



# LESO LUNCHTIME\* LECTURES

renewable energy - building science - urban physics

Friday 30 March 12h20-13h30

EPFL – CM 4

## A bioclimatic approach to design and optimize a hypothetical Masterplan for the new EPFL Research Centre in Ras al Khaimah

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### Summary

The increase of the world's population leads to an urgent need of radical measures to diminish the energy footprint of humanity. The building sector deserves special attention being one of the major energy consumers, especially when considering space conditioning in extreme climates. In the case of subtropical-arid regions, optimising the performance of air-conditioned shelters may lead to a drastic reduction in the electrical consumption. With the help of energy modelling tools at the concept stage, one of the primary objectives for a new architectural and urban project is to improve the environmental sustainability.

This study considers the realisation of an optimal Masterplan in energy terms for the new EPFL Research Centre in Ras Al Khaimah, UAE. The work was developed reuniting two aspects: the archetype of Arab architecture and the bioclimatic analysis. The study of the Arab architecture, from urban scale to the building level, defines the architectural archetype, as form and materials, history and human relationship. It was revisited from the bioclimatic point of view, adding a solid scientific base to the observations.

A hypothetical Masterplan conceptually connected with the Arab Medina, as architectonic symbol of the Arab architecture and as bioclimatic model, was defined. Several analyses with CitySim, an Urban Energy Modelling tool, were made to optimize the urban form. The courtyard house was defined as the best bioclimatic building. The best building orientation and glazing ratios were defined to guarantee passive solar gains during the winter months, and to reduce overheating risks during the very hot summer months.

The hypothetical Masterplan respects the Minergie standards for tropical climates; furthermore it ensures a good energy performance of the campus using renewable energy sources to guarantee a limited carbon footprint.

### Author

Silvia Coccolo is a master student in Architecture at the Politecnico di Torino, currently visiting the LESO-PB laboratory to prepare her Master project, from September 2011 until April 2012.

She holds a bachelor in Architecture of the Politecnico di Torino, in the field "History and Conservation of Architectural and Environmental Heritage" since September 2009.



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\*Presentations are followed by an aperitif, to give the opportunity to guest and speakers to further discuss the topic.