



# LESO LUNCHTIME\* LECTURES

renewable energy - building science - urban physics

Friday 6 June 2014, 12h20-13h30

EPFL – CM4

## ARCHITECTURAL PERFORMATIVE DESIGN: CASE STUDIES, PROCESSES AND SIMULATION TOOLS

**Emanuele Naboni**

PhD in Building Science, MArch, LEED AP, Associate Professor

### Summary

While much international research over the last 15 years focused on the engineering of environmental design, little of this dealt directly with architecture. As a result, a series of standard engineered solutions are today assumed to be sustainable and are awarded by certification codes and voluntary rating systems, limiting opportunities for new design explorations and higher environmental performances.

The lecture discusses the specific weight of architectural design variables, such as buildings' shapes, materials and program, in achieving sustainable design. It is further explained how the role of building users is enhanced when thorough design solutions are preferred over pre-engineered solutions. Finally, it is shown how architectural design can be controlled, combining creativity and science, with the use of building performance simulation.

In order to sustain such arguments a series of works by the author are presented. These include: buildings and prototypes designed with simulation in USA, Europe, Asia and Africa; performance based design and studies performed by students at the Royal Danish Academy; and two recent publications: the book *Green Buildings Pay*, and an article for the magazine *DETAIL* discussing sustainable design teams, methods and tools in international practice.

### Author

Dr. Emanuele Naboni (BArch, MArch, PhD in Building Science, LEED AP, Licensed Architect) is, Associate Professor of Sustainable Design at the Institute of Architectural Technology of the Royal Danish Academy, in Copenhagen. His research and teaching focusses on creative and performance based sustainable design. Ongoing research includes: Sustainable Design Process based on the use of Building Performance Simulation, the use of Cloud Computing and Genetic Optimisation in Energy Design within Venus-C, the development of Climate Based Apps for Sustainable Design within the ASCETIC (FP7 program), the development of XLam Zero Energy Prototypes and the development of Sustainable Dwellings in Tanzania. He is author of several publications related to the integration of qualitative/non-measurable factors and tangible performances in sustainable architecture, including a co-authored book "*Green Buildings Pay*" for Routledge with Brian Edwards 2012 and consults architectural offices with his office E3Lab founded in 2010 proposing the implementation of sustainable agendas and supporting with simulations the development eco-cities, sustainable buildings and high-performance technologies.

