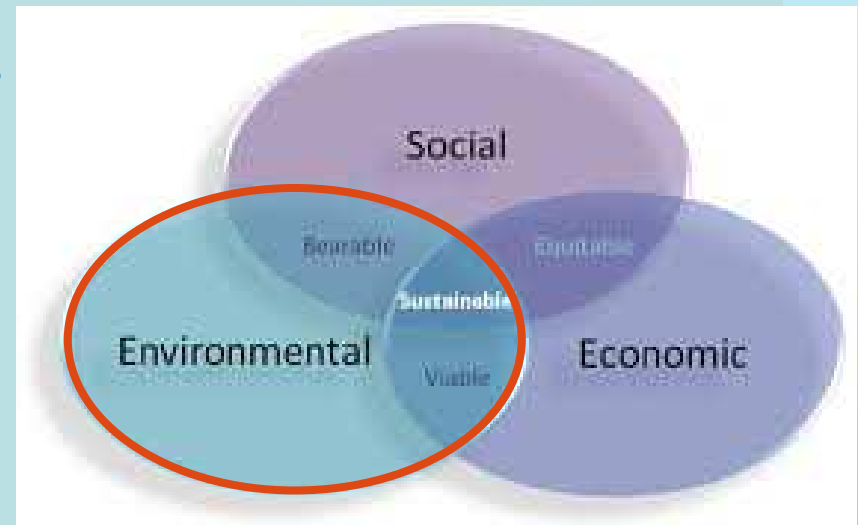
- EPDs for stone products
- EPDs for insulating products
- LCA of inorganic chemical products
- LCA of biobased polymers production
- LCA of cement production
- LCA of waste management options
- LCA of water management
- LCA of biofuels
- LCA of renewable electricity production
- ...





## LCA a nice tool but ...

- LCA → environmental impact evaluation
  - 1 aspect of sustainable development
- Development of other tools
  - LCC = Life cycle cost
  - SLCA = Social LCA



***LCSA = Life Cycle Sustainability Assessment***



## Thanks to the LCA team

- Sandra Belboom (PhD student)
- Saïcha Gerbinet (PhD student)
- Sylvie Groslambert (Research engineer)
- Raphaëlle Melon (Industrial engineer)
- Robert Renzoni (Senior researcher)

## Questions ?

