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**Construction projects using alternative materials: a framework to assess their sustainability.**  
**WASCON 2012, Gothenburg, SWEDEN.**

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**Topic:** 6. Environmental impact analysis, life cycle analysis, risk analysis and assessment, cost-benefit analysis for alternative materials and constructions (tools and examples, comparison with traditional materials).

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**Abstract:**

The increasing use of alternative materials and local solutions for construction projects raises questions about success conditions and criteria for the economic feasibility and global sustainability of such projects. Among others, how can design conditions - especially regarding the decision process - determine their success?

We will present the results of a two-years project conducted from February 2010 to March 2012 in collaboration with ADEME (French agency of environment and energy control), University of technology of Troyes, Industrial Ecology Club (guild) of Aube and Eiffage (French public works firm). This project is based on a French case study: a road construction (the South-Eastern ring road of the city of Troyes) where local alternative and secondary raw materials, and new saving energy techniques have been used.

This case study first focused on an analysis of the context of the road construction, especially regarding the strategies and coordination processes set up by the stakeholders from the conception to the construction of the road. This enabled us to understand how governance, organizational and non-technical factors in general can be decisive to facilitate a sustainable use of secondary raw materials in construction.

A sustainability life cycle assessment framework was then designed, dedicated to the analysis of construction projects using alternative construction materials and techniques. This framework builds on environmental and social LCA methodologies to highlight and assess the economic, environmental and social efficiency of construction projects. It was applied to the case study to assess the global performance of the road construction, in comparison with a similar construction which would have been conducted in "business as usual" conditions.

Finally, this work led to the identification of non-technical barriers and levers (strategies of cooperation, capitalization of knowledge, territorial scale of action, public-private partnership, etc.) and of global assessment criteria able to determine and demonstrate the successful use of alternative materials for a sustainable construction project.